CEDARA REPORT

STANDARDS AND NORMS FOR SOIL AND WATER CONSERVATION PLANNING IN KWAZULU-NATAL

W.B. Russell

Cedara Report No. N/A/93/32

KWAZULU-NATAL DEPARTMENT OF AGRICULTURE

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Preface

The following are the standards that will be used, and the norms that will be applied, whenever soil conservation work is planned and specified by staff of the Cedara Agricultural Development Institute in KwaZulu-Natal. Any deviation from that indicated may only be done with the express permission of the Deputy Director (Soil Conservation) in consultation with the Soil Conservation Engineer (SCE) for the Region.

Director (CADI)

94/10/1

Date

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1 CONSERVATION FARM PLANNING

Field work will be executed in the manner as laid down in the Manual on the Administration of the Soil Conservation Scheme in the first instance, and where not specified therein, as per the principles laid down in sections 1.1 to 1.5 below. A proviso is added that the number of camps allocated per herd under the Soil Conservation Scheme will not exceed the maximum laid down in section 1.6 below for each Grazing Capacity Zone.

A map of the proposed plan will be drawn to a suitable scale, according to the size of the farm, and in order that it does not exceed the standard A1 size (841 mm x 594 mm).

The only symbols that may be used will be those contained in section 1.7.

An aerial photo mosaic is no longer necessary as the base for the farm map. Maps may be drawn using a CAD package, including on the disc all of the documentation that applies to the plan. An aerial photo or ortho map will then accompany the farm map to the regional office for checking purposes if the planning is not done on a mosaic. Note that new mosaics will **NOT** be supplied by the Director of Survey and Mapping if orthophoto coverage is already available.

The map will have a neat border drawn around it, parallel to the edge of the drafting sheet and 10 mm from its edge. The thickness of the border shall be 2 mm.

The standard title block shall be as displayed in section 1.8 and be placed in the bottom right-hand corner of the map sheet whenever possible. The north sign shall be, as near as possible, parallel to the upright edge of the paper and facing directly away from the reader.

All written words will be parallel to the bottom edge of the map sheet.

Documentation : Standard Conservation Guidelines are given in section 1.9 and examples of the forms to be used appear in section 1.10. The conservation guidelines may be altered to suit local specifics, but shall comprise the basic format indicated.

1.1 Principles of conservation farm planning

The most important requirement of any successful production enterprise is that it take place in harmony with nature. This is achieved only after careful planning and design of measures to protect the agricultural resources. Whilst the preferences, economics and practicalities of the various enterprise options open to him will indicate to the farmer the direction he must take, the conservation planner largely ignores this aspect. The only time the planner takes economics into account is when deciding upon alternative sites for mechanical structures such as stockwatering or erosion control facilities. It is his duty to plan the farm for the enterprises chosen by the farmer, but taking into account the fact that the plan must ensure the preservation, if not the improvement of the agricultural resources. If, in the opinion of the planner the choices are not in harmony with the dictates of climate, soil and vegetation, or, judged by the farming patterns of the local district, the economics of the enterprise are seriously in doubt, the planner should refer the applicant to the local Agricultural Extension Officer before proceeding. Once the enterprises have been finalized, it is his duty to prepare a plan which will ensure the stability of the resources on the farm in the long term, based on the enterprises chosen.

Planning in this context entails firstly the classification of these resources into homogeneous units, and secondly the design of measures and systems to enable their utilization in a practical manner.

Insomuch as the basic conservation plan will ideally form the basis for all future planning for increased production, the initial investigation must be carried out as thoroughly and as carefully as possible. Subsequent sections in this chapter attempt to take the prospective planner in a step-by-step manner through all the procedures necessary for compilation of the plan. In doing so it is assumed that the planner has already had basic training in all the relevant techniques such as soil surveys, veld condition assessment, etc.

This section should also be considered as the required procedure for planning farms under the Soil Conservation Scheme of the Conservation of Agricultural Resources Act (No 43/1983), and to this end examples of the necessary forms will be found in section 1.10. The reader is further referred to Government Gazette No. 8673 dated 27 April 1983 of the said Act for definitions, conditions, objectives, etc. The procedures for formally applying for participation in the Soil Conservation Scheme and for the works to be subsidized are fully set out in the relevant Manual on the Application of the Soil Conservation Scheme.

1.2 The Farm Map.

Types of maps : Various maps are available to the planner, but the most useful one, and one which is the easiest read by a farmer, is that which is photo-based. The topography and other physical features which show up on the aerial photo help in orientating oneself on the farm, and are most useful in determining the position of recommended structures. The different types of maps in normal use are discussed below together with their advantages and disadvantages.

The line diagram : For technical reasons photo-based maps are not available for farm units smaller than 80 hectares. In this instance the planner has no alternative than to produce an enlarged line diagram from an aerial photo or from a 1:50 000 published map. This is generally done using a pantograph.

Intensively cropped irrigation farms: A conservation plan is generally needed in this instance in order to plan a subsurface drainage system. The farms are normally featureless and relatively flat. A topographic survey is needed in order to design the drainage system, and this is used at the same time to produce a map of the farm unit.

With the move to computerisation it has become necessary to produce maps which can be stored on diskettes. This means a line diagram, and all new farm plans will be drafted in this form in future, whenever possible.

Contact aerial photos : An aerial survey comprises a series of overlapping photos in strips which themselves overlap. While they do form a map of sorts, and the image of the countryside is readily evident on them, their direct use as farm maps is limited for the following reasons :

* the scale is generally too small, varying from 1:30 000 to 1:100 000
* scale distortion is a problem, especially in broken countryside
* they are not readily reproducible in a legible form
* they very seldom cover a farm unit in its entirety.

It is therefore not recommended that contact photos or enlargements thereof be used as final maps in the planning process. When line diagrams are used for the final product, an aerial photo must be sent to the approving officer along with the line diagram, in order that he may verify the correct positioning of works, based on the photo image.

Aerial photo mosaics : The disadvantages of contact photos are overcome by combining contact photos into a mosaic of adjoining photos to cover the complete farm unit. Sophisticated machinery is used to correct local scale distortion, and to enlarge the mosaic photographically to the scale required. The Director of Surveys and Mapping further provides a diapositive (positive negative) of the final product to enable ammonia prints to be made. The one disadvantage remaining is that of the absence of contour lines to facilitate planning. Superimposing contour lines on the diapositive is however fairly straightforward, if accuracy is not all-important, and the recommended procedures are discussed below.

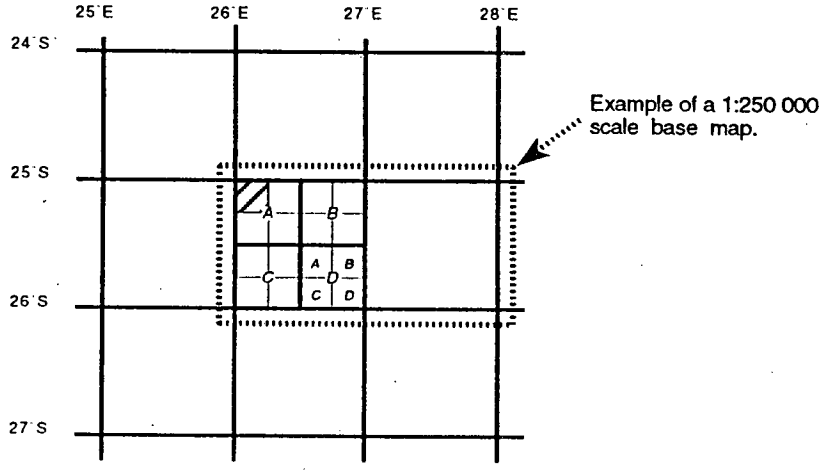


Fig.1(a) The manner in which 1:50 000 maps are indexed on a 1: 250 000 base map. The hatched area is identified as map number 2526 AA

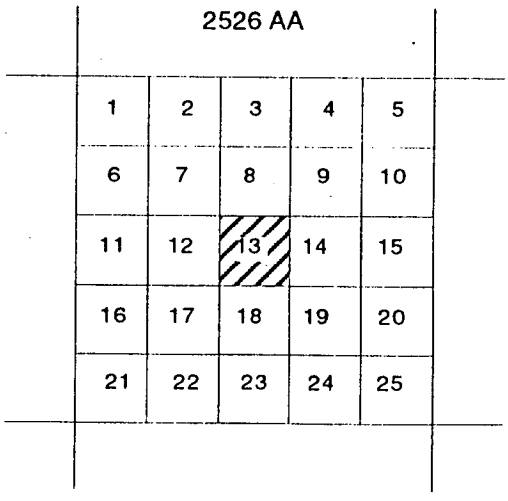


Fig.1(b) The manner in which 1:10 000 Orthophoto maps are indexed on a 1: 50 000 base map The area hatched is identified as map number 2526 AA 13

The use of contour lines : The aerial photo maps, or mosaics as they are called, do not normally have contour lines on them, but it is a relatively simple procedure to transfer them from a published 1:50 000 topo-cadastral map. If it is necessary to construct contour lines, the following procedure should be followed. The mosaic order (on the prescribed form and in the manner as set out in the relevant Manual on the Implementation of the Soil Conservation Scheme) is sent to Soil Conservation, at Head Office, who check it and forward the order to Director Surveys and Mapping, Mowbray. On receipt of the transparency from Mowbray, the farm is identified on the 1:50 000 map referred to, and the portion of the map enlarged to the scale of the mosaic. This may be done in various ways, including the use of an overhead projector, a pantograph, a planvariograph or by use of photography. The contour lines are then transferred onto the transparency in pencil, and these pencil lines are scratched out of the emulsion using a sapphire scribing tool. Because the mosaic is not always strictly true to scale, adjustments may be necessary, but this is generally not a major problem. If the mosaic has the emulsion printed on the underside of the plastic film, scribing of the contour lines will not interfere with the subsequent inking in of the farm planning proposals. In addition, by scribing them the contour lines print out white, which contrasts well with black symbols. Note that the vertical interval (VI) of contour lines on the 1:50 000 map are usually 20 metres apart. In very hilly terrain the excessive number of contour lines resulting from the VI of 20 metres may spoil the appearance of the map. It is then advisable to adjust the VI of the mosaic to meet the requirements of the plan. Where arable lands are concerned however, the vertical interval should be as small as possible. This will help in planning the overall layout of conservation structures on them.

Orthophoto maps : Orthophoto maps to a scale of 1:10 000 are available in limited areas only, and especially around industrial growth points. With their precise accuracy and a VI of five metres they are considered the ideal map for farm planning purposes. Wherever possible orthophoto maps should be used in order to design the farm plan. Note that where orthophoto coverage is available the Director of Surveys and Mapping will not supply mosaics for Departmental use.

Indexing published maps : The index system used by the Survey and Mapping Department is based upon the Lo System whereby the earth is divided up by imaginary but definable lines of latitude and longitude. The area defined by one degree of latitude and one degree of longitude is termed a one degree grid square and is identified by four figures, the first two representing the line of latitude and the second two the line of longitude, intersecting each other at the top lefthand corner of the grid square. See Figure 1. On a regional basis a series of 1:250 000 published sheets forms the base map. If the degree lines are ruled in, a series of grid squares one degree of longitude wide and one degree of latitude long is obtained.
For the purpose of indexing the 1:50 000 map series, the grid square is quartered, and each quarter section is identified from left to right, top to bottom by the letters A to D as indicated in Figure 1.
Each quarter degree block is further quartered and identified in the same manner. An individual sheet is then coded as indicated in Fig. 1. A 1:10 000 orthophoto sheet represents one twenty-fifth of that covered by a 1:50 000 sheet. The latter is sub-divided five ways horizontally and five ways vertically, and numbered from left to right, top to bottom, in order to identify each orthophoto as shown in Fig 1(b).

Size and scale of the farm map : The scale of the map is very important, as it determines both the size of the map and the neatness and clarity of the detail to be added. Apart from the fact that an outsize map wastes paper, its bulkiness fills up a file and it is unwieldy to handle in the field. On the other hand, a map which is too small is not easily read, and the object of the exercise is not only to record the position of works on it, but to indicate to the farmer where the works should be constructed. The mere fact of a large extensive farm unit is no reason for a large map. A small, intensively farmed unit will have

a greater need, generally, for a larger map to enable the correct positioning of the necessary detail. Another point to guard against is the compilation of a large map of an extensive farm unit merely to enable detailed planning of a small intensive section within it. In this instance it is far better to produce a separate map to a larger scale for any small, intensive section of the farm, and to treat it as an annexure to the main one. The scale should be such that all relevant detail can be clearly and neatly drawn in, without wasting paper.

Quality of the finished product : Finishing off the map with neat, stencilled lettering and standardized symbols will not only show pride in one's work but will lend greater credibility to the end product. Standard symbols and their sizes, as well as line thickness are dealt with in section 1.6. The map should be so orientated that the lettering of the north sign is situated approximately in the top lefthand corner of the map, pointing away from the draughtsperson and parallel to the edge of the paper. The title block is then positioned in the bottom righthand corner whenever possible and a margin drawn around the edge of the drafting film. The compilation map (a line diagram showing the relative positions of registered subdivisions comprising the farm unit) should be to a much smaller scale than that of the map so that it does not draw too much attention. It must be orientated to the map itself and framed separately. See section 1.8.

Folding the map : Folding of the map to fit neatly in the office file is important. It should be folded into an A4 size in such a manner as to expedite unfolding, and the title block should, where possible, be clearly visible in the folded position.

1.3 Stereoscopic Interpretation.

Separating physiographic units : Having obtained a suitable map of the farm unit, the next step in drawing up a conservation plan is to carry out a thorough survey of the topography of the farm and to separate out each homogenous unit for further investigation. The degree of slope, aspect and/or altitude all play a vital part in describing the constituent elements of a piece of farmland, whether it be in soil type, veld palatability unit or any other class of land. These homogeneous areas are termed mapping units. Irrespective of whether or not form lines are available on the map, there are few tools to farm planning more basic and necessary than a stereoscope. Viewing the farm unit three-dimensionally through this instrument will save many hours of laborious reconnaissance and will help in every aspect of data collection.
With the stereo pair set up under the stereoscope, and using a colour coding system of wax crayons the planner will first of all delineate, as far as possible, all :

* arable land (brown)
* apparently potentially arable land (yellow)
* abandoned arable land (black)
* non-arable grazing land (green)
* wet and marshy areas (blue)
* eroded areas (red)

It is useful to use a standard colour code and those recommended are bracketed above.

This is the first phase of farm subdivision to enable the individual investigation of the separate resources. It is not always possible to identify potentially arable land from photographs and only field control visits will enable verification. Aerial photo tasks are only flown every ten years on average so that this stereoscopic work in some instances can only be tentative due to outdated photography, but it does

form an essential part of the procedure. The tendency nowadays is also for Survey and Mapping Branch to contract for ever smaller scale photography due to cost. Where small farms are encountered with only small scale photography available it is often helpful to use two-time enlargements of contact-sized photos for stereoscopic work. These are also obtainable from the Director of Survey and Mapping.

Where the farm is large so that it is covered by more than one photo, this initial procedure is continued on the adjacent photos until the whole farm is divided up into all its separate physiographic units. This information is then transferred onto a print of the farm map.

Stereoscopic planning for soil surveys : The planner is conversant with the technique of determining the siting of pits for profile description as well as the marking out of apparent soil boundaries on the aerial photo as a result of changes in colour and tone, slope changes, etc. The need, however, for a full soil survey prior to carrying out a conservation plan will depend upon individual Regional policy. Soil surveys are time-consuming and therefore expensive, and the provisions of the Soil Conservation Scheme do not insist upon a full soil survey as a basis for the plan. On the other hand, and bearing in mind that the plan must allow for the long-term utilization of the resources, there must be a minimum requirement in regard to the defining of soil that is suitable for annual cultivation and that which is not. A further point in favour of some form of soil classification arises from the requirements of Runoff Control Planning. Within the pattern of waterways, contour banks and in-field roads, cognisance of the limitations and non-compatibility of some soils must be recognized. It is, for example, unacceptable to include within the same plough length, soils as widely differing as a Hutton and a Katspruit. For a lengthy period after soaking rains the latter will be waterlogged, while the former will allow cultivation within days if not hours. In some areas again, soils are fairly uniform, and/or because of broken topography lands are relatively small, and the necessity for a complete soil survey is not so great. In the event of a soil survey being a prerequisite, the field part of the exercise must be carried out prior to the next step as outlined below.

Runoff control planning (ROCP) of arable land : Having identified existing lands during the photo interpretation exercise mentioned above, it is next necessary to make a first approximation of the requirements of mechanical protection to the sloping, cultivated lands. The procedure and requirements are fully discussed in the manual ' Waterafloopbeheerbeplanning', issued by the Directorate of Soil Conservation and Drilling Services, and it is sufficient to summarize here the fact that in doing the stereo interpretation of the farm the positions of natural depressions, whether cultivated or not, should be clearly marked. Where no depressions exist and there is a need to create artificial waterways to carry excess runoff from a land, the position of possible artificial waterways must be determined for further investigation in the field. Crestlines in the land must also be identified, as these are the ideal positions for in-field roads, and a system of roads in a land is almost as necessary as the water-carrying structures themselves. In-field roads will stop the farmer using grassed waterways for this purpose. It is also necessary that suspect discharge points be identified and a note made to investigate them during the field visit. Where the ROCP was preceded by a soil survey it will be necessary to decide what soil mapping units may be grouped together for the physical planning exercise in order to simplify the contour bank layout. As a guide the following soil forms may be grouped together as long as their clay percentages are similar :

* Avalon, Bainsvlei, Glencoe, Pinedene and shallow Clovelly.
* Hutton and deep Clovelly.
* Sterkspruit, Valsrivier and Swartland.
* Estcourt, Wasbank, and Kroonstad.
* Shortlands and Oakleaf.

* Rensburg and Willowbrook.
* Arcadia and Milkwood.

Soil depth and texture is very important where artificial grassed waterways must be positioned. If a soil survey has not been done, a note must be made to check on these properties during the field visit, in order to plan for the later design of the necessary waterways.

Subdivision of grazing land : The purpose of subdividing grazing land is firstly to separate areas of differing palatability in order to counteract area selective grazing (these are called basic camps) and secondly to provide sufficient grazing camps within the basic camps in order to allow rotational resting of the vegetation (these are called secondary camps). Until such time as the planner has consulted with the farmer on the number and size of his herds, nothing can be done about secondary grazing camps. Stereoscopic interpretation can, however, help the planner greatly in arriving at the first objective. Inasmuch as palatability is a function of :

* aspect
* slope
* drainage
* species composition
* parent material

Stereoscopic interpretation will greatly facilitate the division of the natural vegetation into areas of similar palatability. The three-dimensional view of the farm enables the determination of aspect through the identification of crest and drainage lines. It is also invaluable in determining slope changes. This enables the five recognized land forms of plateau, escarpment (where present), midslope, footslope, and Thalweg to be identified and separated out. See Figure 2. Figure 3 illustrates the manner in which palatability generally alters with aspect where parent material remains constant. Table 1 indicates the recommended land use as slope increases and where soil suitability is not limiting.

In exaggerating scale the stereoscope enables the determination of dramatic changes in slope, and tonal differences to the practised eye will indicate wet areas (dark tones) and areas of differing vegetation composition. The field visit will be needed to verify these decisions as well as to note changes in parent material. Because aerial surveys are generally carried out in the dry months, overgrazed areas stand out well as paler tones and it is usually fairly simple to identify them.

Table 1 Effect of slope on land use capability (soil depth not limiting).

Slope class	Slope (%)			Land use suitability
	Humid	Sub humid	Sub arid, arid	
A	0 - 3	0 - 3	0 - 2	Annual cropping
B	4 - 8	4 - 7	3 - 5	Annual cropping with occasional ley or special tillage
C	9 - 15	8 - 12	6 - 8	Rotation of ley and crops
D	16 - 25	13 - 20	9 - 15	Permanent cover crops *e.g.* pasture
E	26 - 35	21 - 30	16 - 20	Natural veld grazing or afforestation with special treatment
F	36 +	31 +	21 +	Natural veld grazing or afforestation with special treatment, or total protection from agricultural use

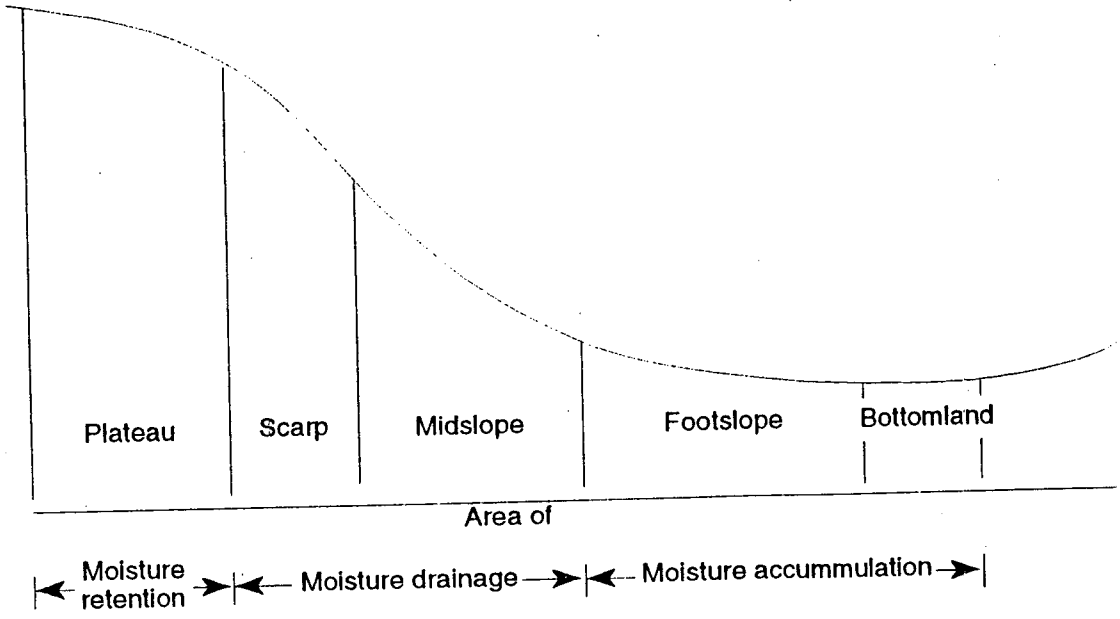


Fig. 2 The five landforms which are normally separated from each other in a conservation plan

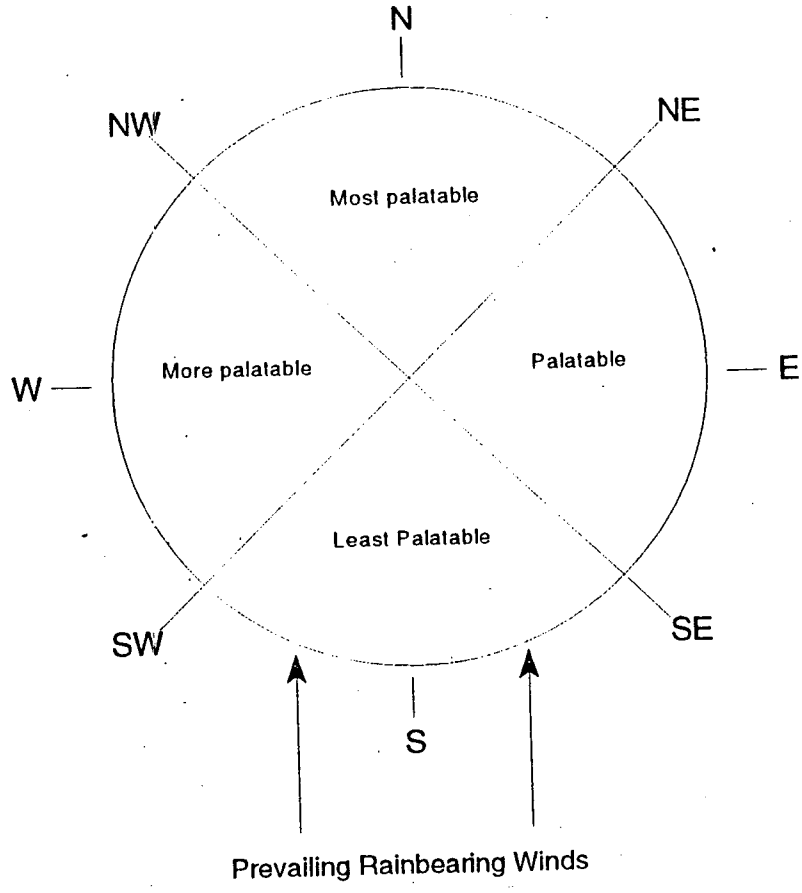


Fig. 3 The palatability rose showing how relative palatatibility tends to change with aspect, all other parameters being similar

Planning for stock water supply.
Storage dam sites : The next step during the photo interpretation phase, and especially in the better watered areas of the country, is the tentative marking, on the farm map print, of possible dam sites, taking into account their positions relative to both grazing and arable areas. Cognisance must be taken of the advantages of a few strategically placed dams with a network of pipelines supplying water by gravity to stockwatering sites. If the map has contour lines marked on it, tentative proposals may even be made at this stage as to possible pumping schemes and/or gravity fed reticulation schemes. The condition and size of catchment areas above those proposed sites should also be gauged, bearing in mind the problems of providing a long term water supply from storage dams when the catchment is in a bad state of conservation.

Surface water : While doing this assessment one should, especially in the higher rainfall areas, attempt to identify probable fountains which could be developed in place of expensive dams. These will then be investigated during the field visit, as well as the permanence of obviously flowing streams.

Subsurface water : The fact that there may be existing boreholes on the farm which can be utilized in place of storage dams should be borne in mind, although it is virtually impossible at this stage to identify their positions. The question of boreholes will be dealt with more fully later. Suffice to say that boreholes constitute the most widespread source of stockwater in the country because of erratic rainfall, problem soils and the high evaporation rate.

Runoff control planning of eroded areas: Last but not least the eroded areas on the farm having been identified and noted for field investigation, an attempt should be made to determine on the stereo pair, what options are open to combat the erosion. The stereoscopic image should give the planner a good idea of the stability of the gulleys and the extent of both headward and lateral erosional activity. It will enable the study of conditions in the catchment area above, and may lead to the conclusion that the catchment itself must first be biologically treated before any mechanical works are proposed in the gulleys themselves. *It is inadvisable to treat the symptoms (i.e. the state of the gulleying) if the cause (e.g. overgrazing / depleted cover in the catchment) is not corrected.*

The stereoscopic analysis will enable the tentative positioning of key works (weirs, dams, chutes, etc.) for further field investigation. It will also help decide whether diversion banks, spreader canals, etc. will help in reducing the overall cost of stabilization and/or rehabilitation.

Having carried out an exhaustive stereoscopic inventory of the physiographic features of the farm unit, and having made notes of items which need further investigation, the planner is now ready to commence the field exercise.

1.4 The Field Visit

Armed with the stereo pair and a print of the map of the farm, the planner now proceeds to do a more detailed investigation *in situ*. Whereas the stereoscopic work in the office attempted to identify, as far as possible, areas of homogeneous terrain, the field investigation is an attempt to assess firstly the value of each mapping unit (whether it be arable land, natural veld, eroded areas, etc.) and secondly the suitability of possible ventures. It acts to sound out the farmer as to his capabilities (both economic and mental) and his performance, and serves to investigate and evaluate all existing conservation structures on the farm as well.

The field investigation therefore entails : A soil survey in the agronomically important areas of the country, or a less detailed investigation of existing and potentially arable land to determine its suitability for cropping in the more extensive areas. See Section 10. As indicated previously this may involve only a determination of clay percentage and effective depth. In the event of the existing lands being found to be substandard for long term cropping, this fact must be drawn to the attention of the farmer, and the possibility of putting them down to planted pasture discussed with him. He should be referred to the Agricultural Extension Officer (AEO) in regard to the choice of pasture.

Typical indications of saline, sodic or waterlogged conditions on irrigated land in areas where this problem is prevalent must be checked. In the event of brak being a problem, the cause thereof must be investigated. See Section 4. The planner is referred to the Departmental manual on the subject which details the options available. A suitable discharge point must be sought, and a preliminary sketch of the proposed rehabilitation measures marked on the field print.

Existing contour banks must be checked for (See Chapter 3):

* correct layout - this should have shown up under the stereoscope, and includes proper access roads well away from discharge points,

* correct spacing according to Departmental specifications,

* effective maintenance of the structures. The whole question of maintenance must be discussed with the farmer at this stage, including mention of the fact that outlets must be cleaned out annually.

Sites for proposed artificial grassed waterways must be inspected. While design specifications will not necessarily be drawn up as a result of this specific visit, the suitability of the site in terms of location and soil depth must at least be ascertained. It is the mark of poor planning if a proposal during the initial planning of the farm has to be changed later because the structure was not feasible due to some physical aspect. Naturally, where a runoff control project has been finalized for the region in which the farm unit lies, the approved layout may not be changed without the permission of the SCE. Where ROCP has not been carried out, the effect of the proposed layout on adjacent farms must be judged, and an ad hoc ROCP for the neighbourhood may then be necessary.

The reason for the abandonment of any arable land must be investigated. Where shallow soils have been allowed to revert to the natural state, the basal cover is generally not very good and sheet erosion takes place between the grass bunches. It may be advisable to recommend that pastures be planted. The help of the AEO will be called in here.

An inventory of the natural vegetation is the next step to be considered when drawing up the conservation plan. Apart from the necessity of verifying the decisions taken during the stereoscopic exercise, it is necessary to determine the carrying capacity of the vegetation in each homogeneous unit basic camp.

Overgrazing is arguably the single most important factor in the overall cause of soil erosion in the country. Most farms carry more stock than they should, and it is one of the aims of the Soil Conservation Scheme to help reduce this overloading of the veld. Determination of the correct carrying capacity of the veld in each basic camp is therefore of the utmost importance. The National Grazing

Capacity map which is available at every Extension Office in the country was drawn up in consultation with experts from the Provincial Department of Agriculture. The official planner must take cognisance of the range of carrying capacities as laid down in the map, adjusting up or down for actual veld condition.

Wetland areas on the farm are particularly vulnerable to degradation. They are generally the first to green up in spring, resulting in a concentration of grazing animals on them at this time. They are also normally a source of stockwater, and bear the brunt of trampling throughout the year if not fenced off. Runoff from the surrounding uplands concentrates on them throughout the wet season, thereby aggravating the erosion potential. Wetlands should therefore be considered as totally separate entities to the upland veld. Any wetland or marshy area of 0,5 ha or more must therefore be fenced off and managed as a separate unit. Bearing in mind the conservation maxim that 'vegetation grazed in a specific season must be rested in that season', the size of the wetland will determine whether the whole of it or only a portion thereof will receive a grazing season's rest once in four years. If the wetland is small and not worth subdividing, it may then be grazed for three years out of four. If it is subdivisible according to Departmental norms for grazing camp size (see section 1.6), the number of camps realised will determine how they are utilized.

Existing fences must be inspected for durability as well as their degree of stockproofness. Any fence which is considered to be in a bad state of repair and/or of very rusted and brittle material should be ignored. Fencing which appears to be in a good state of repair (and this includes the capability of being dismantled and moved elsewhere) should be marked on the map in pencil. The mere fact of its existence in a given position does not automatically confer on it the right to remain there. The correctness of its position can only be judged once the ideal camping system has been determined.

Herd and flock size and composition: It is at this point that the planner needs to discuss with the farmer his grazing camp requirements, The number and size of camps will largely be a function of the condition of the grazing, his preferred herd size and the type of animal farming enterprise. Breeders need more camps than do farmers buying, fattening and selling. This is because of the need to separate sexes at breeding time. Farmers practising mixed animal enterprises will generally need more camps than those who farm with a single species. The benefits to be derived from mixed herds, (e.g. sheep and cattle) must be emphasized, however. In Tall Grassveld areas for example, where sheep are grazed along with cattle, combining them into composite herds will improve grazing efficiency, in that cattle will keep the grass short for the sheep to feed on. This will reduce the amount of burning generally needed when sheep are kept separately. The planner must therefore make a detailed study of the animal farming operation in order to arrive at the optimum number of herds. The following will help to arrive at the decision and will help create a practical grazing system for the farm.

Different classes of beef cattle and sheep have to be run separately at times, including the period while grazing summer veld. This is necessary since management and feeding would become difficult and inefficient if all animals were included in one big herd or flock. The most important reasons for separating different classes of animals are :

* To ration available grazing. It is advisable whenever possible, to separate lactating from dry cows, first-calvers from mature cows, replacement heifers from surplus stock, lactating ewes, dry ewes and wethers from replacement ewes, and ewes with twins from ewes with single lambs

The above-mentioned groups of animals should preferably be kept separately in view of their vastly

differing feed requirements. Subdivision of the herd or flock allows efficient 'rationing' of available grazing, the animals with the highest feed requirements being allocated to the best series of grazing camps, and possibly receiving supplementary feeding on veld. Bullying occurs when large and small cattle are run together, to the detriment of the animals which most need the better quality feed.

* To facilitate breeding management: It is generally advocated that the breeding season for beef heifers should commence 6 - 8 weeks earlier than mating in the cow-herd, to allow for the characteristic long interval between calving and oestrus in first-calvers. The heifer herd(s) should thus be kept separate, in many cases with a young unproven bull to gauge his breeding value, and to prevent injury to heifers by large bulls. Herds of cows and heifers are also separated in cross-breeding programmes, each herd being placed with a bull of different breed.

* To prevent unwanted mating: Post-pubertal bulls and heifers, and ram- and ewe-lambs must be run separately. It is also advisable to keep steers separate from heifers after weaning, and especially as 2-year olds, since the steers do still 'bother' heifers (or cows) which are on heat, and disrupt their grazing pattern.

* To facilitate easy handling and management: Provision of water, licks, supplementary feeding, and the handling of excessively large groups of cattle and sheep may present problems, which can be overcome by subdividing the herd into smaller, more manageable groups.

Beef herd compositions: The methods to be used in deciding on the number of camps and size of camps are fully covered in section 1.6.

This discussion should indicate that the number of herds to be catered for, and therefore the number of camps required, is not a simple matter. It should also be clear that, in order to achieve a system that will work and allow rotational grazing and resting, a lot of detailed discussion and planning with the landowner is needed. The smaller the farm, naturally, the more the herds will have to be grouped together. The Extension Officer will be of great help in this regard.

The condition of the veld will indicate the number of camps which should be allocated per herd (the poorer the veld the greater the number of camps required to allow better control over the grazing). The number of camps per herd required for conservation of the grazing, multiplied by the number of herds will give the total number of camps required. Once the camps have been allocated to each herd, the carrying capacity of the veld will dictate the size of the herd. Alternatively, the herd sizes having been determined, and multiplied by the carrying capacity of the grazing, will result in the total area required for each herd. This area, divided by the requisite number of camps for correct management, will give an indication of the average camp size for the specific herd. The basic camps defined under the stereoscope and confirmed during the field visit are now subdivided along minor crestlines, drainage lines and/or on the approximate contour to give the requisite number of camps of the correct size. One should always attempt to fashion an adjacent group of camps for each herd so that a minimum of trampling occurs when herds are moved from one camp to another, One should also take cognisance of the position of dipping facilities, public roads, etc., when determining the position of these secondary fences. The farmer should be helped further in planning the siting of gates so as to reduce the incidence of erosion. When allocating camp groups one must take cognisance of the particular requirements of specific herds. For instance, sheep which have to be kraaled at night, and dairy cows which commute twice daily for milking purposes, must have easy access to the farmyard which will not in any way cause erosion. Exotic, heavily built cattle cannot negotiate steep and rugged terrain, so that

this type of countryside should be set aside for the more agile animal.

In the absence of suitable winter grazing the help of the Extension Officer should be called in to design a suitable fodder flow programme to tide the animals over the winter period. In many parts of the country farmers tend to set aside summer veld from winter veld. The summer veld may suffer from being heavily grazed throughout the grazing season, and species composition deteriorates. The winter veld also suffers in that excessive shading kills off new plants. Basal cover is reduced, erosion takes place between the bunches, and species variety is reduced. This results in a lower total carrying capacity. With the good quality of protein licks nowadays available, and with a little forethought given to supplementary winter forage, only the highest lying veld may be considered unsuitable for winter grazing.

The field visit should also be considered as an extension exercise. The farmer should be enlightened as to the need for a careful inventory, the need to recognize the incipient signs of resource degradation, and the manner in which the proposed structures will help both resource management and resource improvement. Bearing in mind the fact that he has probably lived on the farm for a long time and knows it intimately, he should also be made to feel that he is participating in the design of the plan, and that the official planner is only guiding him. A plan that he has helped draw up is far more likely to see execution than one that is thrust upon him by a government official who has only spent a couple of days on the farm.

Only once a decision has been reached on the placing of the fences, should the question of water arise. Never plan fences with a view to the availability of water, except possibly in the case of secondary camps and as long as the siting of these fences will not lead to erosion. The vegetation must be camped off according to its physiological requirements and then the position of the watering points determined in order to meet the requirements of the fencing plan. To work the other way round will lead to area selective grazing and trampling of the vegetation.

Inventory of water supplies: All existing water supplies must be inventoried to determine their suitability and permanence for use in the proposed plan.

Existing dams should be visible on the mosaic print. These must be inspected with a view to using them for supplying stockwater to the proposed grazing camps. The Soil Conservation Scheme may not be used for improving the water situation on the farm beyond that which is necessary to ensure a proper grazing management system. Many landowners wish to build dams merely 'to conserve water', and because it looks nice and improves the value of the property. The best way to conserve water is to ensure a good grass cover which will improve rainfall infiltration and replenish the underground water table. Building dams merely for the sake of beautifying the farm is not recommended, and especially where the subsidy scheme is concerned.

Existing (and potential) dams must have sufficient capacity to supply as near a permanent supply of clean water as possible. Figure 4 illustrates how the approximate capacity of a dam basin can be easily estimated in the field. Each dam should be roughly measured with a hand level to determine whether it holds sufficient water for the purpose. The landowner will normally have knowledge of its reliability. Most dams built without Departmental specifications will be unfenced, and the farmer should be urged to include fencing them off in the conservation plan. Use facts such as the danger of internal parasites, slow destruction of the bank through trampling, and the advantages of clean water for fish culture in recommending the exclusion of stock. Check on the degree of sedimentation, spillway capacity and

evidence of overtopping, as well as indications of termite damage and leaks. Discuss with the farmer the possibility of gravitating/pumping from the existing dams to feed as many grazing camps as is economically feasible.

Potential dam sites were noted by the officer during the stereoscopic interpretation phase of the planning exercise. Bearing in mind the fact that water supplied to proposed grazing camps will be based upon this conservation plan, a proper reconnaissance must be made at this stage of any dam site proposed. Figure 5 is a simple graph which will give a very good indication of the amount of earthwork required for an earthen dam of given height, base length and standard side slopes. This will enable the planner to judge the suitability of the site from an economic point of view. Rough calculation of concrete weir dimensions is normally a mere exercise in arithmetic.

Check on the suitability of the basin capacity (Figure 4), foundation, side spillway terrain in the case of an earthen dam, as well as the condition of the proposed return to stream, and the size and condition of the catchment area. Availability of sufficient building material (be it earth, sand, stone, etc.) should also be determined at this point. Having noted the suitability of the various sites on the map, the planner can do no more at this stage. It should however be borne in mind that, where storage dams are to be the source of water, a few large, strategically placed dams are preferable to a large number of small ones.

Streams and fountains: In the better watered areas of the country a proper investigation of this source is imperative, The former may be quite logical (although water quality may be a problem) but the inexperienced planner can quite easily lose sight of the usefulness of the latter. What superficially looks like an insignificant trickle of water, if fenced off, properly developed and led into a small reservoir, can often result in a very important source of stockwatering. Indications of a strong spring (apart from the landowners' own knowledge) include well defined cattle paths leading to it, very soft and spongy mud, and dense stands of luxuriantly growing, water loving plants. An attempt should be made to measure its flow, normally by piping the water into a bucket and measuring the time to fill. Should the fountain prove to be suitable the size of reservoir needed will be a function of its delivery and the number of stock to water. The ground water is then the main reservoir, and the one constructed merely a buffer to hold a couple of day's supply.

Boreholes: Thousands of boreholes have been drilled all over the country, although not all of them are currently in use. The inventory of a borehole entails the determination of its depth, depth to the waterlevel, water quality and the six hour tested delivery. If the hole was drilled by a reputable contractor or a Government drill, this information should be available - either from the farmer, the contractor or the local office of the government Drilling Inspector. Where new boreholes are envisaged the latter should be called in to do a proper gravimetric survey.

The importance of boreholes on a national basis cannot be overemphasized, especially from a water purity and evaporation-loss point of view, but it must be re-iterated that stockwatering is an economic exercise. The cost of drilling without prior knowledge of the likely delivery must be weighed against the cost of piping water from existing sources, be they surface or subsurface.

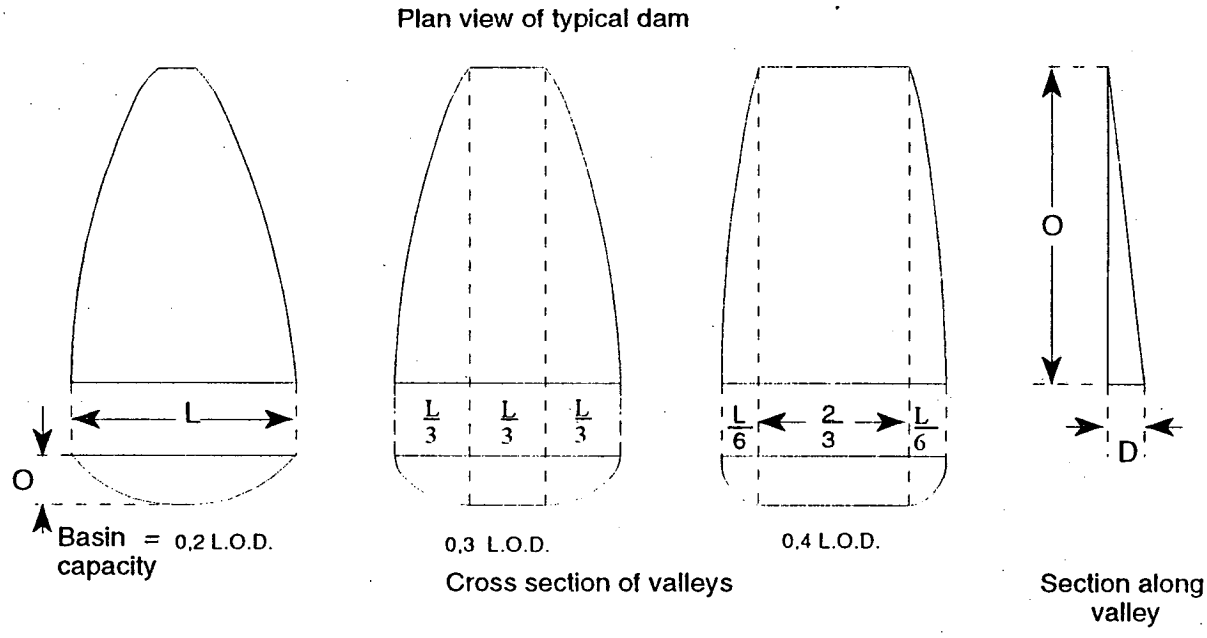


Fig.4 Approximate basin capacities for different basin shapes

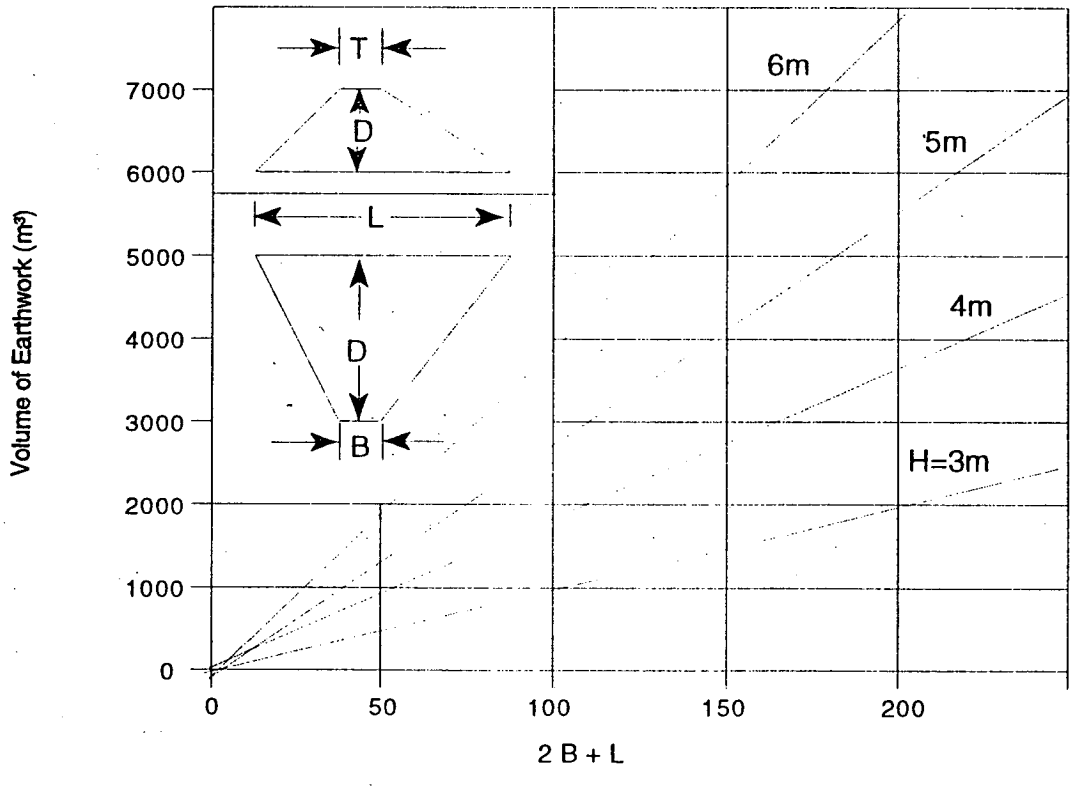


Fig.5 Approximate earthbank volumes for T= 3 m, side slopes 1: 2 and 1: 3

Water harvesting: One often comes across relatively small isolated areas for which the supply of water is a cost-benefit problem. The farmer is loathe to erect an expensive pumping scheme to provide water for a relatively small section of the farm. This often occurs on the top of mountains. The area is then included in an optimum sized camp, thereby enlarging it by the area which is seldom grazed due to lack of water. One should then seriously consider the possibility of water harvesting, a method which is widely practised in such countries as the U.S.A., Israel and Australia. The water source here is natural rainfall. An apron of ground is sealed off by concrete, tar, paraffin wax, etc., and the almost 100% runoff led into a large storage reservoir. It is possible to design a workable system based on the long term monthly rainfall figures for the area and the monthly water requirements. This technique may also be used to supplement pumped storage schemes.

Water distribution: Having determined all the most suitable sources of clean and permanent water available, the distribution of water to all grazing camps is virtually a matter of economics. Having a photo-based map with contour lines on it makes for a fairly simple decision in consultation with the applicant. The contour lines will help decide where storage reservoirs are to be erected and how far one can take a gravity line. The actual positioning of drinking troughs is not critical at this point, but it bears mentioning that they should be placed as centrally to a camp as possible and preferably on hard stony ridges, having easy access from all sides. In the extensive grazing areas where camp sizes are large, one should attempt to have two watering points per camp - one at either end of the camp so that animals can graze from one water point to the other and back again. This will help reduce the incidence of footpaths. Where small reservoir schemes are envisaged, i.e. where so- called standard schemes with individual pipelengths not more than 200 metres in any direction are involved, an immediate decision may be taken on specifications. The reservoir size should be based upon the herd requirements for a ten to fourteen day supply when pumped, and two days for gravity schemes.

Runoff control planning of eroded areas: Although no topographic surveys are involved at this stage, a thorough investigation of eroded sites is required to determine the type/s of structure/s required for rehabilitating or stabilizing each eroded area on the farm. It is not intended that the following comprise a full treatise on gulley control, but merely a guide on points to consider when carrying out the overall planning.

Rehabilitation versus stabilization: Actions taken to halt the extension of eroded areas and to reduce the sediment delivery from them are largely a question of economics. It is not the purpose of the Soil Conservation Scheme to dam up gulleys. Especially in steep terrain it is virtually impossible to rehabilitate them. Means must be found in these situations to create conditions which will encourage vegetation, which will in turn protect the area from further erosion. This involves :

* reduction in the amount of runoff,
* control of the pattern of runoff,
* reduction in the velocity of runoff, and
* reduction in sediment discharge.

The first-mentioned indicates an investigation of the catchment above the eroded area. If in a poor state it should be fenced off and recommendations made for stringent grazing control management to improve the cover. This, if carried out well in advance of mechanical structures in the gulley, will result in reduced runoff and thereby a reduction in the size and number of structures required.

Controlling the pattern of runoff requires careful planning. Diverting runoff in low rainfall areas will lead to drying out of the gulley walls and will work against the establishment of vegetation. A further problem

where sediment discharge is high will be the maintenance of the diversion structure. Where diversion structures are resorted to, the design must make allowance for the utilization of some of the runoff for wetting the area below. This normally takes the form of pipes through the diversion bank to feed spreader canals between it and the gulley edge. Every effort should be made to retain as far as possible the natural drainage pattern. Where diversion is used, therefore, the discharge should take place into the gulley under consideration and preferably at its head. Stabilization of the head can then entail one or more of the following:

* chutes of concrete, tar or gabions,
* drop spillways of concrete or gabions,
* gulley dams to flood the head cut,
* flood control dams above the head cut.

The last mentioned will make available a source of moisture which if released slowly, will aid in the encouragement of vegetation. It will also reduce the velocity of runoff in the gulley.

The only other manner in which to reduce velocity is to either reduce the gradient of the gulley or to increase its roughness co-efficient. The former is realized by introducing grade control dams (normally spillover weirs) with energy dissipators below, and the latter by introducing vegetation in the stream bed. This is not always possible without mechanical structures, but these need not be large. A one metre high weir will go a long way to storing sufficient sediment and moisture for the propagation of common reed *(Phragmites australis)* which, once established, will spread upstream as it traps more sediment.

A gulley-control dam, if placed with care (terrain allowing) will allow the natural flow pattern to be maintained and should result in the minimum of maintenance. Cognisance of the projected sediment slope should be taken when siting the structure.

The efficiency of any structure in a gulley is directly related to the manner in which it can control runoff and foster vegetative growth. Sediment can have two sources : from the catchment and from the gulley itself. The former has already been discussed. In the case of gulleys with widely distributed fingers and with large areas where total removal of topsoil above the sphere of influence of any structures has occurred, it can be expected that a surfeit of sediment from these areas will largely negate the effect of the structures. The sediment results largely from the action of rain drop splash on a bare surface, and some means must be found to counteract this. Indications are that a fairly thick blanket of old veld hay or crop residues spread over these areas and suitably anchored will break the energy of the rain drop, protect the bare soil, provide moisture, and in decomposing make plant nutrients available for the establishment of pioneer plants. Anchoring of the trash can be accomplished by means of thorn tree branches, rocks and/or bitumen emulsion sprayed on it.

Finally, it must be pointed out to the farmer that all stock must be excluded from the area under treatment for at least three years. A fence around the whole area is mandatory under the Soil Conservation Scheme. After the second or third season, however, it may be necessary to carry out some controlled grazing to stimulate vegetational growth in order to stop it becoming moribund.

Structures versus systems: Having carried out an exhaustive reconnaissance of the farm and having done an inventory of the soil, vegetation and water resources, the planner is now in a position to make practical recommendations as to the structures necessary, and the systems required, to either maintain the resources in a satisfactory state, or to improve them. The structures will be symbolized on the farm map, numbered, and listed for record purposes on a form reference BLW 23/10 called the List of Works.

The systems required will be written out in a Soil Conservation Guideline which will relate to :

* the management of the veld and arable lands on the farm unit,
* the maximum number of each kind, type or breed of animal which may be kept on the veld,
* the size and composition of the herds, and
* any other matter which the planner feels is of importance to the conservation of the agricultural resources on the farm unit. An example of the standard Soil Conservation Guideline required appears in section 1.9.

The landowner should now also be sufficiently aware of what the exercise is all about and what is expected of him. In applying for a conservation plan, he should be fully aware that the structures proposed will be a means towards an end and not an end in themselves. In other words, while he will be receiving a government subsidy on structures erected in the correct place and according to specifications provided, he must not only maintain them but carry out measures and practices to make them work.

1.5 The final form of the farm plan.

The conservation plan, in the context of the Soil Conservation Scheme embodied in the Conservation of Agricultural Resources Act No. 43 of 1983, requires the following documents :

* An official Application Form (BLW 23/29) duly completed and signed by the landowner or his authorized representative. This should have been obtained before any maps were ordered or the farm visited.
* An accurate map of the farm indicating the situation of all existing and proposed conservation structures such as fencing, contour banks, grassed waterways, dams and other stockwatering systems which are in a good state of repair and which are also required, as positioned, for the proposed scheme. Both private and public utilities such as farmyard, homestead, roads, dipping facilities, powerlines, etc. which will effect the planned scheme must also be indicated. The standard symbols to be used are portrayed in section 1.7. A compilation map showing the various subdivisions comprising the farm is mandatory.
* A list of proposed works as well as those already subsidised.
* A Soil Conservation Guideline, which describes the proposed grazing systems on the veld, the recommended rotational cropping systems and the mechanical protection measures required for each cultivated land,
* A document detailing the number of animal units on the farm (BLW 23/37).

These documents together comprise the Conservation Plan.

Farm plan amendments: It is sometimes necessary to amend the farm plan as a result of :

* A changed farming pattern - potentially arable land brought into production for the first time and for which mechanical structures must now be provided.
* A changed water supply position - due to continued drought situations, what appeared to be permanent water supplies at the time of planning, subsequently failed and new sources are then needed.
* Subdivision or consolidation of farming units.
* Poor or incomplete planning in the past.

An example of this is where insufficient reconnaissance of a proposed storage dam was carried out, a work number was allocated and the work described on the List of Works. A subsequent in-depth reconnaissance in order to survey and design the work leads to the realization that a dam is not feasible

and either a borehole must be sunk or water reticulated from another source. This is bad planning and reflects not only on the officer concerned but on the image of the department as well. It is expected that subsequent planning, whether for the first time, or as an amendment, will be carried out properly in the manner set out above, and the quality of drafting will be as set out below.

Numbering of camps: In order to identify camps it is necessary to number them on the map, and to indicate what type of camp it is. One numerical sequence is used, with the prefix L, K, E, etc. indicating whether it is cultivated land, grazing or erosion camp respectively. Note that planted pastures and timber plantations are both to all intents and purposes cultivated land camps and must be indicated as such. In order to facilitate checking the documents comprising the farm plan, the numbering should preferably start with the camp in the top lefthand corner of the farm and proceed laterally in a left to right, top to bottom sequence across the map. The number must be neatly encircled and placed as near as possible to the centre of the relevant camp. For further particulars refer to the legend of standard symbols in section 1.7. The house camp, including the profileration of small non-subdivisible industrial camps around the homestead should be grouped together and indicated as *farmyard.*

Numbering of fences: The regulations pertaining to the Soil Conservation Scheme require that each camp side be allocated a separate work number. Cognisance must be taken of this when numbering fences. It does not necessarily apply to all camps however. In respect of erosion control fences, it is advisable to ensure that the area is fenced off as a whole, and as long as completion of the whole fence before claiming subsidy will not constitute a heavy financial burden on the farmer, the complete fence camping off the eroded area should be given one work number. Whether this procedure is followed or not, when allocating work numbers, attempt to identify and number the works in the following order :

1 Erosion control fences.
2 Fences separating land camps from veld,
3 Permissable land subdivision fences,
4 Basic internal camp fences.
5 Secondary internal camp fences.

Numbering of other works: While there is no reason to standardize on a set order of types of work, an effort should be made to keep similar types of work together. This has the effect of presenting a neater List of Works. If there are a number of land camps on the farm, all requiring waterways and contour bank systems, group all the waterway numbers together and group all the contour bank systems together. The same applies to any of the other listed works.

Preparing the final draft: As the tracing of the farm plan proposals onto the mosaic transparency is normally done by the local Provisioning Administration Clerk or the Technical Assistant, a system of coding should be utilized to simplify explanation of the different types of works, Colour coding will enable this person to number the works and draw up the List of Works correctly. A recommended code is as follows :

All existing works - black (solid lines)
Proposed veld utilization works - black (broken lines)
Proposed drainage works - blue
Proposed protection works - red

Where dark areas on the mosaic tend to mask a symbol the tracer has no alternative than to neatly scratch out the emulsion on the back of the transparency where the symbol occurs.

The following points will further improve the overall picture, and relate to the hand drawing of maps (as opposed to computer assisted drafting).

* Proposed fences : All corners should be anchored, lengths of broken lines should be equal, spaces between should be as short as possible and equal in length, and extra care taken in placing the crosses correctly. The example on page 21 is self-explanatory.
* Proposed pipelines and reservoirs: Dotted lines should be of equal length with equal spacing between. All bends in the pipeline should be anchored and the P symbol stencilled. Interrupt the pipeline where it crosses other symbols. The stencil letter E helps form the trough neatly to a standard size. See page 21 for an example.
* Waterways : Make use of the stencil letter V to form the arrow heads.
* Contour bank system : A flexible curve should be used to guide the curved line. Equal lengths and spaces must be maintained and the superimposed contour lines used to demarcate as close as possible the actual direction of the contour banks.
* Arrow heads : These should be kept as thin as possible.
* Arable land symbols : The ditto marks detract badly from the overall image if not done neatly and with care. They should be spaced approximately 25 mm apart in a straight line, and the rows spaced 15 mm apart. They should only be drawn in once the work symbols have been done. Those ditto marks which would tend to interfere with other symbols should be left out.
* Dams : Extra care should be taken to draw the dam as near as possible to scale.
* Compilation map : As has been indicated elsewhere, the compilation diagram should be drawn to a scale small enough so that it will not detract from the overall image of the map. It should be orientated to the main map and should be framed. Identification of the various subdivisions may be either :

    * neatly stencilled subdivision names, or

    * a numerical series relating to the completed Application for Subsidy form (Section 1.10).

The mosaic print which accompanied the officer in the field has normally had a number of alterations marked on it, and in order not to confuse the tracer, a neat, final draft is prepared using the standard symbols, but colour coded as mentioned above. Camp numbers are allocated and the areas are planimetered to enable the completion of the Soil Conservation Guidelines. The map is now ready for tracing.

Quality of drafting : Mention has been made of the need to produce a quality map. By the use of varying line thicknesses and other simple techniques, a presentable map will be obtained. In order to accomplish this the tracer will need, in the absence of a CAD package, the following :

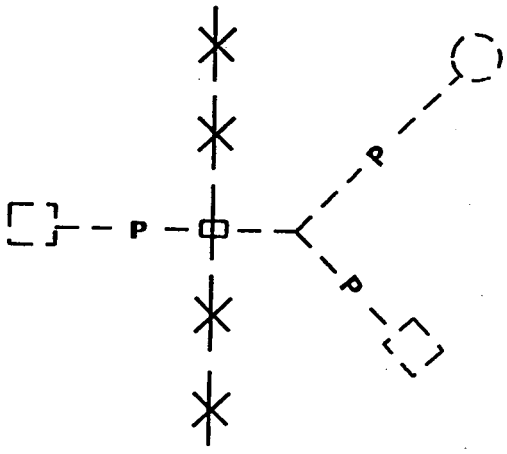
* ruler with bevelled edge to obviate smearing,

* barrel-nib type pen with nibs of 0,7. 0,5 and 0,35 mm thicknesses,

* stencil for drawing circles (or a drop-compass),

* 2 mm thick Khoki pen for the map border,

* letter stencil for 0,7 and 0,35 mm nibs.



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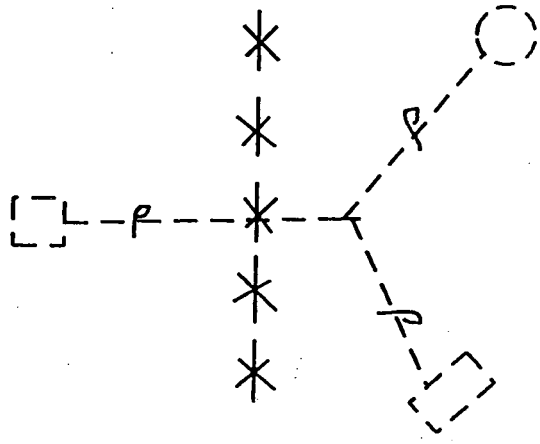

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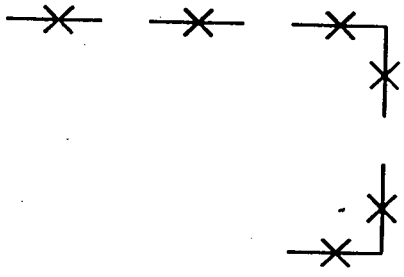

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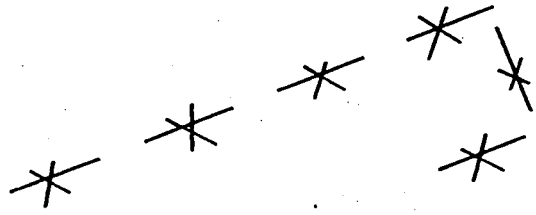


Incorrect

Line thickness and symbol size will naturally depend upon the map size in order to create a satisfying image, but the following recommendations will meet most of the normal sized mosaic requirements.

Map border	-	2 mm Khoki, 10 mm from the edge of the drafting material
Farm boundary	-	0,7 mm thick
Farm beacon	-	3,0 mm diameter using 0,7 mm nib
All work symbols	-	0,5 mm thick with 5,0 mm diameter for reservoirs.
Works and camp numbering	-	0,35 mm with 15 mm diameter circle around camp number and size. All letters and figures to be stencilled with a 0,35 mm nib.
Compilation map border	-	0,7 mm thick
Internal fences	-	0,35 mm thick
Rivers, roads, railways	-	0,35 mm thick

These dimensions are obviously offered as a guide and should not be considered mandatory. The size of the map, for instance, will have a bearing on the size and thickness of symbols.

This manual has been drawn up in an attempt to standardize procedures and work quality when planning farms under the Soil Conservation Scheme for the Conservation of Agricultural Resources Act. As such, cognisance must be taken of the regulations regarding the application of the said Scheme, and the reader is therefore referred to the relevant Manual when interpreting these procedures.

1.6 NORMS FOR PLANNING THE SUBDIVISION OF NATURAL VELD

K G Camp, CADI

Herewith follows the considerations which apply to the determination of all those factors which must be taken into account when planning the subdivision of veld for grazing purposes. The norms given are those which must be adhered to whenever financial aid by Government is to be claimed.

The number of camps per herd: This is based on two very important norms which must be applied in order to ensure conservation of the grazing land. First, the Grazing Cycle on which all other norms must be based in order to control the Grazing Days (G D) per cycle.
The second very important norm is the Period of Stay (P S), or the maximum period during which the grazing animals should stay in a camp before they start doing damage to the vegetation through re-grazing of growing points.

$$\text{The number of camps per herd} = \frac{\text{Grazing cycle}}{\text{Period of stay}}$$

For the correct utilization of all veld types in KwaZulu-Natal Region therefore, 6 camps are recommended to achieve basic conservation standards.

Table 1. The grazing cycle norms per bioclimatic region are

Bioclimatic Group	Grazing Cycle (days)
2, 3, 4e	30
4f, 6	42
7, 8, 9	56
10	70
11	84

Table 2. The recommended optimum period of stay by bioclimate

Bioclimatic Group	Period of Stay
2, 3, 4e	7
4f, 6	7
7, 8, 9	10
10	14
11	14

Herd sizes: To achieve optimum performance in a herd, the size must be restricted to numbers which will ensure a good calving percentage. This refers to the mating season when the maximum number of herds will be found on the farm. Herds of 30 to 50 Large Stock Units (L S U's) should ensure economic and therefore satisfactory results in the steep terrain of Bioclimates 1 to 6, and in the bushy and often steep terrain of Bioclimates 7 to 11.

Camp sizes: This is based on the herd size, grazing capacity (G C) and the number of camps per herd. The G C has been set for each Bioclimatic region. Should it differ because the veld has been physically assessed to be in a better condition than the norm, and the G C should be altered in order to maintain or improve the veld, the delegate of the Executive Officer (Act 43/1983) will have to be requested to approve the alteration. This he will only do on a submission of a special instruction. It must be realised that veld in very good condition can deteriorate if understocked, just as degraded veld will continue to deteriorate if stocked at the accepted norm for veld in good condition. The norm applied to veld in reasonable condition is based on the formula :

$$\text{Camp size} = \frac{\text{LSU (herd size)} \times \text{G C}}{\text{No. of camps (i.e. 6 for KwaZulu-Natal)}}$$

Because of the rugged terrain in KwaZulu-Natal, with marked changes in palatability caused by geological and aspect changes, these figures have been adjusted to meet the situations that experienced officers have encountered in the different veld types. Should camp sizes fall below the norm, the planning officer must provide a motivation for the need for those smaller camps. Camps larger than the norm are acceptable for economic reasons and for larger herds. It is important that farmers be

encouraged to develop their fencing programme in stages, as the economic situation permits. The first plan therefore should not necessarily be the final one envisaged.

Number of herds: The number of herds run on the farm is not merely one of convenience but is of vital importance to animal performance, as it affects competitive ability and therefore both mass gain and calving percentage. It is preferable to have every class of animal in a separate herd, but economics dictate a certain amount of grouping. See Table 5.1 below in conjunction with Table 5, which gives the composition of the herd for different beef production systems. Table 5.2 gives recommended flock compositions for sheep. This aspect must be discussed with the farmer in drawing up his conservation farm plan. In Table 6, for example, there are only 5 classes of animals if the farmer is producing weaners for sale, and one need only look at the first eight lines of Table 5, i.e. down to steers one year old. It is recommended that herd grouping D (see Table 6) be applied as a standard for subsidy schemes. This is a compromise between the ideal and the practical for the aim of maintaining a conservation standard. Note, however, that the breeding herds, i.e. herds D1 and D2 in Table 6, may have to be split into two or more separate herds for management purposes. The maximum of 50 LSU's will therefore apply in determining how many camps are needed on the farm.

To summarise, Tables 4 to 6 give the norms for all aspects of subsidised veld subdivision.
Soil Conservation Officers in KwaZulu-Natal Region are familiar with the Bioclimatic Regions, and so these as well as the Grazing Capacity Zone numbers have been given in Table 4. For the sake of completeness, the latest table of LSU equivalents is given as Table 7.

Table 3. Recommended camp size per bioclimatic region in KwaZulu-Natal

Bioclimatic Region	Grazing Capacity (ha/AU)	Range in camp size (ha)
1	3	15 - 25
2	3	15 - 25
3	2	10 - 25
4e	2	10 - 25
4f	2,2	10 - 25
5	5	10 - 25
6	2,5	12 - 30
7	6,5	20 - 50
8	3,5	15 - 50
9	3,5	15 - 50
10	5,0	25 - 50
10 (Weenen)	6,5	25 - 50
11	5,0	25 - 50

Table 4. Summary of veld camp size and herd norms for use in applying the Soil Conservation Scheme to KwaZulu-Natal.

Grazing Capacity Zone	Bioclimate	Grazing capacity ha/A.U.	Optimum camp size (ha)	Herd size	No. of camps per herd	No. of herds
93	6	2,2	12 - 30	30 - 50	6	For all situations : Number of breeding herds in groups of 50 breeding units per group, plus 2 herds of followers.
129	8	3,5	15 - 30	30 - 50	6	
130	4f	2,5	10 - 25	30 - 50	6	
148	6	3,5	12 - 30	30 - 50	6	
153	8	3,5	15 - 50	30 - 50	6	
155	4f	2,2	10 - 25	30 - 50	6	
156	4f	2,2	10 - 25	30 - 50	6	
157	6	2,5	12 - 30	30 - 50	6	
158	6	2,5	12 - 30	30 - 50	6	
162	6	2,0	12 - 30	30 - 50	6	
163	4e	2,0	10 - 25	30 - 50	6	
164	10	5,0	25 - 60	30 - 50	6	
165	3	2,0	10 - 25	30 - 50	6	
166	6	2,5	12 - 30	30 - 50	6	
167	4f	2,2	10 - 25	30 - 50	6	
168	10, 11	5,0	25 - 60	30 - 50	6	
169	6	2,5	12 - 30	30 - 50	6	
170	10	5,0	25 - 60	30 - 50	6	
171	9	3,5	15 - 50	30 - 50	6	
172	6	2,5	12 - 30	30 - 50	6	
173	8	3,5	15 - 50	30 - 50	6	
212	6	2,5	12 - 30	30 - 50	6	
213	4e	2,2	10 - 25	30 - 50	6	
214	4e	2,0	10 - 25	30 - 50	6	
215	10	5,0	25 - 60	30 - 50	6	
216	4f	2,2	10 - 25	30 - 50	6	
217	6	2,5	12 - 30	30 - 50	6	
218	10 (Weenen)	6,5	25 - 60	30 - 50	6	
219	6	2,5	12 - 30	30 - 50	6	
220	6	2,5	12 - 30	30 - 50	6	
221	6	2,5	12 - 30	30 - 50	6	
222	8	3,5	15 - 50	30 - 50	6	
223	3	2,0	10 - 25	30 - 50	6	
224	2	3,0	15 - 25	30 - 50	6	
225	6	2,5	12 - 30	30 - 50	6	
226	8	3,5	15 - 50	30 - 50	6	
227	4f	2,2	10 - 25	30 - 50	6	
228	4e	2,0	10 - 25	30 - 50	6	
229	6	2,5	12 - 30	30 - 50	6	
230	4e	2,0	10 - 25	30 - 50	6	
231	4e	2,0	10 - 25	30 - 50	6	
232	4f	2,2	10 - 25	30 - 50	6	
233	8	3,5	15 - 50	30 - 50	6	
234	4f	2,2	10 - 25	30 - 50	6	
235	2	3,0	15 - 25	30 - 50	6	
236	10	5,0	25 - 60	30 - 50	6	
237	1	3,0	15 - 25	30 - 50	6	

Table 4 continued...

Table 4 continued...

Grazing Capacity Zone	Bioclimate	Grazing capacity ha/A.U.	Optimum camp size (ha)	Herd size	No. of camps per herd	No. of herds
238	2	3,0	15 - 25	30 - 50	6	For all situations : Number of breeding herds in groups of 50 breeding units per group, plus 2 herds of followers.
262	5	5,0	10 - 25	30 - 50	6	
263	6	2,5	12 - 30	30 - 50	6	
265	2	3,0	15 - 25	30 - 50	6	
266	10	5,0	25 - 60	30 - 50	6	
267	4e	2,0	10 - 25	30 - 50	6	
268	6	2,5	12 - 30	30 - 50	6	
269	10	5,0	25 - 60	30 - 50	6	
270	2	3,0	15 - 25	30 - 50	6	
271	4e	2,0	10 - 25	30 - 50	6	
272	6	2,5	12 - 30	30 - 50	6	
273	10	5,0	25 - 60	30 - 50	6	
274	2	3,0	15 - 25	30 - 50	6	
275	6	2,5	12 - 30	30 - 50	6	
276	10	5,0	25 - 60	30 - 50	6	
277	10	5,0	25 - 60	30 - 50	6	
278	10	5,0	25 - 60	30 - 50	6	
279	10	5,0	25 - 60	30 - 50	6	
280	10	5,0	25 - 60	30 - 50	6	
281	6	2,5	12 - 30	30 - 50	6	
282	10	5,0	25 - 60	30 - 50	6	
283	10	5,0	25 - 60	30 - 50	6	
284	10	5,0	25 - 60	30 - 50	6	
285	10	5,0	25 - 60	30 - 50	6	
301	4f	2,2	10 - 25	30 - 50	6	
302	4f	2,2	10 - 25	30 - 50	6	
303	8	3,5	15 - 50	30 - 50	6	
304	8	3,5	15 - 50	30 - 50	6	
305	4e	2,0	10 - 25	30 - 50	6	
306	8	3,5	15 - 50	30 - 50	6	
307	10	5,0	25 - 60	30 - 50	6	
308	2	3,0	15 - 25	30 - 50	6	
309	10	5,0	25 - 60	30 - 50	6	
310	10	5,0	25 - 60	30 - 50	6	
311	10	5,0	25 - 60	30 - 50	6	
312	2	3,0	15 - 25	30 - 50	6	
313	10	5,0	25 - 60	30 - 50	6	
427	4f	2,2	10 - 25	30 - 50	6	
457	4e	2,0	10 - 25	30 - 50	6	
458	2	3,0	15 - 25	30 - 50	6	
469	8	3,5	15 - 50	30 - 50	6	
471	10	5,0	25 - 60	30 - 50	6	

Table 5.1 Herd composition for 100 breeding cow module

Class of Stock	Mass	AU Equivalent	Weaner Production		18 months		30 months		Herds on farm	
			No.	Au.	No.	Au.	No.	Au.	No.	Au.
Breeding cows	465	1.0 - 1.2	80	94.6	80	94.6	80	94.6		
Breeding Heifers	400	0.89	20	17.8	20	17.8	20	17.8		
Calves Weaners	120	0.36	80	28.8	80	28.8	80	28.8		
Cull Cows	465	1.2	7	8.4	7	8.4	7	8.4		
Replacement Heifers 1-2 yrs	250	0.63	20	12.6	20	12.6	20	12.6		
Surplus Heifers 1-2 yrs	250	0.63			20	12.6	20	12.6		
Steers 1-2 yrs	270	0.67			40	26.8	40	26.8		
Surplus Heifers 2-3 yrs	360	0.83					20	16.6		
Steers 2-3 yrs	400	0.89					40	35.6		
Bulls	650	1.29	4	5.2	4	5.2	7	5.2		
Total			**211**	**167.4**	**271**	**206.8**	**334**	**259.0**		

ASSUMPTIONS

Example for a 30 month system with a total carrying capacity of 500 AU's.

* Calving season Spring
* Heifers mated at 2 yrs
* percentage Overall 80 %
* Replacement 20 %

$$\text{Number of Farm AU} = \text{Constant}$$

AU's of module

eg $\frac{500}{259} = 1.93$

Cows 78 % Bulls 4 % Heifers 90 % Breeding Cows

* Culling Policy (20%)
  - Cull empty heifers = 15 %
  - Allow one miss
  - Cull of 10 years
  - 35 % of culls rearing last calf

80 x 1.93 = 154 cows

94.6 x 1.93 = 182.5 AU's

Table 5.2 Flock composition of 100 ewe module semi-intensive

Class of Stock	Ewes only			Ewes and Wethers			Farm Flock	
	No	Mass	AU	No	Mass	AU	No	AU
Breeding ewes	100	50	18.8	100	50	18.8		
Lambs 6 months	90	35	12.9	90	35	12.9		
Replacements	20	35	2.9	20	35	2.9		
Wethers 2th				25	35	3.6		
Wethers 4th				25	45	4.3		
Wethers 6th				25	50	4.7		
Rams	3	70	0.7	3	70	0.7		
Total	213		35.3	288		47.9		

ASSUMPTIONS:

* Flock composition in summer
* Ewes mate November on veld
* Conception 90 % with 100 % lambing
* Weaning percentage 90 %
* Lambs born April weaned at 100 days on pastures
* Ewes on veld after weaning
* Lambs born April weaned at 100 days on pastures
* Lambs marked @ 45 kg in February on veld
* Wethers on veld
* Age at first mating 18 months
* Replacement 20 % ewes and 33 % wethers

Example : for a ewes only flock on a farm carrying 250 A.U.'s

$$\frac{\text{Farm AU}}{\text{Module Au}} = \text{Constant eg } \frac{250 \text{ Au}}{35.3} = 7.08$$

Breeding Ewes = 708 (7.08 x 100)

AU = 133 (7.08 x 18.8)

Table 6. Examples of herd groupings during the breeding season with varying numbers of camps available.

CLASS OF STOCK	Herd groupings						
	Decreasing number of camps						
	A	B	C	D	E	F	G
Mature cows + calves + bulls	1	1	1	1	1	1	1
Young cows + calves + bulls	2	2	2				
Heifers + bulls	3	3	3	2	2	2	
Cull cows + calves (not bulled)	4	4	4	3	3	3	4
Heifers 3 years surplus	5						
Heifers 2 years surplus	6	5	5	4	4		
Heifers 1 year	7						
Steers 1 year	8	6	6	5	5	4	5
Steers 2 years	9	7					
Steers 3 years	10	8	7	6			

Column A indicates that each class of animal will be run separately as a stock group.

Column G indicates that only 3 stock groups will be run on the farm, which reduces the number of camps required and where :

Stock group 1 consists of the mature cows, first calves and heifers to be bred for the first time.

Stock group 2 consists of cull cows and replacement heifers.

Stock group 3 consists of steers of all age classes.

Table 7. Large stock equivalent (LSU / animal unit) for grazing animals

Kind of animal	Sex and phase of production	Number of large stock units equal to one A.U.
DAIRY CATTLE		
Jersey	Calf (unweaned up to 7 months)	0.32
	Weaners (7 months and older)	0.44
	Cow or heifer (2-tooth and older)	0.96
	Steer (18 months and older)	0.75
	Steer (3 years and older)	1.10
	Bull (3 years and older)	1.36
Ayrshire	Calf (unweaned up to 7 months)	0.34
	Weaners (7 months and older)	0.53
	Cow or heifer (2-tooth and older)	1.10
	Steer (18 months and older)	0.90
	Steer (3 years and older)	1.22
	Bull (3 years and older)	1.38
Friesland / Friesian	Calf (unweaned up to 7 months)	0.50
	Weaners (7 months and older)	0.64
	Cow or heifer (2-tooth and older)	1.49
	Steer (18 months and older)	1.09
	Steer (3 years and older)	1.33
	Bull (3 years and older)	1.63
LIGHT FRAME BEEF BREEDS (Aberdeen, Angus, Hereford, Sussex, Shorthorn, and Red Poll.)	Calf (unweaned up to 7 months)	0.32
	Weaners (7 months and older, approximate mass 180 kg)	0.44
	Cow or heifer (2-tooth and older, approximate mass 500 kg)	1.10
	Steer (18 months and older, approximate mass 300 kg)	0.75
	Steer (3 years and older, approximate mass 490 kg)	1.10
	Bull (3 years and older, approximate mass 600 kg)	1.36
MEDIUM FRAME BEEF BREEDS (Afrikander, Drakensberger, Brahman, Brown Swiss, and British Breed x Zebu.)	Calf (unweaned up to 7 months)	0.34
	Weaners (7 months and older, approximate mass 200 kg)	0.53
	Cow or heifer (2-tooth and older, approximate mass 525 kg)	1.21
	Steer (18 months and older, approximate mass 350 kg)	0.90
	Steer (3 years and older, approximate mass 550 kg)	1.22
	Bull (3 years and older, approximate mass 600 kg)	1.38
LARGE FRAME BEEF BREEDS (Charolais, Limosine, Simmentaler, South Devon, Santa Gertrudis and Bonsmara.)	Calf (unweaned up to 7 months)	0.50
	Weaners (7 months and older, approximate mass 225 kg)	0.64
	Cow or heifer (2-tooth and older, approximate mass 400 kg)	1.32
	Steer (18 months and older, approximate mass 400 kg)	1.09
	Steer (3 years and older, approximate mass 585 kg)	1.33
	Bull (3 years and older, approximate mass 650 kg)	1.63

Table 7 Continued...

Table 7 continued...

Kind of animal	Sex and phase of production	Number of large stock units equal to one A.U.
SMALL STOCK Woollen sheep	Lamb (unweaned up to 4 months)	0,05
	Weaner lambs (4 months and older, approximate mass 20 kg)	0,10
	Ewe (2-tooth and older, approximate mass 47 kg)	0,14
	Wether (2-tooth and older, approximate mass 50 kg)	0,15
	Ram (2-tooth and older, approximate mass 64 kg)	0,19
Mutton breeds	Lamb (unweaned up to 4 months)	0,08
	Weaner lambs (4 months and older, approximate mass 25 kg)	0,11
	Ewe (2-tooth and older, approximate mass 53 kg)	0,15
	Wether (2-tooth and older, approximate mass 60 kg)	0,16
	Ram (2-tooth and older, approximate mass 90 kg)	0,23
Dual purpose breeds	Lamb (unweaned up to 4 months)	0,08
	Weaner lambs (4 months and older, approximate mass 25 kg)	0,12
	Ewe (2-tooth and older, approximate mass 65 kg)	0,17
	Wether (2-tooth and older, approximate mass 70 kg)	0,17
	Ram (2-tooth and older, approximate mass 105 kg)	0,25
Karakul sheep	Lamb (unweaned up to 4 months)	0,07
	Weaner lambs (4 months and older, approximate mass 22 kg)	0,11
	Ewe (2-tooth and older, approximate mass 50 kg)	0,15
	Wether (2-tooth and older, approximate mass 55 kg)	0,16
	Ram (2-tooth and older, approximate mass 75 kg)	0,20
Angora goat	Kid (unweaned up to 4 months)	0,04
	Weaner kids (4 months and older, approximate mass 12 kg)	0,06
	Ewe (2-tooth and older, approximate mass 33 kg)	0,11
	Castrate (2-tooth and older, approximate mass 42 kg)	0,14
	Ram (2-tooth and older, approximate mass 50 kg)	0,15
Boer goat	Kid (unweaned up to 4 months)	0,08
	Weaner kids (4 months and older, approximate mass 23 kg)	0,12
	Ewe (2-tooth and older, approximate mass 65 kg)	0,17
	Castrate (2-tooth and older, approximate mass 62 kg)	0,17
	Ram (2-tooth and older, approximate mass 90 kg)	0,22
OSTRICHES	Chicken	0,12
	Young ostrich	0,26
	Mature ostrich	0,38

Table 7 continued...

Table 7 continued...

Kind of animal	Sex and phase of production	Number of large stock units equal to one A.U.
DRAFT ANIMALS		
Shetland pony	Foal (unweaned)	0,15
	Young pony	0,26
	Mare	0,40
	Stallion or gelding	0,42
Larger ponies and donkeys	Foal (unweaned)	0,23
	Young animal	0,45
	Mare	0,66
	Stallion or gelding	0,70
Light horses and mules	Foal (unweaned)	0,33
	Young animal	0,67
	Mare	0,94
	Stallion or gelding	1,03
Medium draft horses	Foal (unweaned)	0,45
	Young animal	0,86
	Mare	1,20
	Stallion or gelding	1,32
Heavy draft horses	Foal (unweaned)	0,52
	Young animal	1,06
	Mare	1,51
	Stallion or gelding	1,60
WILD ANIMALS		
Elephant	Calf (unweaned)	1,00
	Young elephant (up to 5 years)	1,13
	Cow	3,80
	Bull	4,13
Giraffe	Calf (unweaned)	0,37
	Young giraffe	0,77
	Cow (mature)	1,48
	Bull (mature)	1,68
Eland	Calf (unweaned)	0,28
	Young eland	0,52
	Cow (mature)	1,01
	Bull (mature)	1,28

Table 7 continued...

Table 7 continued...

Kind of animal	Sex and phase of production	Number of large stock units equal to one A.U.
WILD ANIMALS		
Buffalo	Calf (unweaned)	0,29
	Young buffalo	0,42
	Cow (mature)	1,06
	Bull (mature)	1,20
Zebra	Foal (unweaned)	0,16
	Young zebra	0,33
	Mare (mature)	0,65
	Stallion (mature)	0,72
Kudu	Calf (unweaned)	0,13
	Young kudu	0,21
	Cow (mature)	0,37
	Bull (mature)	0,56
Waterbuck	Lamb (unweaned)	0,11
	Young waterbuck	0,20
	Ewe (mature)	0,37
	Ram (mature)	0,50
Blue Wildebeest	Calf (unweaned)	0,10
	Young blue wildebeest	0,21
	Cow (mature)	0,40
	Bull (mature)	0,48
Black Wildebeest	Calf (unweaned)	0,07
	Young black wildebeest	0,17
	Cow (mature)	0,29
	Bull (mature)	0,34
Tsessebe	Calf (unweaned)	0,07
	Young tsessebe	0,16
	Cow (mature)	0,28
	Bull (mature)	0,33
Blesbuck	Lamb (unweaned)	0,05
	Young blesbuck	0,10
	Ewe (mature)	0,21
	Ram (mature)	0,20

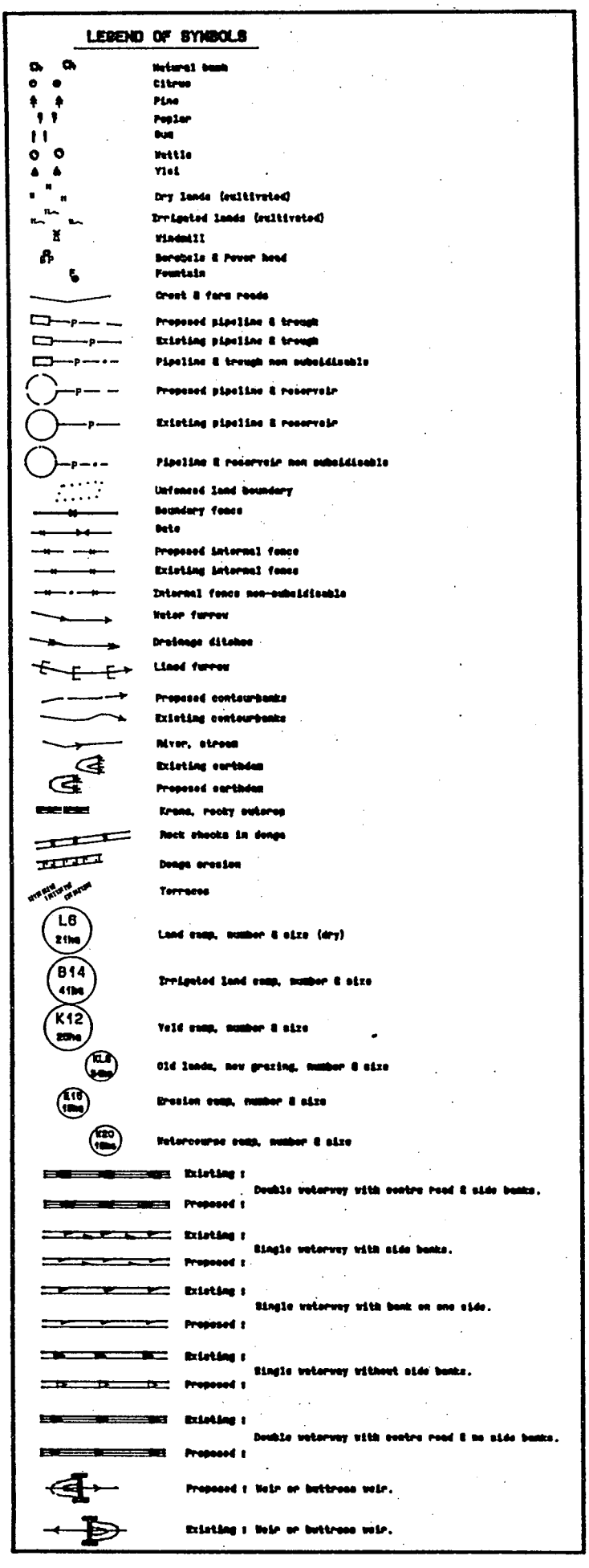
Table 7 continued...

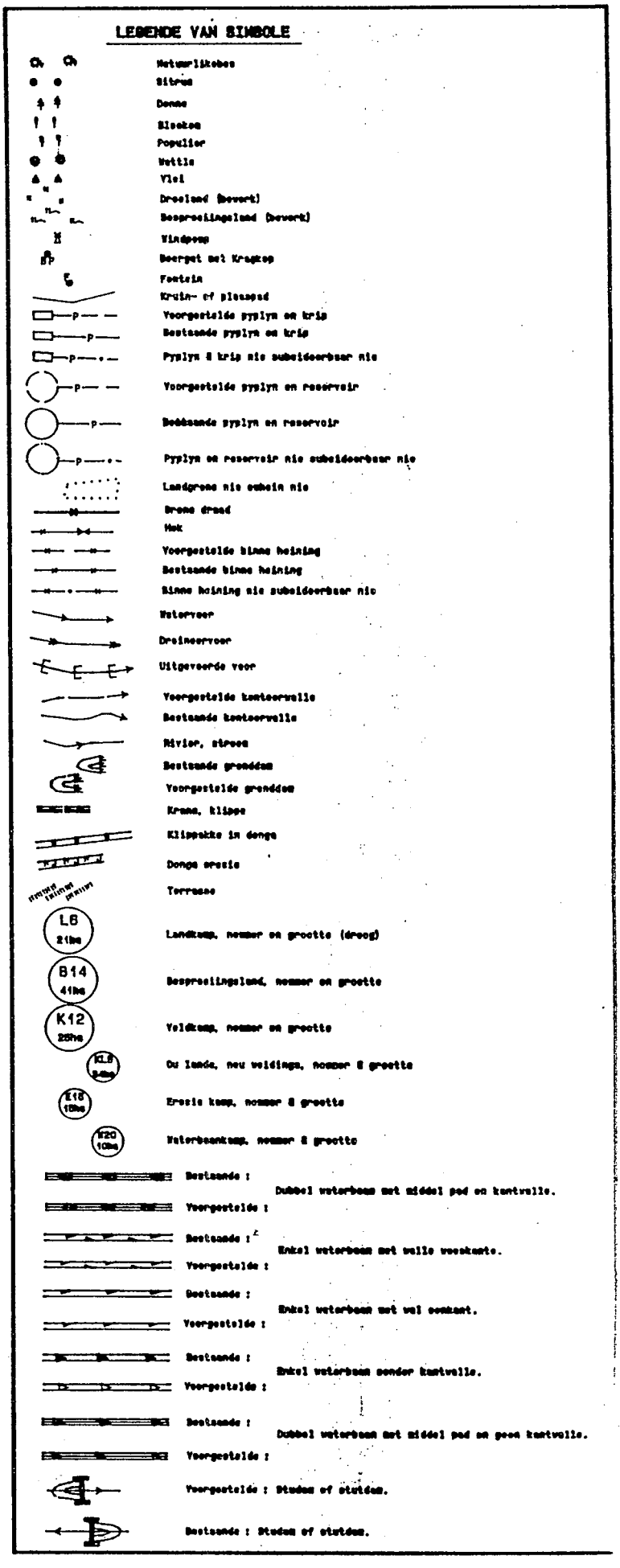
Table 7 continued...

Kind of animal	Sex and phase of production	Number of large stock units equal to one A.U.
WILD ANIMALS		
Warthog	Piglet (unweaned)	0,08
	Young warthog	0,08
	Sow (mature)	0,20
	Boar (mature)	0,25
Impala	Lamb (unweaned)	0,05
	Young impala	0,08
	Ewe (mature)	0,14
	Ram (mature)	0,16
Springbuck	Lamb (unweaned)	0,03
	Young springbuck	0,04
	Ewe (mature)	0,09
	Ram (mature)	0,10
Gemsbuck	Calf (unweaned)	0,10
	Young gemsbuck	0,21
	Cow (mature)	0,40
	Bull (mature)	0,48

1.7. CONSERVATION FARM PLAN MAPS.

1.7.1. Symbols for computer drawn maps



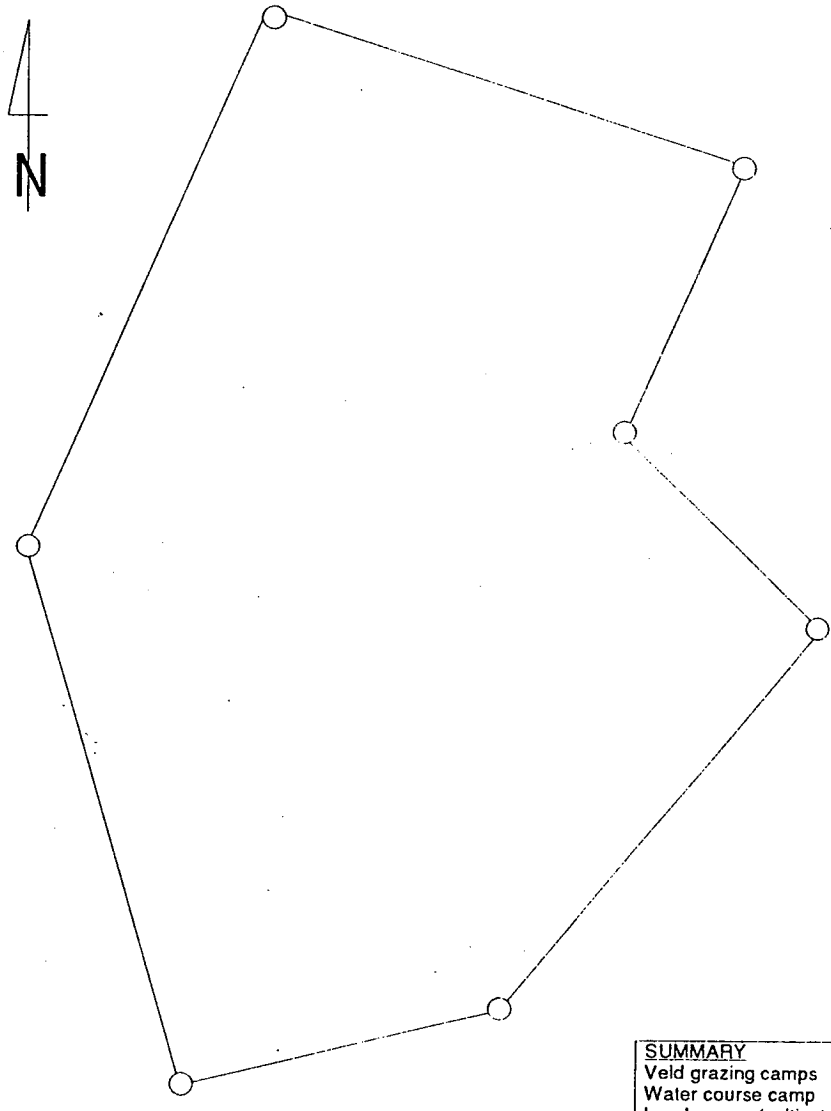


Plaakaartsimbpole
Legend for farm maps

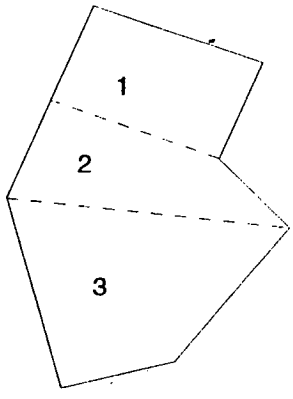
BYLAE TOT PLAASKAART
ANNEXURE TO FARM MAP
(Hersien Junie 1983/Revised June 1983) LA 7/50

	Grens omhein met grensbaken. Boundary fenced with beacon		Moeras, vlei Marsh, vlei.		Bestaande : Enkelwaterbaan met wal weerskante. Existing : Voorgestelde: Single waterway with bank on both sides Proposed :		Swaaiwerke River works.
	Grens nie omhein nie. Boundary not fenced		Droë vlei of laagte Dry vlei or depression			S	Silo. Silo.
	Bestaande heining. Existing fence.		Waaisand Driftsand.		Bestaande : Existing : Enkelwaterbaan met wal eenkant Voorgestelde: Single waterway with bank on one side Proposed :	Dip	Dip Dip.
	Voorgestelde heining met werknommer Proposed fence with work number		Wye river Wide river			Opstal Homestead	Woonhuis of stoor. Homestead or store.
	Heining te verskuif Fence to be moved.		Droë loop Dry water course			Brits Pretoria	Pad. Road.
	Voorgestelde heining nie subsidieerbaar nie. Proposed fence not subsidizable.		Permanente waterloop Permanent water course		Bestaande : Enkelwaterbaan sonder kantwalle Existing : Voorgestelde: Single waterway without side banks Proposed :		Bestaande reservoir. Existing reservoir
	Hek. Gate.		Oppervlakte erosie Surface erosion				Bestaande pyplyn Existing pipeline.
	Hek en roosterhek. Gate and grid.		Gevorderde erosie – donga. Advanced erosion donga.				Bestaande suipkrip. Existing drinking trough.
L15 17 ha	Droëland, nommer en grootte. Dry land, number and area.		Gruisgat. Quarry.		Bestaande : Existing : Dubbel waterbaan met pad in middel en kantwalle. Voorgestelde: Double waterway with road in centre and side banks. Proposed :		Voorgestelde reservoir. Proposed reservoir.
B15 32ha	Besproeiingsland, nommer en grootte Irrigation land, number and area		Hoop, bv. mynhoop. Heap, eg. mine dump.				Voorgestelde pyplyn. Proposed pipeline
	Land onttrek aan gebruik. Land withdrawn from use.	F	Fontein. Fountain.		Bestaande : Existing : Dubbel waterbaan met pad in middel sonder kantwalle. Voorgestelde: Double waterway with road in centre without side banks. Proposed :		Voorgestelde suipkrip. Proposed drinking trough.
W9 32ha	Waterbaankamp, nommer en grootte. Watercourse camp, number and area.	B⊕P	Boorgat met kragkop. Borehole with power head.				Nie subsidieerbare reservoir. Reservoir, not subsidizable.
K25 210ha	Kamp weiding, nommer en grootte. Camp grazing, number and area.		Windpomp. Windmill		Dreineervore of– pype. Drainage ditches or– tiles.		Nie subsidieerbare pyplyn. Pipeline, not subsidizable.
E5 17 ha	Erosiekamp, nommer en grootte. Erosion camp, number and area	SW	Voorgestelde stormwatervoor. Proposed storm water furrow.		Watervoor. Water furrow.		Nie subsidieerbare suipkrip. Drinking trough not subsidizable
	Inheemse bos Natural bush	SW	Bestaande stormwatervoor Existing storm water furrow.		Uitgevoerde voor. Lined furrow.		Brug of padduiker. Bridge or culvert.
Pruime	Boord. Orchard		Voorgestelde kontoerwalsteisel. Proposed contourbank system.		Klippakke in donga. Rock checks in donga.		Spoorbane. Railway lines
Den	Plantasie Plantation		Bestaande kontoerwalsteisel. Existing contourbank system		Bestaande gronddam, alle soorte. Existing earth dam, all types.	SAS SAR	Teletoonlyn Telephone line.
	Pan Pan.		Keerwal. Training bank.		Voorgestelde gronddam. Proposed earth dam.		Kraglyne. Power lines
	Vertikale krans Vertical krantz		Spreiwal. Spreader bank.		Bestaande studam of stu Existing weir or buttress weir.	V	Voerkraal en/of voerkamp Feedlot and/or feed paddock.
	Rotsdagsoom Rocky outcrop		Terrasse. Terraces.		Voorgestelde studam of stutdam. Proposed weir or buttress weir.		

1.8 BASIC LAYOUT FOR THE CONSERVATION FARM PLAN MAP



SUMMARY	
Veld grazing camps	*XXXX ha*
Water course camp	*XXXX ha*
Land camps (cultivated)	*XXXX ha*
Land camps (pasture)	*XXXX ha*
Orchard	*XXXX ha*
Timber	*XXXX ha*
Erosion	*XXXX ha*
Farmyard	*XXXX ha*
	XXXX ha
	Total XXXXX ha
Last camp no.	XXXX
Last work no.	XXXX



Compilation map
See application form for details

DEPARTEMENT VAN LANDBOU DEPARTMENT OF AGRICULTURE **PLAASBEPLANNING • FARM PLANNING**		
Streek Region	Voorligtingskantoor Extension Office	
Plaaseenheid Farm Unit	Grootte Area ha	
Landdrosdistrik Magisterial District		
Eienaar Owner		
Huitverw Grid Ref.	Opgestel Compiled	Datum Date
Dreineringsverw Drainage Ref.	Nagesien Checked	Datum Date
Mosaïek No. Mosaic No.	Goedgekeur Approved	Datum Date
Skaal Scale	Plaasplan No. Farm Plan No.	

1.9 (E) STANDARD SOIL CONSERVATION GUIDELINES

1 **Owner :** **Farm Name :**

Magisterial District : **Ref. No. :**

Homogeneous Farming Area :

2 A condition of payment of subsidies under the various Schemes of the Conservation of Agricultural Resources Act (Act No. 43/83) is that management of the agricultural resources be so controlled as to reduce to a tolerable level the risk of soil loss and further deterioration of the resources. The attached map and list of works (Form BLW 23/10) detail the works for which the Department of Agriculture is prepared to pay subsidies under the said Act. The following is the recommended management to ensure that the agricultural resources of the farm unit are correctly utilized.

3 **Erosion camps.**

Camp numbers . . . . . must be fenced off and withdrawn from grazing for a minimum of three years to enable vegetation to re-establish. Incorporation of the camps into a rotational grazing system may only take place on written authority from the Executive Officer: Act 43/83, and then only in the manner as instructed by him. If, due to very good growing seasons before the three year period is completed, the existing vegetation appears to need short duration grazing to prevent it becoming moribund, the local Extension Officer must be approached for permission to do so. He will determine the number of stock and the period of grazing which will be allowed.

Work numbers . . . . . are structures which are recommended to speed up the stabilization/reclamation of the gulleys in the erosion camps. Once erected, a condition of financial aid will be that suitable vegetative material is planted in the sediment that is trapped behind the structures. Brushpacking, thatching and/or stonepacking in the area outside the main streams is strongly recommended.

4 **Arable land.**

The arable lands on the farm are classified below according to their conservation requirements. Adherence to the specifications should ensure that the landowner meets the requirements of Regulations 4 to 6 of Act 43/1983.

Land No.	Average Slope (%)	Average Soil Depth (mm)	Form and Series or Clay %	Capability Class

Classification	Conservation Requirement
A	Annual cropping may be carried on without restriction.
B	Annual cropping with an occasional grass ley, and/or special tillage techniques to reduce wind/water erosion are imperative.
C	A proper contourbank system must be constructed. Work nos. provide for this. Annual cropping may occur but should be accompanied by an occasional grass ley and/or conservation tillage techniques to reduce erosion.
D	A proper contourbank system is imperative. Work nos. provide for this. Soil loss between the structures must be further reduced by : * following years of annual cropping by years of grass ley, and/or * conservation tillage techniques as will be written into the specifications for the proposed contourbanks work nos.
E	Due to an extreme erosion hazard no annual cropping should be carried out. Excessive soil loss will only be overcome by a permanent cover crop. is recommended.
F	This land is deteriorating through severe waterlogging/alkalinity. The problem must be overcome by subsurface drainage. Work nos. make provision for this. Further management will be written into the specifications for the above-mentioned work nos.
G	Land/s is/are to be planted to permanent pastures. Should annual cropping take place the conservation requirement/s must be specified.

5 Management of the grazing land.

Regulations 9 to 12 of Act 43/1983 require that natural grazing on a farm unit be utilized in such a manner as to prevent further deterioration, or to improve the condition. The attached map for this farm unit shows the veld subdivided into basic camps of similar palatability, with further divisions into a number of secondary camps to enable utilization in the manner as prescribed later (see section 5.2). The proposed camps are classified as follows :

Land Form		Condition of veld		
		Good	Fair	Poor
Plateau veld				
Aspects :	North			
	South			
	East			
	West			
Flats				
Undulating hills				
Water courses				
Vlei veld				
Eroded areas				

In order to improve degraded veld an/or to maintain veld on the farm unit in a good condition it will be necessary to rest 25% - 33% of the veld each year for a full growing season, while rotating the grazing in the other camps as the growing season permits. The rested veld may be used in Winter. Herds should be removed from a grazing camp when the Decreasers (the most palatable species) have been grazed down to 50 - 60 mm height. The period of stay should in any case be no longer than 14 days. In order to allow the veld to recover from defoliation and

produce quality grazing, a camp should not be regrazed within 40 - 70 days. Local weather during the growing season will determine both periods of absence and of stay, as heat and moisture affects the growth cycle of the grasses.

No camp should be grazed during the same critical seasons of Spring and Autumn of successive years. In Autumn the leaves are translocating energy reserves to storage organs, and in Spring all initial growth draws on stored reserves, thus reducing the vigour of the plant.

The Table below indicates the recommended grouping of camps per herd on the farm unit. This should be considered the absolute minimum number of camps required. Every effort should be made to further combine herds making more camps available per herd, thereby increasing the period of absence, to the benefit of the veld.

Burning of veld, if allowed under Act 43/1983, must be carried out strictly according to the conditions as indicated in the KwaZulu-Natal Veld Burning Guidelines.

Table of recommended camp grouping per herd :

Herd No.	Type of Herd	Camp Numbers	Camp Size (ha)	Herd Size (LSU / SSU)

You will have to decide when each camp/s receives a full growing season's rest while the others in the grouping are grazed in rotation according to the principles set out in section 5.2.

6 All soil conservation structures must be maintained and may not be removed or changed without the prior permission of the Executive Officer.

7

Compiled by : Date :

Rank :

Approved by : Date :
Executive Officer : Act 43/1983

1.9 (A) GRONDBEWARINGSRIGLYNE

1 **Eienaar :** **Plaasnaam :**

Landdrosdistrik : **Verw. Nr. :**

Homogene Boerdery Gebied :

2 'n Voorwaarde van betaling van subsidies onder die verskeie skemas van die Wet op die Bewaring van Landbouhulpbronne (Wet Nr. 43/83) is dat bestuur van die landbouhulpbronne so beheer word dat die risiko van grondverlies en die verdere agteruitgang van die genoemde hulpbronne binne toelaatbare perke gehou word. Die aangehegte kaart en Lys van Werke (Vorm BLW 23/10) dui die werke aan wat deur die Departement van Landbou in aanmerking geneem sal word vir die betaling van subsidies onder genoemde Wet. Die inwerkingstelling van die volgende riglyne is noodsaaklik om te sorg dat die hulpbronne oordeelkundig gebruik word.

3 **Erosie kampe.**

Kamp/e nommer/s ..... moet omhein en van beweiding vir 'n minimum tydperk van drie jaar onttrek word om hervestiging van plantegroei te bevorder. Inlywing van die kampe in 'n wissel-weiding stelsel mag alleenlik plaasvind as 'n skriftelike magtiging van die Uitvoerende Beampte ontvang is : Wet 43/1983, en dan op die wyse soos deur hom aanbeveel. Indien die plantegroei weens goeie reen seisoene voor drie jaar vinnig begin herstel, moet die Voorligtingsbeampte genader word om toestemming te gee dat die gras vir 'n kort tydperk bewei mag word om te verhoed dat dit versmoor. Hy sal die aantal vee en die weidingstydperk wat toelaatbaar is, bepaal.

Werk/e nommer/s ..... is strukture wat aanbeveel word om die stabilisasie/herwinningsprosesse van die verspoelings in die erosiekampe te bespoedig. 'n voorwaarde van finansiele hulp is dat gepaste plantegroei in die sediment, wat agter die strukture opbou, geplant word. Die aanbring van takversperrings, dekgrasbedekking en klippakstrukture in lope langs die hooflope word baie sterk aanbeveel.

4 **Ploegbare grond**

Die ploegbare grond op die plaas word in die tabel hieronder volgens bewaringsvereistes geklassifiseer. Die aanbevole spesifikasies hieronder sal verseker dat die grondeienaar die vereistes van Regulasies 4 tot 6 van Wet 43/1983 nakom.

Land Nr.	Gemiddelde helling (%)	Gemiddelde gronddiepte (mm)	Grond vorm and series of % klei	Klassifikasie kode

Klassifikasie	Bewaringsvereistes
A	Jaarlikse bewerking mag toegepas word sonder beperking.
B	Jaarlikse bewerking met 'n grasrusoes af en toe, en/of spesiale grondbewerkingstegnieke om wind/water erosie te verminder, is noodsaaklik.
C	'n Behoorlike kontoerwalstelsel moet opgerig word. Werk/e nr/s maak voorsiening hiervoor. Jaarlikse bewerking mag uitgevoer word maar moet vergesel word van grasrusoeste af en toe, en/of stoppelbewerkingstegnieke om erosie te verminder.
D	'n Behoorlike kontoerwalstelsel is noodsaaklik. Werk/e nr/s. maak voorsiening hiervoor. Grondverlies tussen die strukture moet verder verminder word deur : * volg jaar van jaarlikse bewerking op met jaar grasrusoeste, en/of * stoppelbewerkingstegnieke soos ingelyf by die spesifikasies vir die voorgestelde kontoerwalstelsel werk/e nr/s.
E	Weens die uiterste erosiegevaar van die landery/e mag geen jaarlikse verbouing plaasvind nie. Die ernstige erosie verliese sal net in toom gehou word deur verbouing van permanente gewasse.
F	Die landery/e gaan agteruit weens ernstige versuiping/verbrakking. Die probleem moet deur ondergrondse dreinering voorkom word. Werk/e nr/s. maak voorsiening hiervoor. Verdere bestuursaanwysings sal by die spesifikasies van bogenoemde werke ingesluit word.
G	Landery/e is/gaan met permanente gras beplant word. Indien jaarlikse bewerking toegepas word, moet die bewaringsvereiste/s gespesifiseer word.

5 **Weiveldbeheer:** Regulasies 9 tot 12 van Wet 43/1983 verels dat natuurlike weidings op 'n plaaseenheid op so 'n wyse benut sal word dat verdere agteruitgang verhoed of verbeter word. Die veld op hierdie plaaseenheid is eerstens in basiese kampe volgens plantsmaaklikheid verdeel, en dan verder in 'n reeks sekondêre kampe vir stelselmatige benutting gegroepeer. Die voorgestelde kampe is soos volg geklassifiseer:

Landvorm		Toestand van veld		
		Goed	Redelik	Swak
Platobergveld				
Aspekte :	Noord			
	Suid			
	Oos			
	Wes			
Vlakte				
Bulte				
Waterbane				
Vleiveld				
Erosiedele				

Om verswakte veld te verbeter en/of veld in 'n goeie toestand te behou, sal dit nodig wees om tussen 25% en 33% daarvan jaarliks vir 'n volle groeiseisoen te rus. Die geruste veld mag gedurende die wintermaande bewei word. Ten opsigte van die kampe wat wel gedurende die reenseisoene bewei word, moet kuddes uit die kampe onttrek word sodra die afnemers (smaaklikste plante) tot 'n hoogte van 50-65 mm afgewei is, maar hulle mag ook nie langer as 14 dae daarin aangehou word nie. Om toe te laat dat die plantegroei voldoende herstel om die

kwaliteit weiding op te bou, behoort die kampe tussen 40 en 70 dae van beweiding onttrek te word. Heersende weersomstandighede gedurende die groeiseisoen sal egter die werklike periodes bepaal.

Geen kampe behoort gedurende dieselfde kritieke seisone, Lente en Herfs, in opeenvolgende jare bewei te word nie. In die Herfs is die blare besig om krag reserwes terug aan die stoororgane te besorg, terwyl lentegroei geheel afhanklik is van gestoorde kragreserwes. Dus put dit die plante uit.

Die onderstaande Tabel toon die aanbevole groepering van kampe per kudde op die plaaseenheid aan. Die aantal kampe moet beskou word as die absolute minimum wat benodig word om goeie veldbestuur te kan toepas. Alle moontlike pogings moet aangewend word om kuddes bymekaar te voeg om sodoende die aantal beskikbare kampe per kudde te vermeerder. Dit sal die periode van onttrekking verleng tot voordeel van die veld.

Brand van veld, indien onder Wet 43/1983 toegelaat, moet streng volgens die bepalings van die KwaZulu-Natal Veldbrandriglyne geskied.

Tabel: Aanbevole kampgroepering per kudde:

Kudde Nr.	Tipe Kudde	Kamp nommers	Grootte (ha)	Kuddegrootte (GVE)

U sal self moet bepaal wanneer elke kamp(e) in elke groepering 'n volle seisoen gerus moet word terwyl die ander om die beurt volgens die beginsels soos hierbo uiteengesit, bewei word.

6 Alle grondbewarings werke moet instand gehou word en mag nie sonder die skriftelike toestemming van die Uitvoerende Beampte verwyder of verander word nie.

7 Opgestel deur: Datum :

Rang :

Goedgekeur deur : Datum :
Uitvoerende Beampte : Wet : Act 43/1983

1.10 SET OF STANDARD FORMS FOR USE IN THE SOIL CONSERVATION SCHEME.

DEPARTMENT OF AGRICULTURE AND WATER SUPPLY

ORDER FOR AERIAL PHOTOGRAPHS

Reference.....

The Director

.....Region

.....

.....

Date.....

The Chief Director: Surveys and Mapping
Private Bag
MOWBRAY
7705

Kindly supply the undermentioned contact prints/enlargements, ... The photographs are required for .....

.....

1. Photographs required in respect of complete jobs:

Job..... complete from strip..... to strip.....

Job..... complete from strip..... to strip.....

2. Photographs required in respect of portion of a job:

Job.....		Job.....	
Strip	Photo numbers	Strip	Photo numbers

.....

for Director, ...Region

(Afrikaans op keersy)

DEPARTEMENT VAN LANDBOU EN WATERVOORSIENING

LUGFOTO-BESTELLINGS

Verwysing .....

Die Direkteur

..... Streek

.....

.....

Datum .....

Die Hoofdirekteur: Opmetings en Kartering
Privaatsak
MOWBRAY
7705

Voorsien asseblief die onderstaande kontakafdrukke/vergrotings, ... Die foto's word benodig vir

.....

.....

1. Foto's benodig ten opsigte van volledige take:

Taak ..... volledig vanaf strook..... tot strook.....

Taak ..... volledig vanaf strook..... tot strook.....

2. Foto's benodig ten opsigte van 'n gedeelte van 'n taak:

Taak		Taak	
Strook	Fotonommers	Strook	Fotonommers

.....

Vir Direkteur, ... Streek

(English on reverse side)

G.P.-S. (81-82)

LA 7/42

DEPARTEMENT VAN LANDBOU EN VISSERYE

BESTELLING VAN LUGFOTOMOSAÏEK

Streek:	(Vir gebruik in Streek.) Volg No.:	(Vir gebruik deur D.G.O.) Mosaïek No.:

Wyk..... Verwysingsnommer..... Kompilasiekaartnommer.....

Applikant..... Datum.....

Beskrywing van eiendom (volgens eiendomsbewys).....

.....

.....

Plaaseenheid bekend as..... Grootte.....ha

Landdrosdistrik.....

Die volgende veldfoto(s) word ingesluit:

Taak	Strook	Fotonommers	Taak	Strook	Fotonommers

BEREKENING VAN VERGROTINGSFAKTOR

1. Kort metode:

$$\frac{\text{skaal van vlugtaak}}{\text{skaal verlang}} = \frac{\qquad}{\qquad} = \text{.....} \text{ (Maksimum: 6,5)}$$

(Vir 'n werkbare skaal van 10 mm = ...m)

2. Metode vir bergagtige gebiede of in geval van foto's met 'n groot skaal:

$$\text{Skaal van foto} = \frac{\text{Afstand op kompilasiekaart tussen twee bakens} \times \text{-skaal van kompilasiekaart}}{\text{Afstand op foto tussen dieselfde bakens.}}$$

$$= \frac{\qquad \times \qquad}{\qquad} = \text{.....}$$

$$\text{Vergrotingsfaktor} = \frac{\text{skaal van foto}}{\text{skaal verlang}} = \frac{\qquad}{\qquad}$$

= ..... (Maksimum: 6,5)

(Vir 'n werkbare skaal van 10 mm = ...m.)

OPMERKINGS

1. *Direkte/saamgestelde vergroting.
2. Mosaïek beslaan figuur soos in sagte potlood omlyn.

.....

.....

(*Skrap waar nie van toepassing.)

....

Streekkontrolebeampte vir Direkteur *Voorligtingsbeampte*

Datum..... Datum.....

N.B.—Afwykings soos byvoorbeeld 'n bestelling "dringend" te merk; klein plasies uitermate te laat vergroot; aanvrae vir mosaïeke van groter gebiede vir globale beplanning, ens. moet hieronder gesertifiseer word.

SERTIFIKAAT

Geval word as verdienstelik gesertifiseer.

.....

Handtekening en rang

Datum.....

(Vir gebruik deur Direkteur-generaal van Opmetings in geval van enige onduidelikheid oor bestelling)

DIE DIREKTEUR,

.....STREEK,

.....

Die bestelling kan vir die volgende rede(s) nie uitgevoer word nie:

.....

.....

.....

.....

Direkteur-generaal van Opmetings

DEPARTMENT OF AGRICULTURE AND WATER SUPPLY

Reference No. .....

Enquiries.....

Telephone No. .....

Office of the.....

.....

.....

..... Postal code .....

Date.....

.....

.....

.....

.....

* | Dr | Mr | Mrs | Miss | |,

CONFIRMATION OF PARTICIPATION IN THE.....SCHEME

1. The farm unit ..... in the Magisterial District of ..... has now been accepted for participation in the above-mentioned scheme. Before any work is undertaken, written consent must be obtained from this office. An application form for this purpose is attached hereto.

2. The following documents, marked with a cross, are attached hereto:

☐ Copy of your application for participation in the scheme.

☐ Farm plan consisting of the following documents:
   (a) Farm map and legend of map symbols.
   (b) List of soil conservation works.
   (c) Resource conservation guidelines.

☐ Application for * Consent * Postponement of expiry date to construct soil conservation works, in quadruplicate (fences separately on one set of forms please).

☐ Application for consent to repair flood damaged soil conservation works, in quadruplicate (fences separately on one set of forms please).

☐ Application for consent to combat invader plants, in quadruplicate.

Yours faithfully,

.....
for *Executive Officer: Act 43/1983.*

* Indicate with an "X" where applicable.

Afrikaans op keersy

DEPARTEMENT VAN LANDBOU EN WATERVOORSIENING

Verwysing No. .....

Navrae .....

Telefoon No. .....

Kantoor van die .....

.....

.....

..... Poskode .....

Datum .....

.....

.....

.....

.....

* Dr. | Mnr. | Mev. | Mej. | ,

BEVESTIGING VAN DEELNAME AAN DIE ..... SKEMA

1. Die plaaseenheid..... in die landdrosdistrik..... is nou vir deelname aan die bogemelde skema ingeskryf. Alvorens enige werk onderneem word, moet u eers skriftelike toestemming daartoe van hierdie kantoor verkry. 'n Vorm waarop u aansoek vir so 'n toestemming kan doen, gaan hierby vir u gebruik.

2. Die volgende dokumente met 'n kruisie gemerk, is hierby aangeheg:

☐ Afskrif van u aansoek om deelname aan die skema.

☐ Plaasplan wat uit die volgende stukke bestaan:
   (a) Plaaskaart en plaaskaartsimbole.
   (b) Lys van grondbewaringswerke.
   (c) Hulpbronbeskermingsriglyne.

☐ Aansoek om * Toestemming * Uitstel van vervaldatum om grondbewaringswerke op te rig, in viervoud (heinings afsonderlik op een stel vorms asseblief).

☐ Aansoek om toestemming om vloedbeskadigde grondbewaringswerke te herstel, in viervoud (heinings afsonderlik op een stel vorms asseblief).

☐ Aansoek om toestemming om indringerplante te bestry, in viervoud.

Die Uwe,

.....
namens *Uitvoerende Beampte: Wet 43/1983.*

* Dui aan met 'n "X" waar van toepassing.

English overleaf

G.P.-S. 020-0442 BLW 23/29

DEPARTMENT OF AGRICULTURE AND WATER SUPPLY

Reference	Head Office:	Region:

SOIL CONSERVATION SCHEME: APPLICATION FOR PARTICIPATION

Name: * | Dr | Mr | Mrs | Miss | | .....

Capacity * | Registered owner | Assignee of owner | Guardian | Buyer | Usufructuary | |

Farm unit..... Magisterial District .....

Telephone number..... (code) .....(number)

Postal address .....

..... Postal code.....

†I/We, the undersigned, hereby apply to enter the above-mentioned farm unit for participation in the Soil Conservation Scheme.

Full names	Identity number	Date of birth

COMPOSITION OF THE FARM UNIT

Description as per title deed	Extent, ha	Title deed: No. and year

†I/We undertake—

to abide by the provisions of the Conservation of Agricultural Resources Act (Act 43 of 1983), the regulations promulgated thereunder and the conditions which may be applicable to the Soil Conservation Scheme from time to time, which include inter alia, the conditions for the payment of subsidy as shown overleaf.

Signature of owner(s)..... Date .....

Countersigned ..... Date .....

* | Owner | Co-owner(s) | Spouse |

FOR OFFICE USE IN REGION

Location of land	Map grid reference	Drainage region	Catchment area	Sub catchment area
	.....	.....	.....	.....

Previous planning to Head Office	Name of previous owner	Regional reference	Head Office reference
	.....	.....	.....

* Indicate with an "X" where applicable.
† Delete whichever is not applicable.

(Hierdie vorm is ook in Afrikaans verkrygbaar)

CONDITIONS REGARDING PAYMENT OF SUBSIDY

1. The construction of soil conservation works on which subsidy is desired may only be commenced with after—
   (a) the works have been taken up in the farm plan and the list of works of the land concerned; and
   (b) written approval thereto has been obtained from the executive officer.
   The mere possession of departmental specifications is no authority to commence with any work.
2. Completed soil conservation works must conform to departmental specifications and requirements.
3. On completion of the works, notice to that effect must be given in writing within the period granted for the construction of the works. Should it not be possible to complete a work within the stipulated time, the local extension office must be approached before the expiry date of the consent for postponement of that particular date. Such postponement is subject to the availability of funds.
4. Subsidy is payable only when funds are available, but is calculated according to the tarriffs which are applicable at the date on which the department is given written notice that the works have been completed.
5. Subsidy on a soil conservation work which exceed departmental specifications but is nevertheless acceptable to the executive officer, will be calculated as if the work has been constructed according to the proposed specifications.
6. Subsidised soil conservation works must be maintained at the expense of the land owner to the satisfaction of the executive officer and may not be altered, destroyed or removed without prior written permission of the executive officer.
7. If a person to whom subsidy has been paid—
   (a) has furnished false information as a result of which he has received excessive subsidy; or
   (b) has infringed or failed to comply with any condition subject to which the payment of subsidy was made;
   the executive officer may, apart from any action that may be taken in terms of section 23 of the Conservation of Agricultural Resources Act (1983), demand that such person refund the full amount of the subsidy paid to him, together with interest thereon calculated from the date of payment of the subsidy.
8. Any overpayment as a result of a departmental miscalculation is recoverable.
9. Although the department provides plans, specifications and other advice in connection with the construction of soil conservation works, it does not accept liability for anything done in good faith in terms of the provisions of the Conservation of Agricultural Resources Act (1983).

REQUIREMENTS IN CONNECTION WITH THE COMPLETION OF THE APPLICATION

1. WOMEN OWNERS

   In signing the application, a married woman must be assisted by her husband, unless she can produce proof that she is lawfully empowered to act without his assistance.

2. MINORS

   Besides the full name, date of birth and identity number of the minor, the full name of the guardian who signs the application, must also be stated.

3. JOINT OWNERS, PARTNERSHIP AND CLOSED CORPORATIONS

   Full names of all the joint owners, partners or members must be given and the application must be signed by all of them, unless one of the joint owners, partners or members is authorised to sign on their behalf, in which case the power of attorney must be submitted. In the case of closed corporations, a copy of the founding statement is required.

4. COMPANIES, MUNICIPALITIES AND CHURCH ASSOCIATIONS
   - All applications in favour of companies must be accompanied by a resolution of the board of directors, assigning a person to act on their behalf.
   - The mayor and the town clerk are generally accepted as representatives of a municipality. The official title of the person must however be given opposite his signature. Should any other person officiate on behalf of a municipality his action must be authorised by a resolution of the Board.
   - In the case of a church association, the signatures of the chairman and secretary of the controlling body (church council) is required. The signatures must be affirmed by the relevant official titles.

5. ESTATES

   Letters of Administration must accompany the application.

6. AGENTS AND AUTHORISED PERSONS

   A written, duly stamped power of attorney must accompany the application.

7. TRUSTS

   An application in the name of a trust must be accompanied by proof of the establishment of the trust, as well as the nomination of the trustee(s).

Voortsettingsblad/Continuation Sheet No.....

LYS VAN GRONDBEWARINGSWERKE VOLGENS PLAASKAART No.....
LIST OF SOIL CONSERVATION WORKS AS PER FARM MAP

Werk No./Work No. Groep/Group			Ligging volgens plaaskaart Location as per farm map	Beskrywing en doel van werk Description and purpose of work	Afmetings Measurements
1	2	3			

Opgestel deur: Compiled by:	Rang: Rank:	Kantoor: Office:	Datum: Date:
Nagesien deur: Checked by:	Rang: Rank:	Kantoor: Office:	Datum: Date:
Goedgekeur: Approved:	Rang: Rank:	Kantoor: Office:	Datum: Date:

DEPARTMENT OF AGRICULTURAL DEVELOPMENT

SOIL CONSERVATION SCHEME: NUMBER OF ANIMALS ON FARM UNIT

I, the undersigned ..... land user of the farm unit ..... Magisterial District ..... hereby declare that the number of animals at present being kept on this farm unit, irrespective of ownership, is comprised as follows:

CATTLE

	Factor	Number on veld grazing	Number on remainder of farm unit
Dairy, Breed:			
Calf, unweaned			
Weaners, 7 months+			
Cow/Heifer, 2 tooth+			
Steer, 18 months+			
Steer, 3 years+			
Bull, 3 years+			
Beef, Breed:			
Calf, unweaned			
Weaners, 7 months+			
Cow/Heifer, 2 tooth+			
Steer, 18 months+			
Steer, 3 years+			
Bull, 3 years+			
Other, Breed:			
Calf, unweaned			
Weaners, 7 months+			
Cow/Heifer, 2 tooth+			
Steer, 18 months+			
Steer, 3 years+			
Bull, 3 years+			

SMALL STOCK

	Factor	Number on veld grazing	Number on remainder of farm unit
Sheep, Breed:			
Lamb, unweaned			
Weaners, 4 months+			
Ewe, 2 tooth+			
Wether, 2 tooth+			
Ram, 2 tooth+			
Sheep, Breed:			
Lamb, unweaned			
Weaners, 4 months+			
Ewe, 2 tooth+			
Wether, 2 tooth+			
Ram, 2 tooth+			

SMALL STOCK

	Factor	Number on veld grazing	Number on remainder of farm unit
Goats, Breed:			
Kid, unweaned			
Weaners, 4 months+			
Ewe, 2 tooth+			
Castrate, 2 tooth+			
Ram, 2 tooth+			
Goats, Breed:			
Kid, unweaned			
Weaners, 4 months+			
Ewe, 2 tooth+			
Castrate, 2 tooth+			
Ram, 2 tooth+			

HORSES, MULES, DONKEYS AND PONIES

	Factor	Number on veld grazing	Number on remainder of farm unit
Kind:			
Foal, unweaned			
Young animal			
Mare			
Stallion or gelding			

OSTRICHES

	Factor	Number on veld grazing	Number on remainder of farm unit
Chicken			
Young ostrich			
Mature ostrich			

GAME

	Factor	Number on veld grazing	Number on remainder of farm unit
Kind:			
Calf/Lamb/Piglet			
Young animal			
Cow/Ewe/Sow			
Bull/Ram/Boar			
Kind:			
Calf/Lamb/Piglet			
Young animal			
Cow/Ewe/Sow			
Bull/Ram/Boar			

....

Signature of deponent *Date*

FOR OFFICE USE ONLY

Conversion: Animals on veld grazing .....LSU. Animals on remainder of farm unit.....LSU.

Converted by..... Checked by .....

Afrikaans op keersy

DEPARTEMENT VAN LANDBOU-ONTWIKKELING

GRONDBEWARINGSKEMA: GETAL DIERE OP PLAASEENHEID

Ek, die ondergetekende..... grondgebruiker van die plaaseenheid..... landdrosdistrik.....
verklaar hiermee dat die getal diere wat op hierdie plaaseenheid aangehou word, ongeag aan wie hulle ookal mag behoort, soos volg saamgestel is:

BEESTE

	Faktor	Getal op veld-weiding	Getal op res van plaas
Melkbeeste, Ras:			
Kalf, ongespeen.....			
Jong diere, 7 maande+			
Koei/Vers, 2 tand+			
Os, 18 maande+			
Os, 3 jaar+			
Bul, 3 jaar+.....			
Vleisbeeste, Ras:			
Kalf, ongespeen.....			
Jong diere, 7 maande+			
Koei/Vers, 2 tand+			
Os, 18 maande+			
Os, 3 jaar+			
Bul, 3 jaar+.....			
Ander soort beesras:			
Kalf, ongespeen.....			
Jong diere, 7 maande+			
Koei/Vers, 2 tand+			
Os, 18 maande+			
Os, 3 jaar+			
Bul, 3 jaar+.....			

KLEINVEE

	Faktor	Getal op veld-weiding	Getal op res van plaas
Skape, Ras:			
Lam, ongespeen.....			
Speenlammers, 4 maande+..			
Ooi, 2 tand+			
Hamel, 2 tand+			
Ram, 2 tand+			
Skape, Ras:			
Lam, ongespeen.....			
Speenlammers, 4 maande+..			
Ooi, 2 tand+			
Hamel, 2 tand+			
Ram, 2 tand+			

KLEINVEE

	Faktor	Getal op veld-weiding	Getal op res van plaas
Bokke, Ras:			
Lam, ongespeen.....			
Speenlammers, 4 maande+..			
Ooi, 2 tand+			
Kapater, 2 tand+			
Ram, 2 tand+			
Bokke, Ras:			
Lam, ongespeen.....			
Speenlammers, 4 maande+..			
Ooi, 2 tand+			
Kapater, 2 tand+			
Ram, 2 tand+			

PERDE, MUILE, DONKIES EN PONIES

Soort:			
Vul, ongespeen.....			
Jong dier.....			
Merrie			
Hings of reun			

VOLSTRUISE

Kuiken			
Jong volstruis.....			
Volwasse volstruis			

WILD

Soort:			
Kalf/Lam/Varkie			
Jong dier.....			
Koei/Ooi/Sog			
Bul/Ram/Beer			
Soort.....			
Kalf/Lam/Varkie			
Jong dier.....			
Koei/Ooi/Sog			
Bul/Ram/Beer			

....
Handtekening van verklaarder *Datum*

SLEGS VIR KANTOORGEBRUIK

Omrekening: Diere op veldweiding .....GVE. Diere op res van plaaseenheid.....GVE.

Omreken deur..... Nagesien deur.....

English overleaf

G.P.-S. 020-0409

DEPARTEMENT VAN LANDBOU EN WATERVOORSIENING

BLW 23/22

Verwysings	HK:	Streek:

GRONDBEWARINGSKEMA: Aansoek om * **Toestemming** * **Uitstel van vervaldatum van 'n toestemming** **Om grondbewaringswerke op te rig waarop subsidie verlang word.**

Geregistreerde eienaar(s) van plaaseenheid (van en voorletters)	
Posadres	Poskode
Plaaseenheid	Landdrosdistrik
†Ek Ons (volle naam)	in †my ons hoedanigheid

as * Geregistreerde eienaar(s) | Voog | Gevolmagtigde van die eienaar | Vruggebruiker

van bogenoemde plaaseenheid wat onder die Grondbewaringskema ingeskryf is, doen hiermee aansoek om:

* ☐ toestemming om die volgende grondbewaringswerke waarop subsidie verlang word, op te rig. Die beplande aanvangsdatum is:

* ☐ uitstel van die vervaldatum van die toestemming vir die oprigting van die volgende grondbewaringswerke waarmee ek tans besig is:

Werk No.	Soort werk en besonderhede daarvan (Indien heining, dui die lengte en getal lyndrade aan)

†Ek Ons is bewus van die bepalings van die Wet op die Bewaring van Landbouhulpbronne, 1983 (Wet 43 van 1983), die regulasies daarkragtens uitgevaardig en die voorwaardes wat van tyd tot tyd op die Grondbewaringskema van toepassing mag wees en wat onder andere die voorwaardes vir die uitbetaling van subsidie insluit soos op (a) die keersy van die AANSOEK OM DEELNAME AAN DIE SKEMA en (b) die keersy van hierdie TOESTEMMING verskyn.

Handtekening van aansoeker(s) | Datum | Tel. No.

Aan ..... Kantoor van die .....

.....

.....

.....

* Dr. | Mnr. | Mev. | Mej.

Datum

* TOESTEMMING * UITSTEL VAN VERVALDATUM VIR DIE OPRIG VAN GRONDBEWARINGSWERKE:

1. Hierdie aansoek is goedgekeur ten opsigte van grondbewaringswerke No.(s)
2. Hierdie werke sal slegs vir subsidie oorweeg word indien u voor *Vervaldatum *Uitsteldatum kennis gee dat die werke voltooi is en daar by inspeksie gevind word dat die betrokke werke aan die vereistes van die skema voldoen.
3. Die volgende dokumente met 'n kruisie gemerk, is hierby aangeheg:
   - ☐ Spesifikasies vir heinings.
   - ☐ Spesifikasies vir standaard veesuipingstelsels.
   - ☐ Planne en spesifikasies vir werk(e) No.(s)
4. Fakture vir die aankoop van vir werk(e) No.(s) moet bewaar word vir insae.
5. Die subsidie op die betrokke werke word soos volg beraam:

Werk No.					
Bedrag R					

6. Opmerkings .....

.....

.....

.....

Die Uwe.

† Skrap wat nie van toepassing is nie.
* Dui aan met "X" waar van toepassing.

.....
namens Uitvoerende Beampte: Wet 43 1983

(This form is also available in English)

Vir voorwaardes, kyk anderkant

7. Hierdie toestemming is onderhewig aan die voorwaardes as volg met kruisies gemerk:

☐ Die uitbetaling van subsidie is onderhewig aan die beskikbaarheid van fondse.

☐ Subsidie sal eers betaal word nadat 'n gewaarmerkte afskrif van u transportakte ontvang is.

☐ Subsidie op kampheinings sal eers betaal word as veesuipings in die betrokke kampe beskikbaar is.

☐ Die veegetal moet binne 12 maande tot binne perke van die neergelegde weidingskapasiteit verminder word en die werke sal eers vir subsidie oorweeg word nadat die verminderde veegetal in 'n nuwe veeregister bevestig is.

☐ Toestemming om 'n afleibaan met 'n meerjarige gras te vestig sal eers uitgereik word nadat die afleibaan gebou en die konstruksiewerk bevredigend gevind is.

☐ Subsidie op heinings om 'n begrasde afleibaan af te kamp, sal eers betaal word nadat die meerjarige gras gevestig is.

☐ Subsidie sal eers op kontoerwalle betaal word as die afleibaan(-bane) waarin dit uitmond bevredigend voltooi is.

☐ Nadat erosieheining(s), werk(e) No.(s) ..... opgerig is, mag geen vee in die afgekampte erosie-kwesbare terrein(e), Kamp(e) No.(s) E ..... vir minstens 3 jaar na die datum van die Verklaring vir Finansiële Bystand op Voltooide Binneheinings, sonder my skriftelike toestemming toegelaat word nie.

☐ As gevolg van die aard en omvang van werk(e) No.(s) .....is dit noodsaaklik dat konstruksie-inspeksies uitgevoer moet word namate die werk vorder. U moet asseblief u Voorligtingskantoor verwittig wanneer u met die werk begin sodat daar tydig gereël kan word vir die nodige konstruksie-inspeksies.

☐ Vereistes van die volgende owerheidsinstansies:

(a) **Padowerheid/Spoorwegowerheid:*

Subsidie op werk(e) No.(s):.....sal alleenlik betaal word indien u 'n skriftelike toestemming van die betrokke owerheid voorsien wat u magtig om die pyplyn(e) onderdeur die publieke *pad/spoorlyn te lê.

(b) .....

.....

.....

.....

.....

☐ .....

.....

.....

.....

.....

.....

☐ .....

.....

.....

.....

.....

.....

namens Uitvoerende Beampte: Wet 43 1983 | *Rang* | *Datum*

* Skrap wat nie van toepassing is nie

BLW 23/24

DEPARTMENT OF AGRICULTURE AND WATER SUPPLY

Ref. No.....

PRELIMINARY REPORT ON NON-STANDARD WORKS

1. (a) Participant.....
   (b) Postal address.....
   (c) Farm unit..... (g) Work No.....
   (d) Magisterial District..... (h) Kind of work.....
   (e) Extension Office..... (i) Purpose.....
   (f) Date of inspection..... (j) Farm Plan No.....

2. Quantity and details of materials*:

	Subsidy tariff	R	c
TOTAL.....			

Remarks.....

.....

.....

	Drawn up by	Subsidy tariff checked	Technically checked	Plans and specifications approved
Officer.....				
Rank.....				
Date.....				

* Full details must be furnished to determine the subsidy tariff.

(Afrikaans op keersy)

DEPARTEMENT VAN LANDBOU EN WATERVOORSIENING

Verw. No.....

VOORLOPIGE VERSLAG VAN NIE-STANDAARDWERKE

1. (a) Deelnemer.....
   (b) Posadres.....
   (c) Plaaseenheid..... (g) Werk No.....
   (d) Landdrosdistrik..... (h) Soort werk.....
   (e) Voorligtingskantoor..... (i) Doel.....
   (f) Datum van inspeksie..... (j) Plaasplan No. .....

2. Hoeveelhede en besonderhede van materiale*:

	Subsidie-tarief	R	c
TOTAAL.....			

Opmerkings.....

.....

.....

	Opgestel deur	Subsidietarief nagesien	Tegnies nagesien	Planne en spesifikasies goedgekeur
Beampte.....				
Rang.....				
Datum.....				

* Volledige besonderhede moet verstrek word om die subsidietarief te bepaal.

(English on reverse side)

BLW 23/11

DEPARTMENT OF AGRICULTURE AND WATER SUPPLY

COST SHEET: STANDARD/NON STANDARDISED STOCK-WATERING SYSTEM

(Afrikaans op keersy)

Ref .....

Participant .....

Farm unit ..... Magisterial District .....

Details of system				Work No	
				Tariff	Subsidy
Main reservoir in camp	Type of material:				
	Internal diameter: metre	Internal depth: metre		R.....	R.....
.....	Fencing in of reservoir:			R.....	R.....
Aux. reservoir in camp	Type of material:				
	Internal diameter: metre	Internal depth: metre		R.....	R.....
.....	Fencing in of reservoir:			R.....	R.....
Aux. reservoir in camp	Type of material:				
	Internal diameter: metre	Internal depth: metre		R.....	R.....
.....	Fencing in of reservoir:			R.....	R.....

PIPELINES: SUPPLY AND RETICULATION

Material	Class	Diameter (mm)	Length (m)		
.....				R.....	R.....
.....				R.....	R.....
.....				R.....	R.....
.....				R.....	R.....
.....				R.....	R.....
.....				R.....	R.....
.....				R.....	R.....
.....				R.....	R.....

DRINKING TROUGHS

Material	Rectangular			Circular		Number		
	Width mm	Depth mm	Length m	Ø m	Depth mm			
.....							R.....	R.....
.....							R.....	R.....
.....							R.....	R.....
.....							R.....	R.....
.....							R.....	R.....
							TOTAL	R.....

1 trough per camp in .....

..... troughs per camp in .....

..... troughs per camp in .....

Compiled by ..... Rank ..... Date .....

Checked by ..... Rank ..... Date .....

G.P.-S. 020-0383 BLW 23/11

DEPARTEMENT VAN LANDBOU EN WATERVOORSIENING

KOSTESTAAT: STANDAARD/NIE-STANDAARD VEESUIPINGSTELSEL

(English on reverse side)

Verw .....

Deelnemer .....

Plaaseenheid ..... Landdrosdistrik .....

Besonderhede van stelsel				Werk No	
				Tarief	Subsidie
Hoofreservoir in kamp	Tipe materiaal:				
	Binnediameter: meter	Binnediepte: meter		R.....	R.....
.....	Omheining van reservoir:			R.....	R.....
Hulpreservoir in kamp	Tipe materiaal:				
	Binnediameter: meter	Binnediepte: meter		R.....	R.....
.....	Omheining van reservoir:			R.....	R.....
Hulpreservoir in kamp	Tipe materiaal:				
	Binnediameter: meter	Binnediepte: meter		R.....	R.....
.....	Omheining van reservoir:			R.....	R.....

PYPLEIDING: TOEVOER EN VERBINDINGSPYPE

Materiaal	Klas	Diameter (mm)	Lengte (m)		
				R.....	R.....
				R.....	R.....
				R.....	R.....
				R.....	R.....
				R.....	R.....
				R.....	R.....
				R.....	R.....
				R.....	R.....

SUIPKRIPPE

Materiaal	Langwerpig			Rond		Getal		
	Wydte mm	Diepte mm	Lengte m	Ø m	Diepte mm			
							R.....	R.....
							R.....	R.....
							R.....	R.....
							R.....	R.....
							R.....	R.....

1 suipkrip per kamp in .....

..... suipkrippe per kamp in .....

..... suipkrippe per kamp in .....

TOTAAL R.....

Opgestel deur ..... Rang ..... Datum .....

Nagesien deur ..... Rang ..... Datum .....

BLW 23/25

DEPARTMENT OF AGRICULTURE AND WATER SUPPLY

Reference numbers: Directorate..... Region .....

REPORT ON COMPLETED INTERNAL FENCES AND STATEMENT FOR FINANCIAL ASSISTANCE

Name of participant.....

Postal address..... Postal code .....

Farm unit..... Magisterial district .....

Full name of declarant and capacity.....

COMPOSITION OF FENCES (Indicate portion of fence constructed with new material separately from portion constructed with used material)					
Work No. of fence (one per column).....					
Length of fence (m).....					
Height of fence (m).....					
Spacing of straining posts (m).....					
Spacing of standards (m).....					
Number of droppers per spacing.....					
Number of barbed wires.....					
Number of plain wires					
Prefabricated fence (Yes/No).....					
Wire netting in fence (Yes/No)					
Width of wire netting (mm)					
Erosion fence (Yes/No).....					
Camp fence: Large stock (Yes/No)					
Camp fence: Mixed stock (Yes/No).....					
Camp fence: Small stock (Yes/No)					
Camp fence: Game-proof (Yes/No)					
Jackalproof fence (Yes/No).....					
Used material in fence (Yes/No)					

I, the undersigned, hereby declare that every fence, the details of which are stated above—

(a) complies to the best of my knowledge, with the minimum requirements of the Department of Agriculture and Water Supply;
(b) is of the dimensions as stated; and
(c) has been constructed with new material, unless otherwise indicated.

I further declare that I am aware of the fact that financial assistance is rendered for the fences mentioned, on the information set out in this statement and that the amount paid will become repayable should the information furnished prove to be incorrect.

Signed at.....this.....day of.....19.....

As witnesses:1.....

2..... .....
Signature of declarant

Details appear against each item and the work numbers and lengths have been verified with the farm planning documents.

....
Signature and rank of officer *Extension Office* *Date*

FOR USE BY DIRECTORATE ONLY

Work No.....: Length.....m × R...../ m = R .....

Work No.....: Length.....m × R...../ m = R .....

Work No.....: Length.....m × R...../ m = R .....

Work No.....: Length.....m × R...../ m = R .....

Work No.....: Length.....m × R...../ m = R .....

Total amount.....R.....

Checked and amount calculated

.....
Signature and date

Payment approved

.....
Signature and date

Afrikaans op keersy

G.P.-S. 020-0444 BLW 23/25

DEPARTEMENT VAN LANDBOU EN WATERVOORSIENING

Verwysingsnommers: Direktoraat..... Streek .....

VERSLAG OOR VOLTOOIDE BINNEHEININGS EN VERKLARING VIR FINANSIËLE BYSTAND

Naam van deelnemer.....

Posadres ..... Poskode.....

Plaaseenheid..... Landdrosdistrik .....

Volle naam van verklaarder en hoedanigheid .....

SAMESTELLING VAN HEININGS
(Dui gedeelte van heining gespan met nuwe materiaal afsonderlik aan van gedeelte waarin gebruikte materiaal voorkom)

Werknommer van heining (een per kolom)					
Lengte van heining (m)					
Hoogte van heining (m).....					
Spasiëring van trekpale (m)					
Spasiëring van lynpale (m).....					
Getal sparre per spasiëring.....					
Getal doringdrade					
Getal gladde drade					
Geweefde heining (Ja/Nee)					
Ogiesdraadheining (Ja/Nee).....					
Wydte van ogiesdraad (mm)					
Erosieheining (Ja/Nee)					
Kampheining: Grootvee (Ja/Nee)					
Kampheining: Gemengde vee (Ja/Nee).....					
Kaapheining: Kleinvee (Ja/Nee)					
Kampheining: Wildwerend (Ja/Nee)					
Jakkalsheining (Ja/Nee)					
Gebruikte materiaal in heining (Ja/Nee).....					

Ek die ondergetekende verklaar hiermee dat elke heining waarvan die samestelling hierbo verstrek is—

(a) na die beste van my wete aan die minimum vereistes van die Departement van Landbou en Watervoorsiening voldoen;
(b) dat die afmetings soos verstrek juis is; en
(c) dat die materiaal nuut is, tensy anders aangedui.

Ek verklaar voorts dat ek bewus is dat finansiële bystand op gemelde heinings verleen word op die inligting hierbo verstrek en dat die bedrag betaal onmiddellik terugbetaalbaar sal wees indien dit sou blyk dat hierdie inligting onjuis is.

Geteken te .....hierdie .....dag van .....19.....

As getuies: 1.....

2..... .....
Handtekening van verklaarder

Besonderhede verskyn teenoor elke item en die werknommers en lengtes is met die plaasbeplanningsdokumente gekontroleer.

....
Handtekening en rang van beampte *Voorligtingskantoor* *Datum*

SLEGS VIR GEBRUIK DEUR DIREKTORAAT

Werkno.....: Lengte.....m × R...../ m = R	.....	Nagesien en bedrag bereken
Werkno.....: Lengte.....m × R...../ m = R	.....	
Werkno.....: Lengte.....m × R...../ m = R	.....	.....
Werkno.....: Lengte.....m × R...../ m = R	.....	*Handtekening en datum*
Werkno.....: Lengte.....m × R...../ m = R	.....	Uitbetaling goedgekeur
Totale bedrag.....R.....	.....	.....
		Handtekening en datum

English overleaf

DEPARTMENT OF AGRICULTURAL DEVELOPMENT

Reference: Directorate Region

CONTROL INSPECTION REPORT: CAMP FENCES

Name of participant .....

Postal address ..... Postal code .....

Farm unit ..... Magisterial district .....

Date notice was given inducing inspection ..... Date of inspection .....

Work number of fence				
Length declared in metre				
Findings during inspection: Length of fence in metre				
Height of fence in millimetre				
Straining posts: Type and spacing				
Standards: Type and spacing				
Droppers: Type and number per space				
New barbed wire: Number and diameter				
Old barbed wire: Number and diameter				
New plain wire: Number and diameter				
Old plain wire: Number and diameter				
Woven mesh fence (state brand name)				
Wire netting: Width				
Are straining posts anchored?				
Are wire strands correctly spaced?				
Are wire strands wound around straining posts?				
Is fence sturdy and stock proof?				
Is position of fence correct?				

Work Nos. ..... are acceptable. Work Nos. ..... must be improved and the following recommendations were made to the land user .....

.....

.....

Additional remarks .....

I hereby certify that I have inspected the works and that I have found same as stated above.

.....	.....	.....	.....
Signature of inspecting officer	*Rank*	*Office*	*Date*

FOR USE OF DIRECTORATE ONLY

Subsidy already paid				
Subsidy calculated according to this report				
Difference (Plus in blue—Minus in red)				

Total for payment/rejection R .....

Afrikaans op keersy

G.P.-S. 020-0560

DEPARTEMENT VAN LANDBOU-ONTWIKKELING

Verwysings: Direktoraat Streek

KONTROLE-INSPEKSIEVERSLAG: KAMPHEININGS

Naam van deelnemer .....

Posadres ..... Poskode .....

Plaaseenheid ..... Landdrosdistrik .....

Datum kennis gegee wat tot inspeksie gelei het ..... Datum van inspeksie .....

Werknommer van heining				
Lengte verklaar in meter				
Bevindings tydens inspeksie:				
Lengte van heining in meter				
Hoogte van heining in millimeter				
Trekpale: Tipe en spasiëring				
Lynpale: Tipe en spasiëring				
Sparre: Tipe en getal per spasie				
Nuwe doringdraad: Getal en diameter				
Ou doringdraad: Getal en diameter				
Nuwe gladdedraad: Getal en diameter				
Ou gladdedraad: Getal en diameter				
Geweefde maasheining (meld handelsnaam)				
Ogiesdraad: Wydte				
Is trekpale geanker?				
Is lyndrade korrek spasieer				
Is lyndrade om trekpaal gedraai?				
Is heining stewig en veewerend?				
Is posisie van heining korrek?				

Werke Nos. .....is aanvaar. Werke Nos. .....moet verbeter word en die volgende voorstelle vir verbetering is aan die grondgebruiker gemaak .....

.....

.....

Verdere opmerkings .....

Hiermee word gesertifiseer dat ek die werke geïnspekteer het en dat ek dit soos hierbo vermeld gevind het.

.....	.....	.....	.....
Handtekening van inspekterende beampte	*Rang*	*Kantoor*	*Datum*

SLEGS VIR GEBRUIK DEUR DIREKTORAAT

Subsidie reeds betaal				
Subsidie bereken volgens dié verslag				
Verskil (Plus in blou—Minus in rooi)				

Totaal vir uitbetaling/afkeuring R .....

English overleaf

BLW 23/34

DEPARTMENT AGRICULTURE AND WATER SUPPLY

References	Directorate:	Region, Subregion and Extension Office:

FINAL REPORT ON COMPLETED NON-STANDARD STOCKWATERING SYSTEM

Applicant:		
Postal address:		Postal code
Farm unit:	Magisterial District:	
Work No.:	Expiry date of consent:	Date completion was notified:

DETAILS OF SYSTEM

					Subsidy tariff	Subsidy
Main reservoir	Material used:			Fenced off: *Yes/No		
	Internal diameter: m	Internal depth: m	Wall thickness: mm		R.....	R.....
Buffer reservoir	Material used:			Fenced off: *Yes/No		
	Internal diameter: m	Internal depth: m	Wall thickness: mm		R.....	R.....

Pipe lines (supply and distribution pipes)

Material	Class	Diameter mm	Length m	Working head m		
					R.....	R.....
					R.....	R.....
					R.....	R.....
					R.....	R.....
					R.....	R.....
					R.....	R.....
					R.....	R.....

SABS mark	Seen ☐	Not seen ☐	Depth pipes laid mm

Drinking troughs

Material	Rectangular			Circular		Number		
	Width mm	Depth mm	Length m	Diameter m	Depth mm			
							R.....	R.....
							R.....	R.....
							R.....	R.....
							R.....	R.....

Remarks .....

Total	R

For use by directorate only

Subsidy calculation checked

..... *Signature and date*

Payment approved

..... *Signature and date*

Hereby is certified that I have inspected the work and that I have compiled the report; that the work has been erected as specified above; and that the applicant gave notice on the date mentioned above that the work was ready for inspection.

..... *Signature* ..... *Rank* ..... *Office* ..... *Date*

The report has been technically checked, the work conforms to departmental requirements and is recommended for subsidy.

..... for *Director* ..... *Region* ..... *Date*

Afrikaans op keersy

* *Delete which is not applicable.*

2. THE HYDROLOGIC DESIGN OF WATER BEARING STRUCTURES

The SCS method of runoff intensity prediction will be used in the case of designs of structures on cultivated land, and the Rational Method in the case of natural catchments for storage dam and gulley stabilization design. The norms to be used in both cases are contained in sections 2.1.1 and 2.1.2 below.

Rainfall intensity - duration - frequency for design purposes will be used as follows:

* for earthen type structures for erosion control on cultivated land :
  a 1 in 10 year frequency storm,

* for concrete lined structures for erosion control on cultivated land :
  a 1 in 25 year frequency storm,

* for all waterbearing structures on natural water courses having a catchment area of 25 ha and less :
  a 1 in 10 year frequency storm,
  for all waterbearing structures on natural water courses having a catchment area of 26 ha and more :
  a 1 in 25 year frequency storm,

* for all structures on watercourses within 500 metres either side of a public utility (i.e. road, rail, etc.): as specified by the Soil Conservation Engineer (CADI) and approved by the Chief Engineer of the organization concerned.

Freeboard to be used : as specified separately in the following chapters.

Five hundred hectares will be the largest size catchment area off which a SCO may calculate runoff intensity without the assistance of the Soil Conservation Engineer (SCE). Thereafter the SCE will calculate the design flood and supply the SCO with the details.

2.1 NORMS FOR PEAK FLOOD AND MAR DETERMINATION.

2.1.1 THE S.C.S. METHOD FOR USE IN GRASSED WATERWAY CALCULATIONS

$$Q = \frac{0,224 \times A \times da}{100 \times tc} \qquad m^3/s$$

The Soil Conservation Service method is to be used for grassed waterways and the non-standard contour banks on the calculation sheet supplied. The steps referred to below, and as they appear in the calculation sheet, need some explanation:

Step 1 This entails filling in the front page of the calculation sheet completely.

* A separate sheet is to be filled in for each design location, e.g. top of waterway, bottom of waterway, change of slope, etc.

* Coastal rainfall events are characterised by frontal types of long duration, while inland rainfall zones experience convective type thunderstorms. *For design purposes the entire KwaZulu-Natal region will be considered to be characterised by convective type thunderstorms.*

Step 2 Determine time of concentration in the normal manner. Figure 1 is a guide. Use 0,6 m/s for flow in contour bank canals at 1 : 200 grade and the chosen (design) velocity down waterways. When dealing with natural catchments above lands, note that overland flow tends to concentrate after ± 300 metres. Use the velocity (Figure 1) for small grassed water courses, upland gulleys, natural channels thereafter.

Step 3 With time of concentration known, determine the size of d_1 and d_2 using Figure 2.

Step 4 Determine the average Hydrologic Soil Grouping (HSG) of the soil(s) occurring in the catchment (Table 1). Each unit of adjustment is worth half a grade, e.g. A to A/B.

Step 5 Correct choice of Runoff Curve Number (CN) is very important. Table 5 refers. Hydrological condition refers to the capability of the landuse treatment to promote infiltration and thereby reduce runoff. The worst condition during peak rainfall intensities will be used for design purposes. In the case of semi-permanent crops such as sugarcane and pineapples, the planting pattern must be known. In the case of sugarcane, the landuse plan should indicate what proportion of land in the catchment will be in a replant stage and what proportions at that time should be under limited, partial and full cover. If this information is not available, use the average CN of the four. Minimum tillage in the system will allow the designer to ignore the bare fallow situation, and then the average CN may be derived from limited, partial and full cover only.

Step 6 Runoff depths de_2 and de_1 (relating to storm depth d_2 and d_1) are obtained from Fig. 3.

Steps 7 and 8 should need no explanation.

2.1.2 THE RATIONAL METHOD OF FLOODPEAK DETERMINATION FOR USE IN DAM SPILLWAY CALCULATIONS

$$Q = \frac{C \times I \times A}{360} \quad m^3/s$$

The Rational Method shall be used for dam spillway calculations. It follows the S.C.S. very closely.

Steps 1 and 2 are identical to that for the SCS method.

Step 3 Having determined storm depth from Figure 2, divide this by Time of Concentration to determine rainfall intensity. Use a design frequency storm as follows :
Catchment areas of 25 ha and less : 1 in 10 year frequency
Catchment areas of 26 ha and more : 1 in 25 year frequency

Step 4 is the same as for the S.C.S. method.

Step 5 makes use of Table 3

Step 6 is self-explanatory.

Step 7 needs explanation : Figure 7 shows how to determine a rainfall-runoff relationship for the major catchment in which the design is to take place. The rainfall-runoff relationship changes with a change in the characteristics of the specific catchment vis-a-vis the larger catchment. It is possible to rationalize the way in which the basic rainfall-runoff relationship changes, using the characteristics, by estimating how much the characteristics of the specific catchment differ from those of the major one. The difference may bring about an increase (+ value) or a decrease (- value) in the rainfall-runoff relationship. In using this system, a 3-point scale is used :
there could be a large change (+ + +/- - -),
a moderate change (+ + /- -),
a small change (+/-),
or no change brought about at all.
One considers each of the following characteristics, and sums the total of +'s and -'s. Each sign is given a value of 0,05 (ie 5% change). If for instance the final tally (Σ factors) is + + +, the MAR is increased by 3 x 0,05 = 0,15 or 15%. The catchment size, topography, drainage pattern, soil type and vegetation of the specific catchment must be judged relative to the major catchment, bearing in mind that :

* there is generally an increase per unit area with a decrease in catchment size
* steeper topography will lead to greater runoff
* the denser the water course network, the greater the runoff
* shallow soils and soils with low infiltration capacity will give rise to greater runoff
* dense vegetation will cause lower runoff.

Under Hazard of Structure, its proposed position in relation to public facilities and other private property must be given.

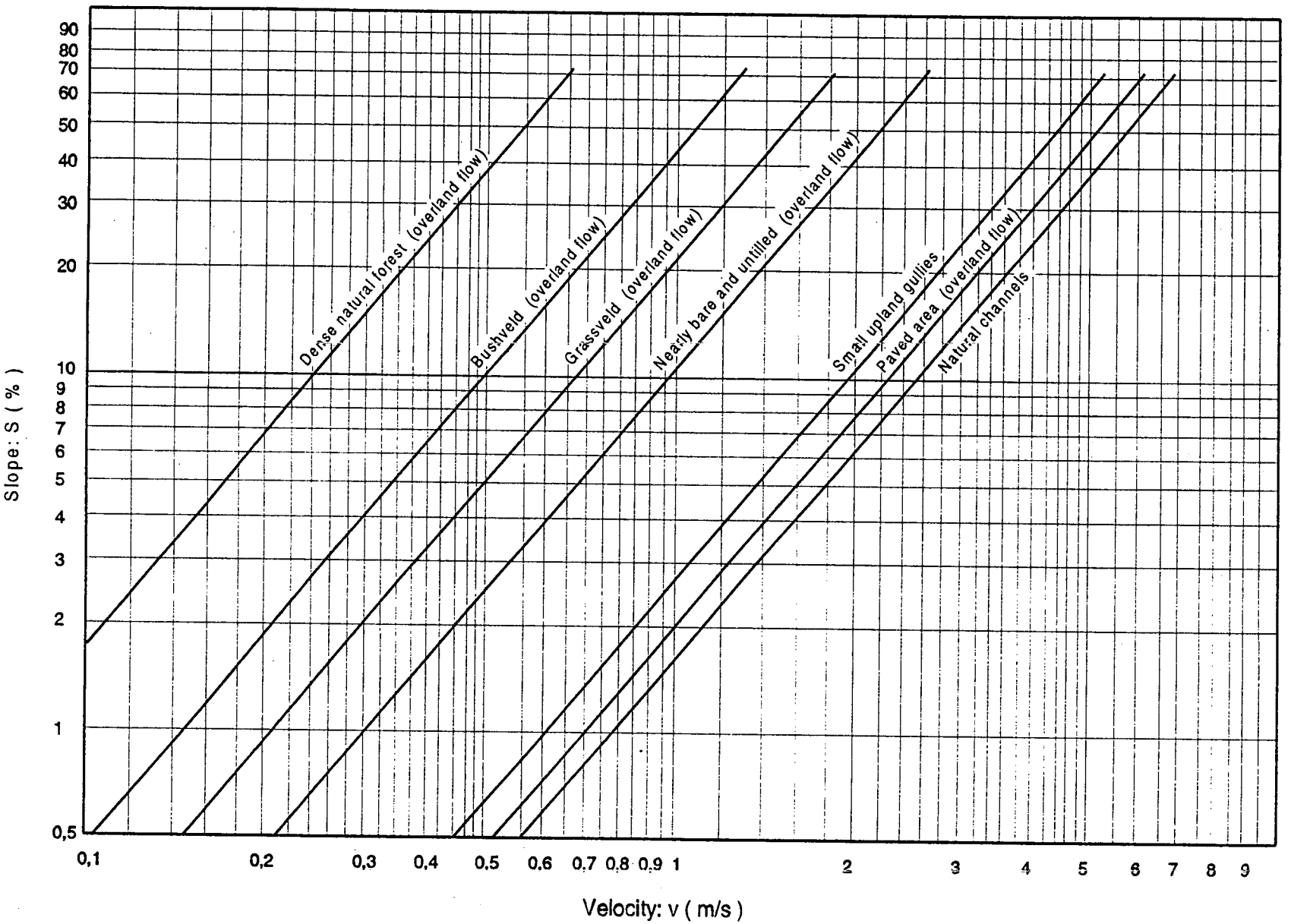


Fig.1. Estimation of velocity of flow

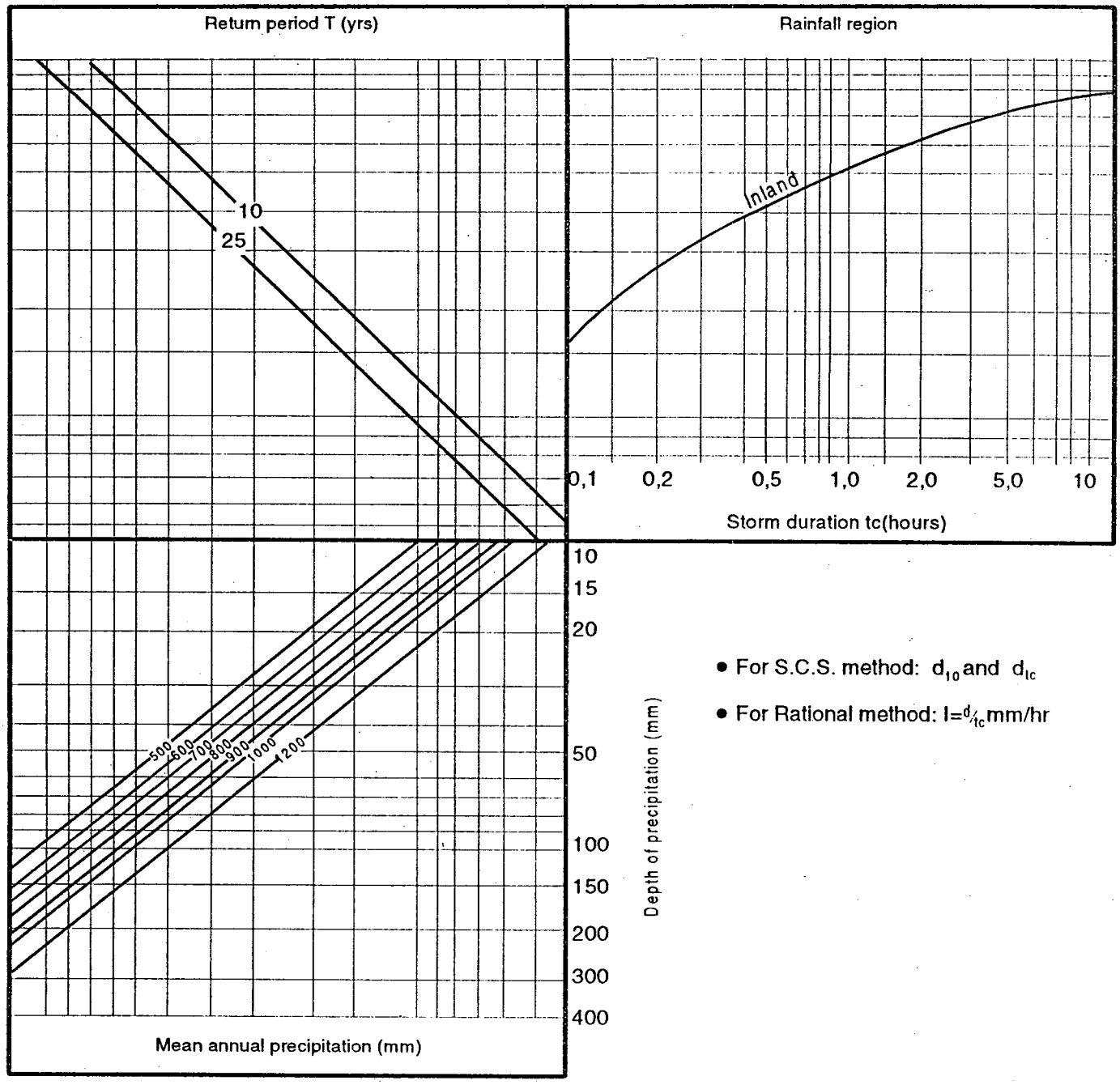


Fig. 2. Nomograph for storm depth determination

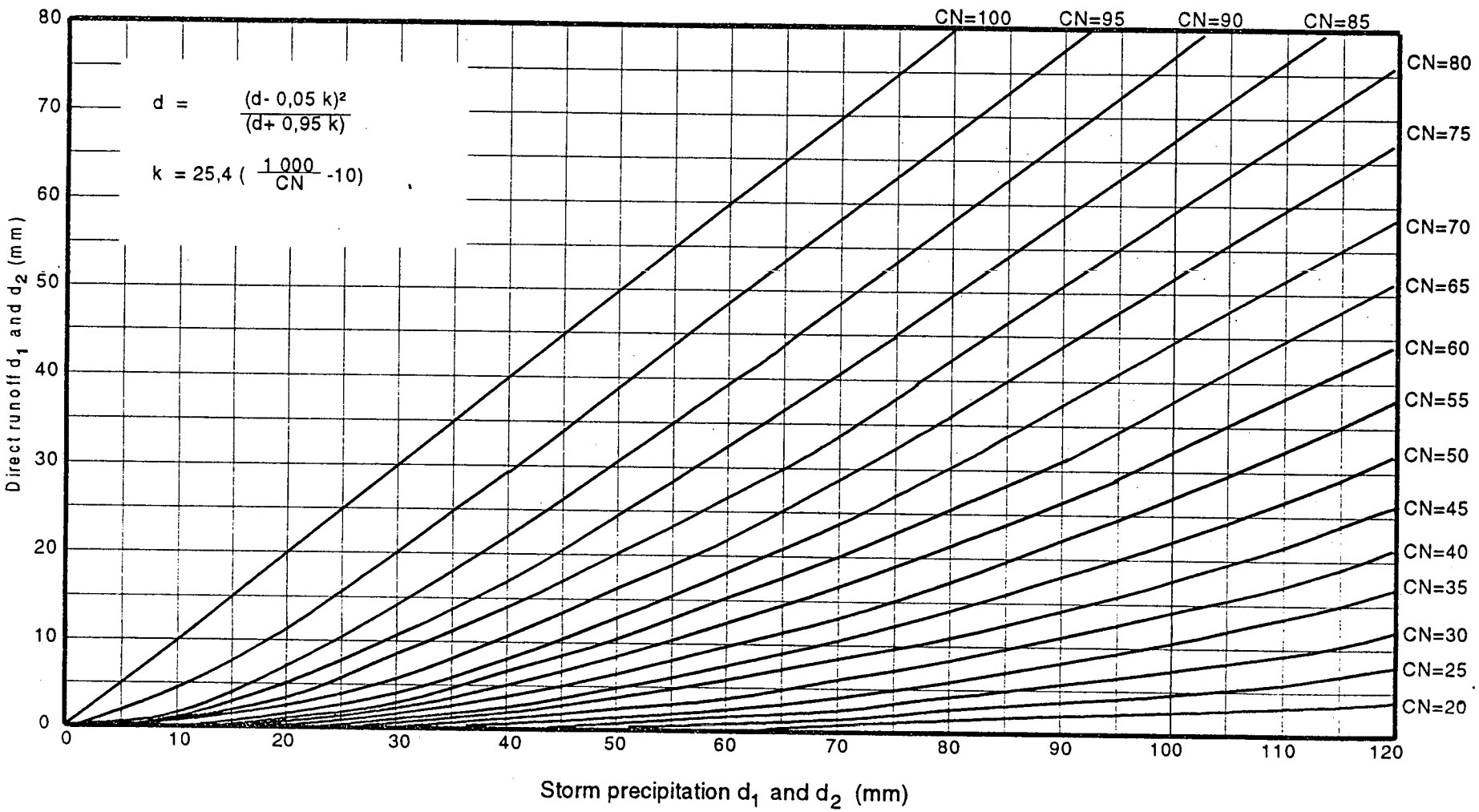


Fig. 3. SCS method: Rainfall-runoff depthfrom curve numbers.

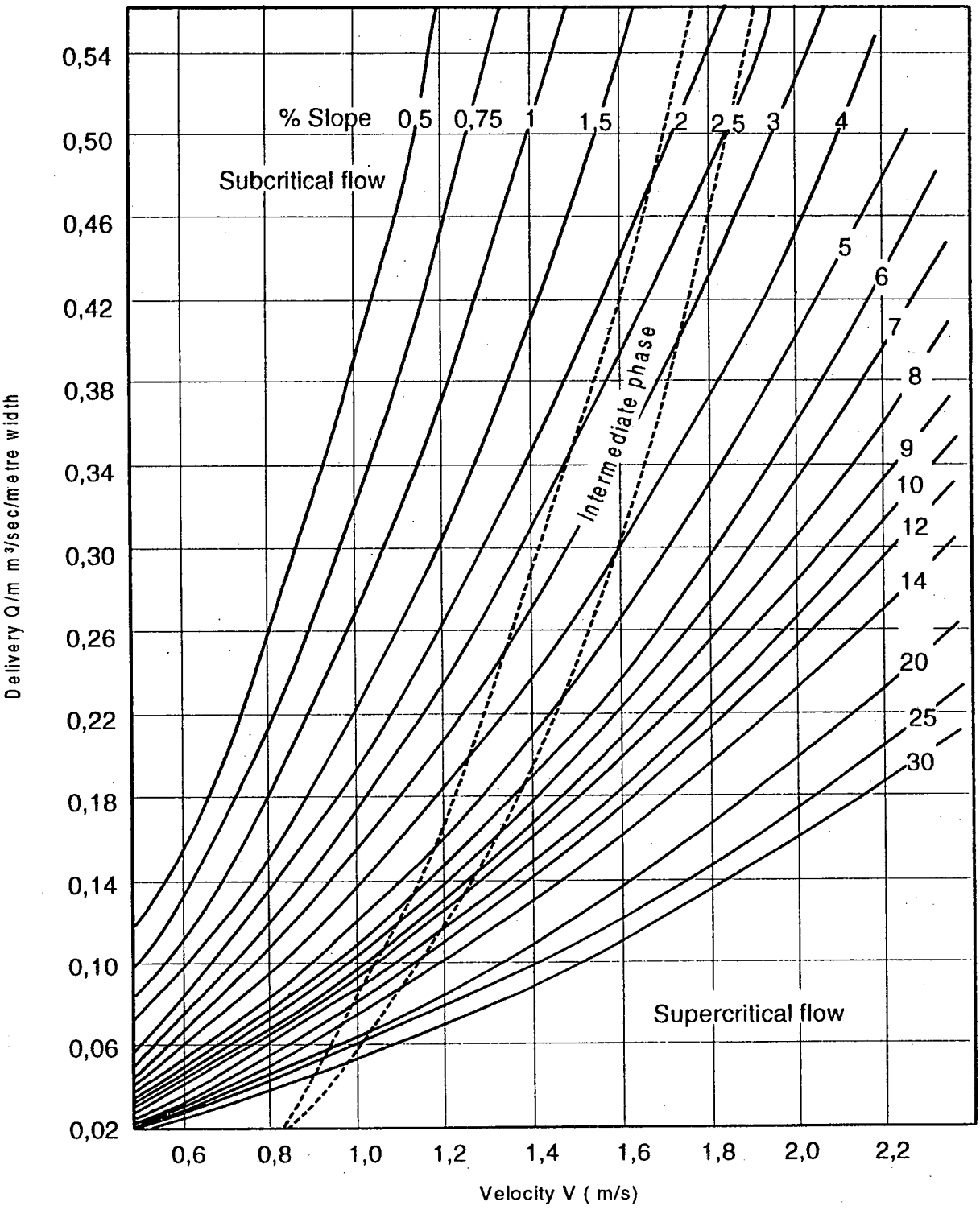


Fig.4. Delivery per metre width in grassed waterways

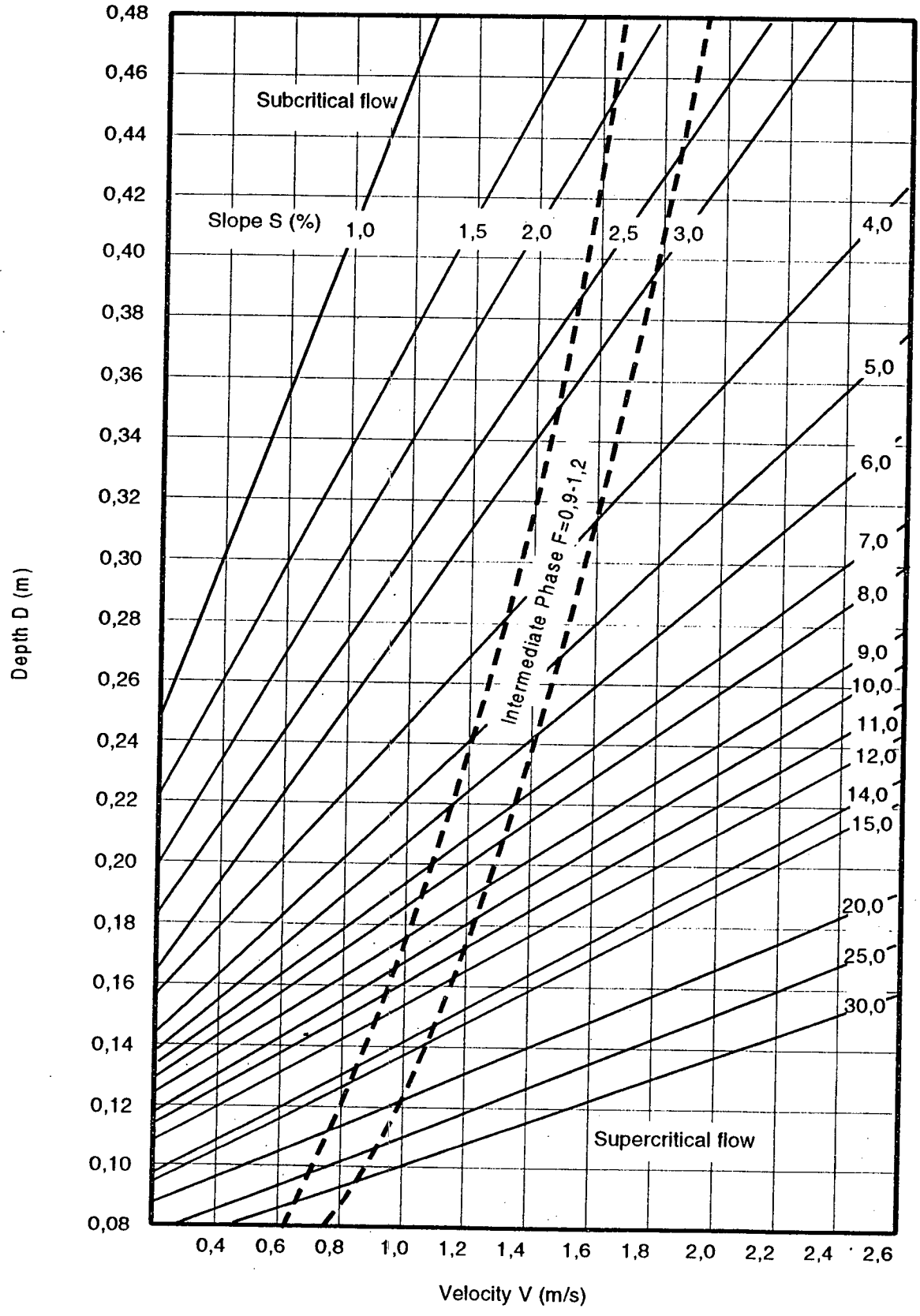


Fig 5. Flow depth for parabolic shaped waterways.

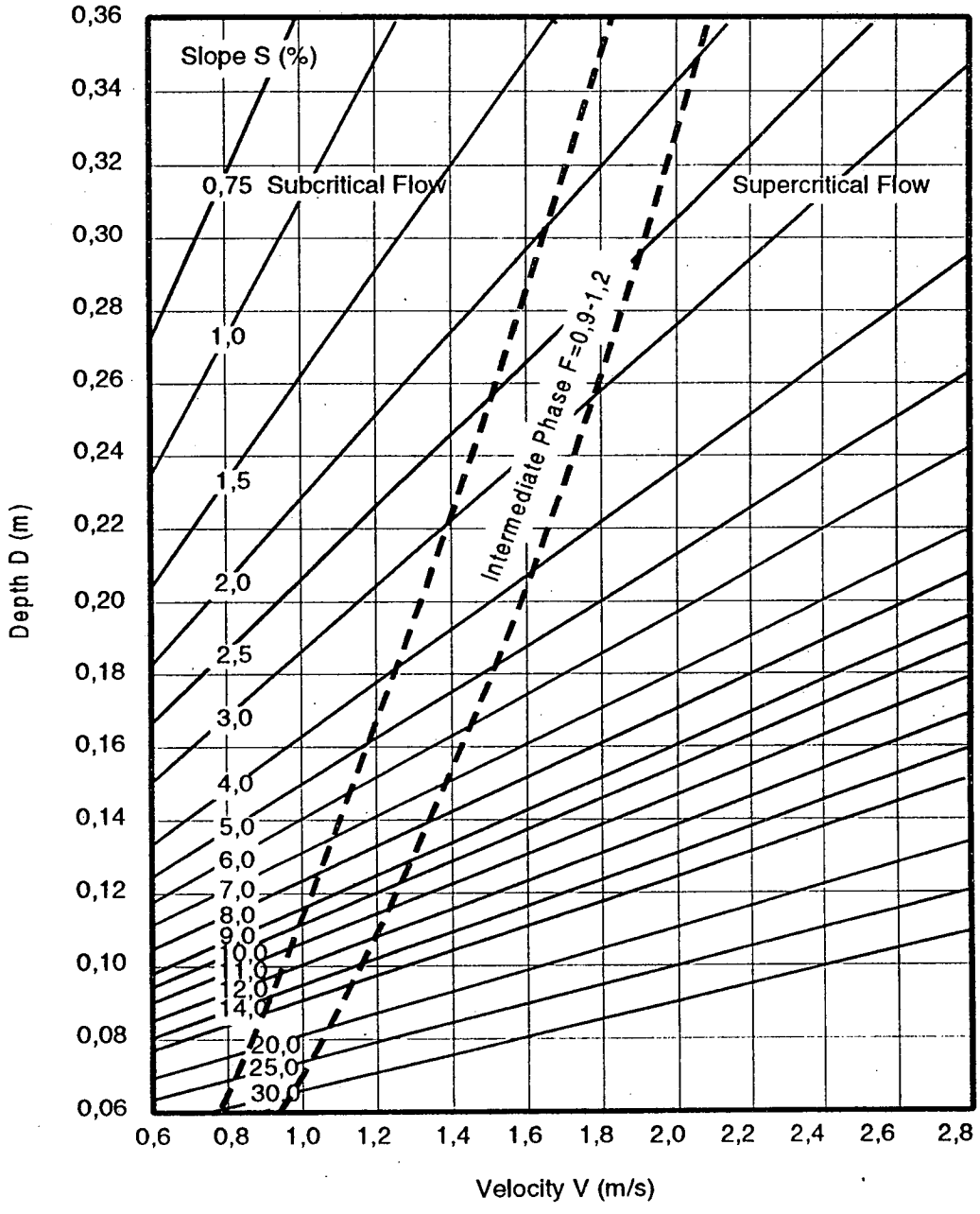


Fig. 6. Flow depth for flatbottomed waterways.

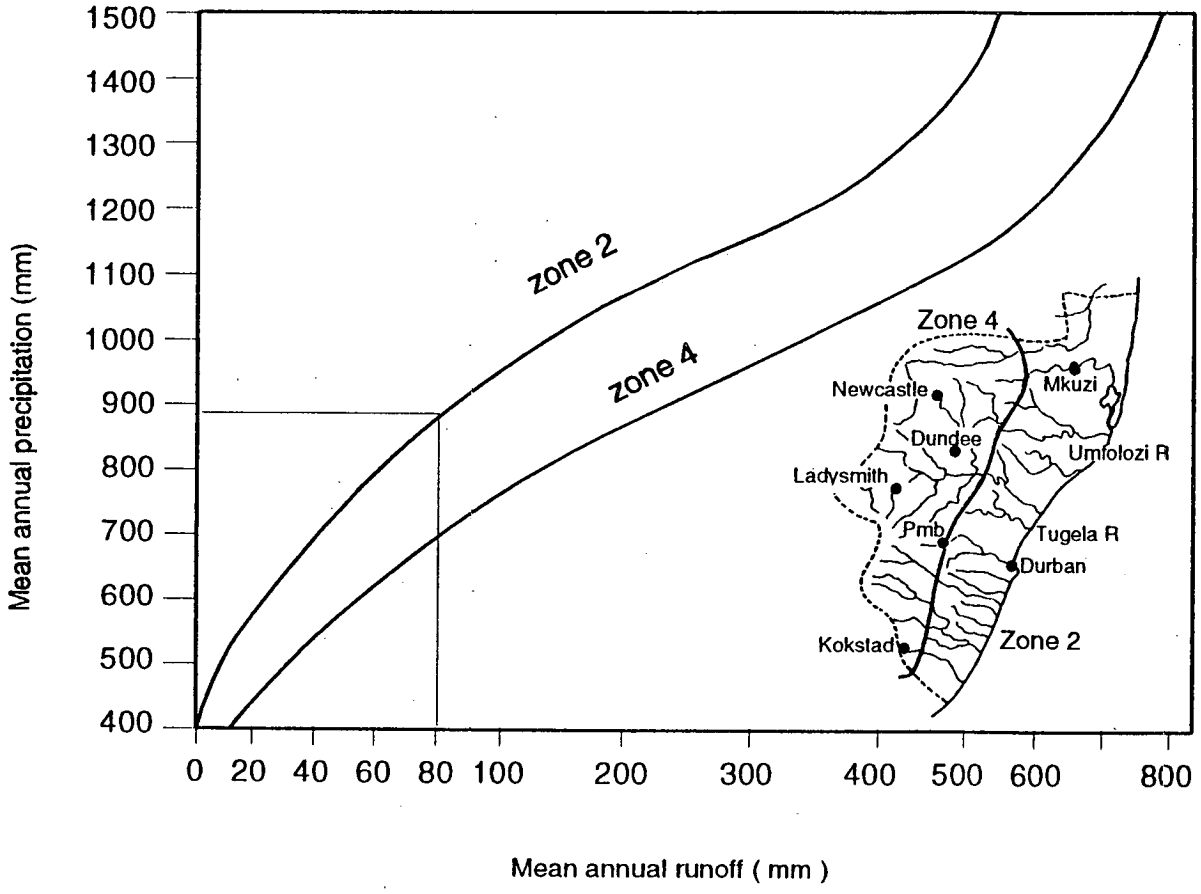


Fig.7. Rainfall - Runoff relationships in KwaZulu-Natal

Table 1 Hydrologic Soil Grouping

Hydrologic Soil Group	Description
A Lowest runoff potential	Soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well to excessively drained soils or gravels. These soils have a high rate of water transmission.
B	Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.
C	Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.
D Highest runoff potential	Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay layer of nearly impervious material at or near the surface. These soils have a very slow rate of water transmission.
Infiltration rate :	The rate at which water enters the soil at the surface and which is controlled by surface conditions.
Transmission rate :	The rate at which the water moves in the soil and which is controlled by the horizons.

Soil form	Code	Hydrological group	Soil form	Code	Hydrological group
Arcadia	Ar	D	Lamotte	Lt	A/B
Avalon	Av	B	Longlands	Lo	C
Bainsvlei	Bv	A/B	Magwa	Ma	A/B
Bonheim	Bo	C	Mayo	My	A
Cartref	Cf	C	Milkwood	Mw	C
Champagne	Ch	D	Mispah	Ms	C
Clovelly	Cv	A/B	Nomanci	No	B
Constantia	Ct	B	Oakleaf	Oa	B
Dundee	Du	B/C	Pinedene	Pn	B
Estcourt	Es	D	Rensburg	Rg	D
Fernwood	Fw	A	Shepstone	Sp	A
Glencoe	Gc	B	Shortlands	Sd	B
Glenrosa	Gr	B/C	Sterkspruit	Ss	D
Griffin	Gf	A	Swartland	Sw	C/D
Houwhoek	Hh	C	Tabankulu	Tk	C
Hutton	Hu	A	Valsrivier	Va	C/D
Inanda	Ia	A	Vilafontes	Vf	A
Inhoek	Ik	C	Wasbank	Wa	C
Katspruit	Ka	D	Westleigh	We	C
Kranskop	Kp	A	Willowbrook	Wo	D
Kroonstad	Kd	C/D			

Note : Adjustments to the hydrological groups within soil forms according to soil series may be made based on the following considerations. One notch refers to half a group e.g. B to B/C.

1 Texture - Soils with A-horizon clay contents exceeding 35% may be downgraded a notch (e.g. B to B/C). Where clay content is less than 6% and coarse sand makes up at least 6% of the soil fraction, soil series may be upgraded a notch.

2 Leaching - Dystrophic soils (well leached) may be upgraded while eutrophic soils (little leaching) downgraded one notch.

3 Water table - Where a high water table exists soils may be downgraded one notch.

4 Crusting - Where crusting was evident when not normally encountered in the form, soils may be downgraded a notch and *vice-versa*.

Other factors which should be considered are:

1 Soil depth - Typically deep soils, in shallow phase - downgrade one notch.

2 Topographic condition - Bottomland soils usually found in higher locations could be upgraded.

3 Surface sealing - Evidence of surface sealing should be considered.

Source: Schulze, R.E. (1979). ACRU report No. 8.

Note : Simulator experience may warrant adjustment of above form classifications, e.g. Mayo has been adjusted from C to A due to simulator experience.

Table 2 **Design velocities for grassed waterways**

M A P (mm)	<600			600 - 700			>700		
Soil Clay % / Grass type	>15	6 - 15	<6	>15	6 - 15	<6	>15	6 - 15	<6
Indigenous Couchgrass	1,5	1,2	0,8	1,8	1,5	1,0	2,3	2,0	1,2
Kikuyu	-	-	-	1,8	1,5	0,8	2,3	2,0	1,2
Bermuda (NK 37)	1,5	2,2	0,8	2,0	1,5	1,0	2,0	1,5	1,2
Coastcross (K11)	-	-	-	1,5	1,2	1,0	2,0	1,5	1,2
Rhodes grass	-	-	-	1,2	0,8	0,6	1,5	1,0	0,8
* *Eragrostis curvula*	1,0	0,8	0,6	1,2	1,0	0,8	1,5	1,2	1,0
* *Cenchris ciliaris*	1,0	0,8	0,6	1,2	1,0	0,8	-	-	-
Paspalum notatum	-	-	-	1,2	0,8	0,6	2,0	1,5	1,0

* Do not use on slopes steeper than 5 %.

Table 3 **Catchment characteristic values for use in the Rational Formula**

Factor	Factor categories	Average annual rainfall (mm)		
		<600	600-900	>900
Cs Average slope of hillsides (%)	< 3	0,01	0,03	0,05
	3 - 10	0,06	0,08	0,11
	10 - 30	0,12	0,16	0,20
	> 30	0,22	0,26	0,30
Cp Hydrological soil group	A	0,03	0,04	0,05
	B	0,06	0,08	0,10
	C	0,12	0,16	0,20
	D	0,21	0,26	0,30
Cv Vegetation / Land use	Natural forest	0,03	0,04	0,05
	Well conserved veld & lands	0,07	0,11	0,15
	Poorly conserved veld & lands	0,17	0,21	0,25
	Bare ground	0,26	0,28	0,30

Table 4 **Discharge through earthen dam side spillway with 1:100 gradient**

Type of Surface	Sand to Sandy Loam	Sandy Loam to Loam	Loam to Loam Clay	Loam Clay to Clay	Pot Clay Ouklip Gravel	Rock		
						Soft to Hard		
Max. permissible velocity (m/s)	0,3	0,6	0,8	1,0	1,3	1,4	1,7	1,9
Flow depth in m	0,15	0,30	0,45	0,60	0,75	0,90	1,20	1,50
Discharge rate (m^3/s per metre width of spillway)	0,05	0,20	0,35	0,60	1,0	1,30	2,10	2,95

Table 5 Runoff curve numbers

LAND USE	Treatment / practice, description	Hydrological condition *	Hydrological soil group						
			A	A/B	B	B/C	C	C/D	D
Fallow	Straight row	-	77	82	86	89	91	93	94
Row crops	Straight row	Poor	72	77	81	85	88	90	91
	Straight row	Good	67	73	78	82	85	87	89
	Planted on the contour	Poor	70	75	79	82	84	86	88
	Planted on the contour	Good	65	70	75	79	82	84	86
	Contour banks	Poor	66	70	74	77	80	81	82
	Contour banks	Good	62	67	71	75	78	80	81
Garden crops	-	-	45	56	66	72	77	80	83
Small grain	Straight row	Poor	65	71	76	80	84	86	88
	Straight row	Good	63	69	75	79	83	85	87
	Planted on the contour	Poor	63	69	74	79	82	84	85
	Planted on the contour	Good	61	67	73	78	81	83	84
	Contour banks	Poor	61	67	72	76	79	81	82
	Contour banks	Good	59	65	70	75	78	80	81
Close seeded legumes or rotation meadow	Straight row	Poor	66	72	77	81	85	87	89
	Straight row	Good	58	65	72	75	81	84	85
	Planted on the contour	Poor	64	70	75	80	83	84	85
	Planted on the contour	Good	55	63	69	74	78	81	83
	Contour banks	Poor	63	68	73	77	80	82	83
	Contour banks	Good	51	60	67	72	76	78	80
Sugarcane	Bare fallow	0%	54		80		89		92
	Planted on the contour	<50%	48		68		78		81
	Planted on the contour	>50%	23		52		68		77
	Planted on the contour	100%	6		28		55		63
Pasture	Planted on the contour	Poor	47	57	67	75	81	85	88
	Planted on the contour	Fair	25	46	59	67	75	80	83
	Planted on the contour	Good	6	14	35	59	70	75	79
	Irrigated	Good	35	41	48	57	65	68	70
Orchards	No ground cover	-	48	59	68	74	79	82	83
	Understorey of crop cover	-	39	44	53	61	66	69	71
	Ground cover : terraces	-	22	38	52	61	68	72	75
Forest plantations		Poor	52	62	72	77	82	85	87
		Fair	41	53	64	69	74	77	80
		Good	30	43	56	61	66	69	72
Grassveld		Poor	68	74	79	83	86	88	89
		Fair	49	61	69	75	79	82	84
		Good	39	51	61	68	74	78	80
Natural forest		Poor	45	56	66	72	77	80	83
		Fair	36	49	60	68	73	77	79
		Good	25	47	55	64	70	74	77
Bushveld		-	28	34	44	53	60	64	66
Pineapples	Bare ridges	-	66	73	80	85	89	90	92
	Limited cover	-	42	55	68	73	78	80	81
	Partial cover	-	36	45	54	61	68	72	77
	Full cover	-	30	34	37	43	55	59	63

* Refers to both mechanical structures (where existing) and the degree of stable soil cover.

CALCULATION SHEET FOR ESTIMATION OF PEAK FLOW RATE AND DIMENSIONS OF WATERWAYS	Work No :	Sheet No : 1 of 2
Cedara Agricultural Development Institute	Owner :	
Extension Office :	Farm Unit :	
Magisterial District :	File No :	

STEP 1 Diagram of Catchment

Design location No.	Catchment size (ha)	Design storm frequency 10 Yr.

M A P (mm)				Designed		Date	
Checked		Date		Approved		Date	

STEP 2	Time of Concentration (Figure 1) = L/V (* Table 2 for design V in waterway)				
Reach (m)	Length (m)	Description of route	% Slope	Velocity m/s*	Travel time (h)
				tc	

STEP 3	Design Storm Depth (Figure 2)			
$d_{10\ hr.}$	d_{tc}	$d_1 = (d_{10} - d_{tc})\ 0,5$	$d_2 = d_1 + d_{tc}$

STEP 4	Hydrological Soil Grouping (Table 1)					
Form and series or Clay %	Initial	Adjustments	1	2	3	Modified HSG
1.		Texture				1.
2.		Leaching				2.
3.		Depth				3.
		Surface condition				
		Sum of adjustments for each soil type =				

STEP 5	Runoff Curve Number (Table 5)				
Modified H.S.G.	Use / Treatment	Condition	CN	Area (ha)	CN x Area
1.					
2.					
3.					
			Totals	A =	CN x A =
			CN = Σ (Cn x Area) ÷ Total Area A =		

STEP 6	Runoff Depth da (Figure 3)	
d_{e2}	d_{e1}	$d_a = d_{e2} - d_{e1}$

STEP 7

$$Q = \frac{0,224 \times A \times da}{100 \times tc} = m^3/s$$

STEP 8	Dimensions of waterways (Figures 4 to 6)		
% Slope	Type of grass	Design V (m/s)	% Slope
$^{Q}/_{m}$	^{W}(m)	Shape	d(m)

CALCULATION SHEET FOR ESTIMATION OF PEAK FLOW RATE USING THE RATIONAL METHOD	Work No :
Cedara Agricultural Development Institute	Owner :
Extension Office :	Farm Unit :
Magisterial District :	File No :

STEP 1

Diagram of Catchment

Design location No.	Catchment size (ha)			Design storm frequency 10 Yr.	
M A P (mm)			Designed	Date	
Checked	Date		Approved	Date	

STEP 2	Time of Concentration tc (Figure 1 or design V) = L/V				
Reach (m)	Length (m)	Description of route	Slope of route %	Velocity m/s	Travel time (h)
				tc	

STEP 3	tc to Fig. 2 to get depth of precipitation d
d mm (from Fig. 2)	By calculation Rainfall intensity I = $d/_{tc}$ mm/hr

STEP 4	Hydrological Soil Grouping (Table 1)							
Form/series/ Clay %	Area (A)	Initial HSG	Adjustments	1	2	3	Final HSG	HSG x A
1.			Texture					
2.			Leaching					
3.			Depth					
Total			Surface condition				Total	
			Sum of adjustments for each soil type				Ave HSG	

STEP 5		Catchment Characteristic C (Table 3)					
	Slope	Cs x Area	HSG	Cp x Area	Veg.	Cv x Area	Σ C x Area ÷ total Area
1.							
2.							
3.							
							C =

STEP 6	Runoff Intensity								
	(	C	x	I	x	A	)	÷ 360	= Q m^3/s
	(		x		x		)	÷ 360	= m^3/s

STEP 7	Mean Annual Runoff from Catchment (Figure 7)		
Modifying factor	Factor value (±)	Σ Factor (±)	
Catchment size		MAR zone	
Topography		Basic MAR (mm)	
Drainage pattern		Adjusted MAR (mm)	
Soil type		MAR volume (m^3)	
Vegetation		Basin volume (m^3)	
Hazard of structure			

3. RUNOFF CONTROL PLANNING ON CULTIVATED LAND

The proposed layout, which will include the approximate siting of all necessary waterways, contour banks *and infield roads*, will be prepared in the form of a map produced to a scale of either 1:5 000 or 1:10 000, and on transparent material suitable for the production of prints by the Diazo ammonia printing method whenever paper sizes larger than A3 are used. For paper sizes A3 and smaller photostatic reproduction will be carried out. Accepted standards of cartography will apply.

Symbols used will be in accordance with the Legend for Farm Maps, ref. BLW 23/20, as compiled for use by the Department of Agriculture. See section 1.7.

The runoff control plan will be carried out in accordance with the principles laid down in the National Soil Conservation Manual, Chapter 7: 'Grondbewaringsbeplanning - Waterafloopbeplanning' (Department of Agriculture and Water Supply, undated), and will fit in with the local natural drainage network, unless otherwise approved by the Soil Conservation Engineer. See Chapter 7 for approval authority.

All proposed works will be numbered in one numerical series, and the proposed layout will be drawn on the standard work sheet for contour bank layouts.

3.1 Maximum land slope:

* For annual cropping : 12% Requests for assistance in planning erosion control on slopes steeper than 12% where annual cropping is practised must be referred to the SCE.

* For timber plantations : See chapter 9, Table 6.

* For sugarcane : See chapter 9, Table 5.

3.2 Design of the proposed works will be carried out according to the following principles:

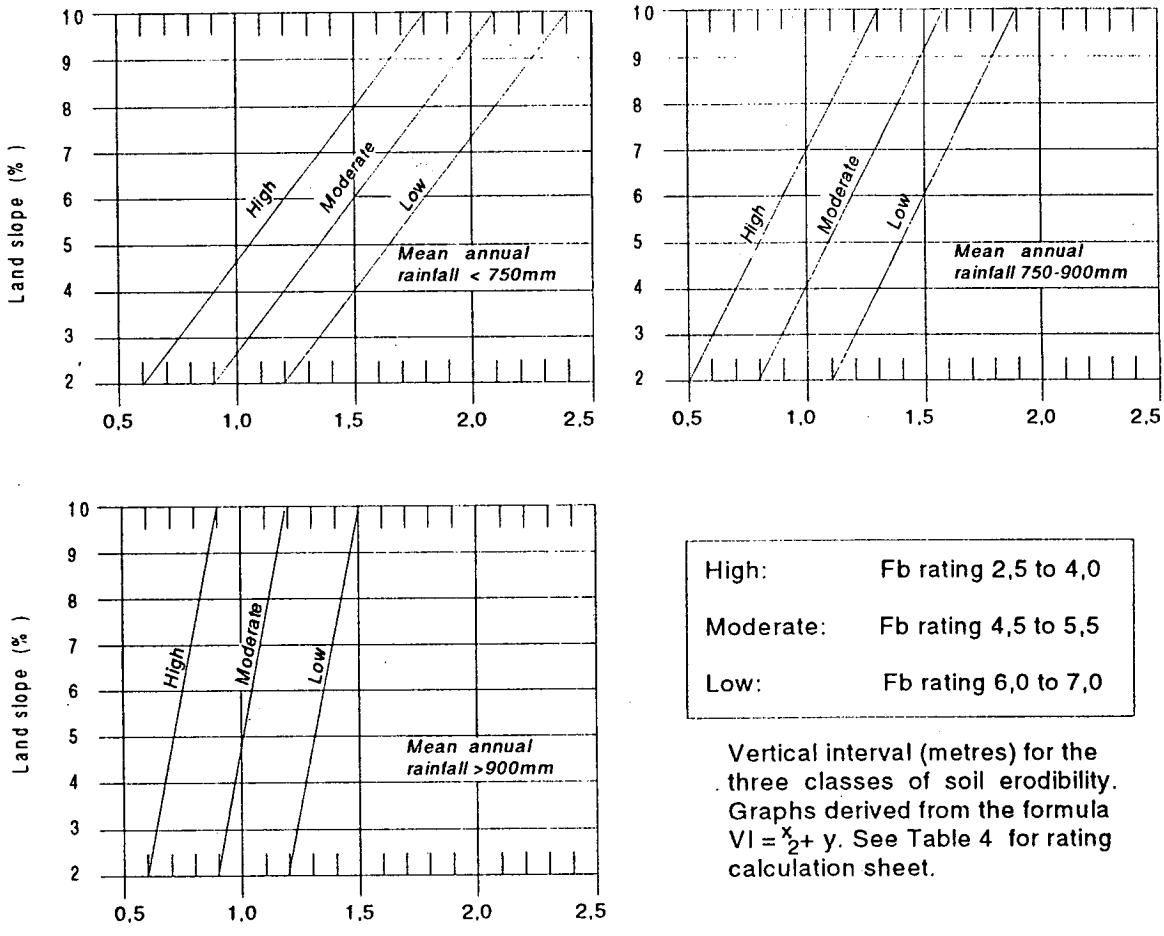
* Runoff intensity will be calculated using the Soil Conservation Service method, with curve numbers as approved by the Department of Agriculture. See chapter 2.

* Dimensions of waterways will be calculated using the norms laid down in chapter 2.
They will not be given a freeboard.

* Freeboard for stormwater drains shall be 250 mm for catchment areas up to 10 ha. The SCE will approve designs for catchments larger than 10 ha.

3.3 Design of contour bank systems.

Table 1 Spacing of structures:



High:	Fb rating 2,5 to 4,0
Moderate:	Fb rating 4,5 to 5,5
Low:	Fb rating 6,0 to 7,0

Vertical interval (metres) for the three classes of soil erodibility. Graphs derived from the formula $VI = {}^{x}/_{2} + y$. See Table 4 for rating calculation sheet.

Table 3 Gradient of structures:

Soil texture (% clay)	Gradient	Maximum length (m)
Light (<15)	1 : 300	300
Medium (15 - 35)	1 : 200	400
Heavy (>35)	1 : 100	300 *

* Maximum length at that gradient : if made longer, use gradient of 1 : 200.

Table 4 Minimum cross sectional area of flow required (m^2) :

Land slope (%)	Length of flow (m)	
	0 - 300	300 - 500
1 - 8	0,5	0,6
9 - 12	0,4	0,5

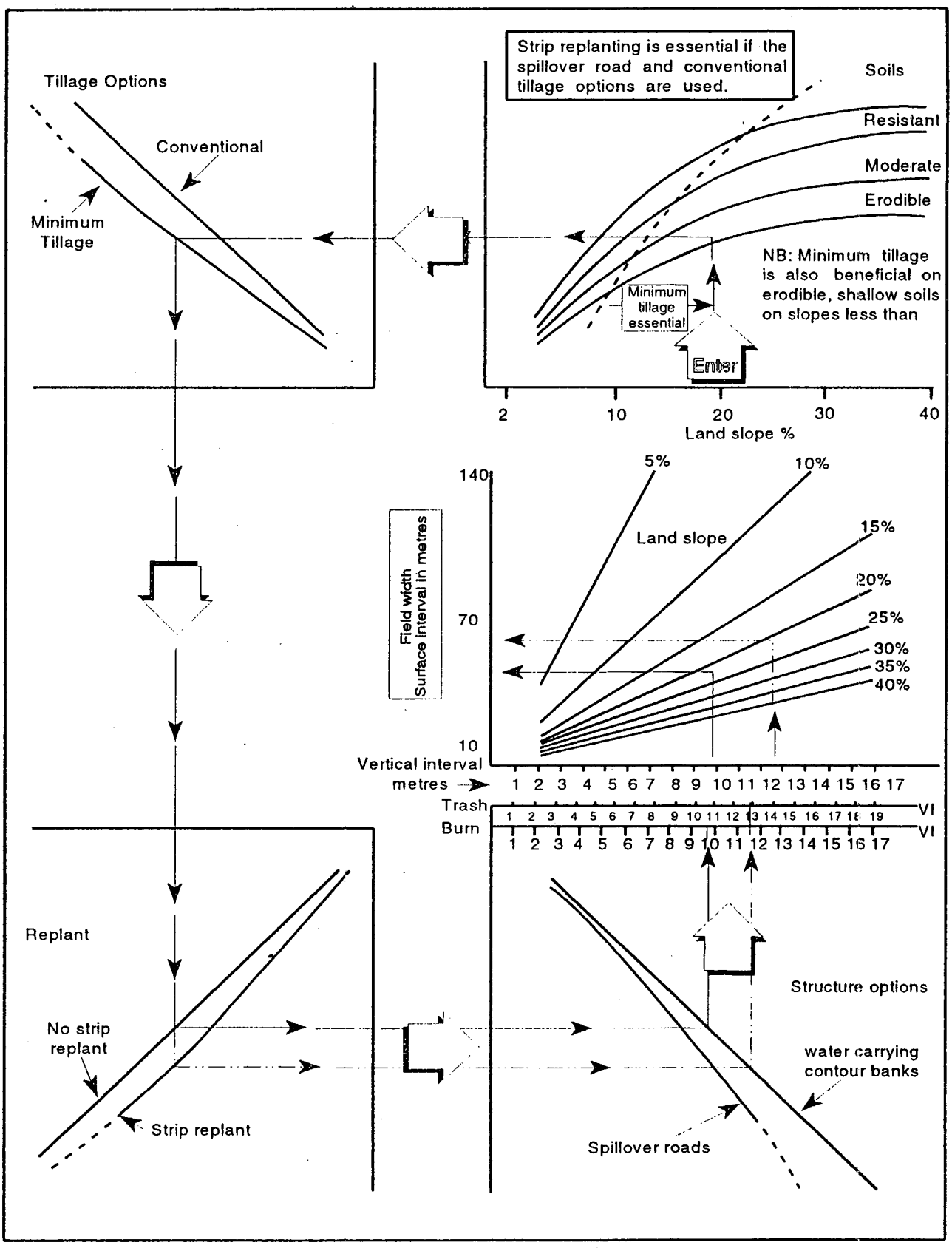


Table 2. Nomograph for the spacing of contour banks on sugarcane fields.

Table 5 METHOD FOR DETERMINING SOIL ERODIBILITY (F_b VALUE) FROM SLEMSA

						SOIL PIT		
1. TEXTURE OF A HORIZON						1	2	3
Light (0 - 15% clay)		Medium (15 - 35% clay)		Heavy (> 35% clay)				
Fine sand	Medium or course sand	Fine sand	Medium or course sand	All sands	**INITIAL VALUE**			
3,5	4,0	4,5	5,0	6,0				
2. PERMEABILITY OF SUBSOIL HORIZON								
Slightly restricted		Moderately restricted		Heavily restricted	**ADJUSTMENT VALUES ±**			
-0,5		-1,0		-2,0				
3. DEGREE OF LEACHING (EXCLUDE BOTTOMLANDS)								
Dystrophic soils, medium and heavy textures	Mesotrophic soils		Eutrophic or Calcareous soils, medium and heavy textures					
+0,5	0		-0,5					
4. ORGANIC MATTER STATUS								
Organic A horizon		Humic A horizon						
+0,5		+0,5						
5. A HORIZON LIMITATIONS								
Surface crusting		Excessive Sand/High swell -shrink/Self mulching						
-0,5		-0,5						
6. EFFECTIVE SOIL DEPTH								
Very shallow <250 mm		Shallow 250 to 500 mm						
-1,0		-0,5						
See tables 5 for explanations.		F_b = INITIAL VALUE - ADJUSTMENT VALUES =						

Table 6 **Field determination of elements in F_b rating calculation**

Table 6.1 **Texture determination : Spindle 10 mm x 150 mm. Sample moist (not wet)**			
Clay %	Deformation		
0 - 6	No spindle	-	weak ball
6 - 15	Stable ball	-	weak spindle
15 - 35	Stable spindle	-	U breaks
35 - 55	Stable spindle	-	ring breaks
> 55	Stable spindle	-	stable ring

Table 6.2 **Permeability determination:** 5 drops at one per second on fresh surface of clod. Time from last drop to end of shine : (Sample moist not wet.)	
Time in Seconds	Degree of restriction
0 - 5	None
5 - 15	Slightly
15 - 60	Mod. rate
> 60	Severe

Table 6.3 **Determination of degree of leaching**			
Degree	S value *	pH	MAP mm **
Dystrophic	0 - 5	< 6,0	> 850
Mesotrophic	5 - 15	6,0 - 7,0	700 - 850
Eutrophic	15 - 30	> 7,0	< 700

* S+ Ca + Mg + K + Na exchangeable cations in 100 meq. / 100 gm of soil (See soil analysis).

** Use MAP with care.

3.4 Scoring the conservation status of annually cultivated land for runoff erosion

This is a subjective method of assessment, with no scientific proof of its validity. It does however, cover all aspects of the erosion process and in roughly the order of importance.

Table 7 Scoring the conservation status of cultivated land

					Score / Land No.				
1. Erosion hazard (Basic value)					1	2	3	4	5
Average Fb rating + (12 - Average slope)									
+ (12 -)									
ADJUSTMENTS :									
2. Access roads									
Siting		Maintenance							
				+					
3. Floodwater discharge area									
Siting	Capacity		Stability						
				+					
4. Contourbanks									
Spacing	Capacity	Stability	Outlets						
				+					
5. Tillage system									
Conventional	Rip and disc	Stubble mulch	No till						
				+					
		Conservation Score (%)							

Where no structures are required because of a flat slope, mark out of items 1,2 and 5 only, and calculate the percentage score out of a total of 65 points.

Definitions

1. F_b rating as defined in the SLEMSA Model. 12% of land slope should be the maximum on which annual cultivation is carried out.
   The scorecard does not cover semi-permanent or permanent crops (e.g. sugarcane).
   The slope mark will be negative on slopes in excess of 12%.
2. Access roads need not be weatherproof, but should not constitute an erosion hazard in themselves.
3. The floodwater discharge area may comprise an artificial waterway, a natural depression or adjacent veld. Score the suitability whichever form it takes, and siting must take account of whether or not floodwater re-enters the land.
4. Spacing of contourbanks as determined in Table 1.
   (Stability of both the canal and bank is required.)

Table 8 Rating values

Item	Rating	Points	Item	Type of tillage	Minimum groundcover at planting (%)	Points scored
2	Excellent	5	5	Conventional	0	5
to	Very good	4		Rip and disc	10	10
4	Reasonable	3		Stubble mulch	30	15
	Fair	2		Direct drill	70	35
	Poor	1				
	Very poor / non-existent	0				

Table 9 Conversion

Degree of Erodibility	Erodibility K Factor (USLE)	Erodibility F_b Index (SLEMSA)	Erosion hazard (Table 6, point 1.)
Very high	0,5	3	0 - 4,5
High	0,4	4	5,0 - 8,0
Moderate	0,3	5	8,5 - 11,5
Low	0,2	6	12,0 - 15,0
Very low	0,15	7	15,5 - 19,0

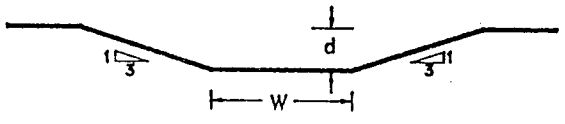
LOCALITY SKETCH OF WATERWAY

N

WATERWAY DIMENSIONS (m)

Section	W	d	Length

CROSS SECTION OF WATERWAY



NOTES:

1. See attached pamphlet on the construction methods recommended.
2. Excavated material should be used to fill in gulleys and / or construct infield roads.
3. Excavation must be protected by cross berms at _____m intervals, until the vegetation is established.
4. Do not plant grass until the excavation has been checked by a Departmental official and written approval given for the grassing. See work no._____.
5. Type of grass to be planted:_____
- 5.1. Fertilize at a rate of 500kg 2:3:2(22) per ha. and topdress with 200kg LAN annually. Cut grass regularly.
- 5.2. Sow seed at a rate of _____kg/ha. or plant runners in rows 250mm apart.

DEPARTMENT OF AGRICULTURE CEDARA A.D. INSTITUTE

Extension Office: Mag.District:

Owner: Farm Unit:

GRASSED WATERWAY SPECIFICATIONS

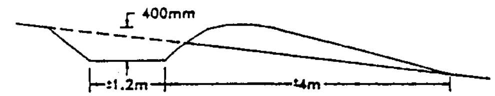
Surveyed	Designed	Drawn	Checked

Reference No.: Work No.:

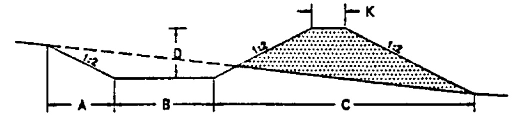
N

CONTOURBANK	
Number	Length (m)

PLAN
APPROX SCALE 1:



TYPICAL CROSS SECTION OF CONTOURBANK



CROSS SECTION OF STORMWATER DRAIN

SECTION	A	B	C	D	K

All measurements apply to consolidated banks.

PARTICULARS OF

LAND: No. ________
Area ________ ha.

SOIL: % clay ________
Effective depth ________ mm
Form ________
Series ________
Fb rating ________
y factor ________

DESIGN: Slope variation ______ % to ___ %
VI variation ______ m to ______ m
Gradient of canals ______ %
No. of contourbanks ________
Total length: Contourbanks ________ m
Stormwater drains ____ m

NOTES

*Contour banks must be upgraded, worked over and repaired annually as part of the primary tillage operation.
*Contour bank outlets and stormwater drains must be kept clear of all debris and sediment.
*The flatter the backslope of the bank is made, the easier it will be to plant the bank, and the less land area will be lost to cultivation.
*See attached pamphlet 'Contour Bank Construction and Maintenance'
*Cross sectional flow area of contour should not be less than 0,6 m².

DEPARTMENT OF AGRICULTURE CEDARA A. D. INSTITUTE
Extension Office: Mag.District:
Owner: Farm Unit:

CONTOURBANK AND STORMWATER DRAIN SYSTEM

Surveyed	Designed	Drawn	Checked

Reference No.: Work No.:
Annexure to BLW 23/21

4. SUBSURFACE DRAINAGE DESIGN ON CULTIVATED LAND

E. U. Koch, SCE, Directorate of Soil Conservation and Drilling Services (SC & DS)

1 Statement of problem.

A short description of the problem and the type of scheme proposed will be supplied, together with a suitably sized sketch indicating the following:- (Three prints are required and the colours to be used are as indicated in brackets.)

* farm boundaries (black lines);
* affected areas (yellow);
* existing streams, waterways, open furrows and drainage canals (blue);
* discharge point (give available depth) and name of river or drain.

2 Soil survey.

Holes will be augured on a suitable grid (up to a maximum of 150 m x 150 m) over all the affected fields. A minimum of one auger hole per hectare or ten holes per field, whichever is the greater number of holes, is required. The following information will be obtained and transferred onto a topographic map of the field(s):

* depth to water table;
* depth to impermeable layer;
* relative height of auger holes and other points which may be of significance.

At least one representative soil sample from the affected area shall be taken from the topsoil (0-300 mm depth) and one from the subsoil (± 1200 mm or just above the impermeable layer, whichever is the deeper) to establish the salinity status. If ameliorative measures are required, further samples will be taken according to normal practices, for determining gypsum application rates.

3 Drain spacing.

The drain spacing shall be derived according to a recognised method and presented in such a way that the person checking the design can follow the calculations. Double spacing is allowable but must be clearly stated as such on the plans. Drains not threatened by sediment deposition shall have a maximum slope of 5% and a minimum slope of:

Pipe diameter (mm)	% Slope
100	0,10
125	0,07
150	0,05
Sandy soils	0,02

* Where the gradient for a given drainage lateral is less than 0,4%, the next greater pipe diameter is to be specified.

4 Manholes.

* Manholes shall have an opening of at least:
  750 mm diameter for circular openings
  600 mm width for square openings

* 200 mm water depth is required as a sediment trap at the bottom of the manhole.
* Manholes will extend a minimum of 100 mm above the soil surface. Subsurface manholes will require a specific motivation. In such cases these will be well below implement working depth and be adequately marked for easy detection.
* Covers will be constructed of steel or reinforced concrete.
* Manholes will be spaced a maximum of 125 m apart with a cleaning eye at the end of each lateral.
* Additional manholes will be provided at each junction, change of slope, change of pipe diameter, and/or pipe direction.

5 Filter materials and the filter envelope.
These materials, if required, will be placed at least 75 mm thick around the drain pipe.

5.1 Filters will be used for sandy soils with no cohesion, poor particle size distribution and/or very fine material. For such soils it is absolutely essential to obtain a sieve analysis of both the filter material and the *in situ* soil.
Filter material will comply with the following criteria:

$$\frac{D_{50}\ (filter)}{D_{50}\ (soil)} = 12\ to\ 58$$

$$\frac{D_{15}\ (filter)}{D_{15}\ (soil)} = 12\ to\ 40$$

or in the case of uniformly graded soils:

$$\frac{D_{15}\ (filter)}{D_{50}\ (soil)} = < 5$$

where D_x is the particle size for which x% of the material will pass through a sieve with mesh size D.

5.2 Envelopes will be used for soils with a reasonable clay content (15% and more) and cohesiveness.
Envelope material may comprise of the following:

* Crushed stone (5 mm to 15 mm)
* Riverbed gravel or coarse sand
* Sifted coal ash

Note that no fine material or dust may be used.

5.3 Other materials.
Other suitable materials may be used but must be approved beforehand by the Soil Conservation Engineer or his delegate.

6 A cleaning procedure for regular removal of sediment (at least during the first year after installation) will be included in the specifications.

7 Drawings:

7.1 Plan:
The following information will be shown on a plan of suitable scale:

* General layout of the scheme
* Type of pipe for each section
* Diameter and type of each pipe specified
* Manholes
* Cleaning eyes
* Other improvements such as permanent irrigation, canals, irrigation dams, pumphouses, etc.
* Discharge point

Note: Descriptions should be put on the plan whenever necessary, to ensure complete understanding of the requirements.

7.2 Long-section:
The following information will be shown on a long-section of all main lines and laterals longer than 200 m: (Drawings for laterals need not be repeated for grid or herringbone systems on even gradients).

* Relative height of the ground surface
* Excavation depth at the beginning and end of each drain
* Slope at which drain is to be laid
* Length of the pipeline
* Diameter of the pipe
* The type of pipe, perforated or solid
* Vertical and horizontal scales
* Position of manholes

7.3 Topographic map : (The scale of the map will depend on the size of the area).
The following information will be transferred onto a topographic map. (Also referred to in paragraph 4.3.3).

* Depth to water table.
* Depth of impermeable layer.
* Relative height of auger holes and other points which may be of significance.
* At least one bench mark, but preferably one per 5 ha.

8 Combatting surface erosion:
Where the land being planned for subsurface drainage is liable to surface erosion through runoff, a suitable ROCP will be planned and specified along with the drainage design.

5. DESIGN OF EARTHEN STORAGE DAMS FOR STOCKWATERING

1 Flood peak determination for catchment areas greater than 500 ha must be referred to SCE for approval.

2 Basin capacity may not be more than ⅔ of the calculated mean annual runoff (MAR) from the catchment. The method of estimation of MAR is given in Chapter 2.

3 A minimum depth of water measured at the deepest point, but excluding the depth of a degraded watercourse, of 2 metres is a prerequisite.

4 A basin capacity equal to six months water supply, plus provision for evaporation, the latter being standardised at 1,5 metres throughout the Province, is a minimum requirement.

5 A maximum wall height of 5 metres in conjunction with a maximum basin capacity of 50 000 m^3 is a limitation. If the watering requirements indicate a dam larger than category O (Section 9c of the Water Act) the classification and permit must be obtained ***(by the applicant)*** before the dam is surveyed and designed. The permit must accompany the preliminary report. Any wall height in excess of 6 m, and irrespective of basin capacity, must be cleared with the SCE (CADI).

Dam safety: The State has an obligation to protect the public against loss of life and property which may result from the failure of a major dam. For this reason, section 9c, dealing with dam safety was added to the Water Act in 1986.

Regulations in terms of section 9c of the Water Act, promulgated in Government Notice R1560, require that all existing dams with a safety risk be registered with the Department of Water Affairs, by their respective owners.

In terms of section 9c of the Water Act, all dams with a height in excess of 5 metres **and** a capacity of more than 50 000 m^3 are considered to be dams with a safety risk. The height is measured vertically from the non-spillway crest to the lowest natural ground level on the downstream side. Control can, however, also be extended to other dams if they appear to threaten life or safety.

Before commencing the design of any new dam, the Dam Safety Office of the Department must be supplied with the necessary information to enable it to classify the proposed dam. This classification will determine the extent of departmental control over the design and construction stages, as well in the operation and maintenance of the dam after completion.

In order to determine the degree of control applicable in terms of the regulations, every dam posing a safety risk is classified according to its size and its hazard potential.
The classification of the size of dams with a safety risk is based on the maximum height of the wall in accordance with Table 1.

Table 1. Size classification:

Size classification	Maximum height of wall in metres
Small	Higher than 5 m but less than 12 m
Medium	Higher than 12 m but less than 30 m
Large	Equal to or higher than 30 m

In accordance with Table 2, the classification of the hazard potential of a dam is based on the potential loss of life and property which could be caused by failure of the dam wall. The hazard potential level is the highest level and is determined by means of independent consideration of the potential loss of life and the potential economic loss. Classification is based, not on possible failure during an abnormal flood, but on possible failure without warning, on a normal sunny day.

Table 2. Hazard potential classification

Level	Loss of Life	Economic Losses
Low	None	Minimal
Significant	Not more than ten	Significant
High	More than ten	Great

The category classification of dams is determined according to Table 3.

Table 3. Category classification of dams posing a safety risk.

Size classification	Hazard potential		
	Minimal	Significant	Great
Small	I	II	II
Medium	II	II	III
Large	III	III	III

The regulations also allow for a category classification which differs from that given in Table 3.

Requirements for dams having a safety risk:

Category I

a) a responsible designer and
b) a permit to construct.

Category II

a) an approved professional Engineer to design the dam,
b) a permit to construct,
c) an approved professional Engineer to supervise construction.
d) a permit to impound water, and
e) dam safety inspections at specified intervals.

Category III

Direct all enquiries to the Department of Water Affairs.

Control measures that are provided for in the regulations include:

a) The review of designs, plans, and project specification for new dams or alterations to existing dams.

b) The review of quality control measures applied at dam construction sites.

c) The review of operation manuals and maintenance and monitoring procedures for the initial filling of a dam.

d) The review of dam safety inspection reports for the existing dams.

e) The issuing of directions for corrective measures to enhance the safety of dams.

6 Table 4. Minimum freeboard:

Maximum catchment size (ha)	Minimum Dry (m)	Minimum Total (m)
100	0,5	1,0
250	0,75	1,5
500	1,0	1,8

7 Table 5. Minimum side slopes (vert. over horiz.) and crest widths:

Wall height (m)	Waterside paved		Waterside unpaved		Crest width (m)
	Waterside	Downstream side	Waterside	Downstream side	
0 - 2,5	1 : 1½	1 : 2	1 : 2	1 : 2	2,5
2,6 - 3,5	1 : 2	1 : 2	1 : 2½	1 : 2	3,0
3,6 - 6,0	1 : 2½	1 : 2½	1 : 3	1 : 2½	3,5
For average conditions			1 : 3	1 : 2	
For coarse material not easily compacted			1 : 4	1 : 2	

8 Outlet pipe : Although an outlet pipe is preferable this will not be mandatory. When one is included in the design, the following will apply :

* Minimum size 75 mm ϕ
* Unplasticized polyvinyl chloride : Fully encased in concrete as specified in the standard worksheet.
* Galvanised steel pipe : See standard worksheet

9 Trickle or base flow : Wherever this is prevalent at a site, the base flow will be taken, either through a pipeline near full supply level, or along a concreted furrow constructed through the spillway. Either option will be sized to suit the base flow expected during high summer.

10 Wherever cutanic-type soils are encountered in MAP zones of 750 mm and less (Fig.1), soil samples will be analyzed for dispersivity, and suitable precautionary measures stipulated to control the effects thereof on the completed embankment.

11 An estimate of the required moisture content of the soil to be used in construction will be given. See Table 6 for assistance in this regard.

12 Minimum size and shape of side spillway as specified in Fig. 2. In every case the outlet width will be calculated, using Mannings Formula and the physical characteristics of the return-to-

stream and the non-erosive velocity allowable.

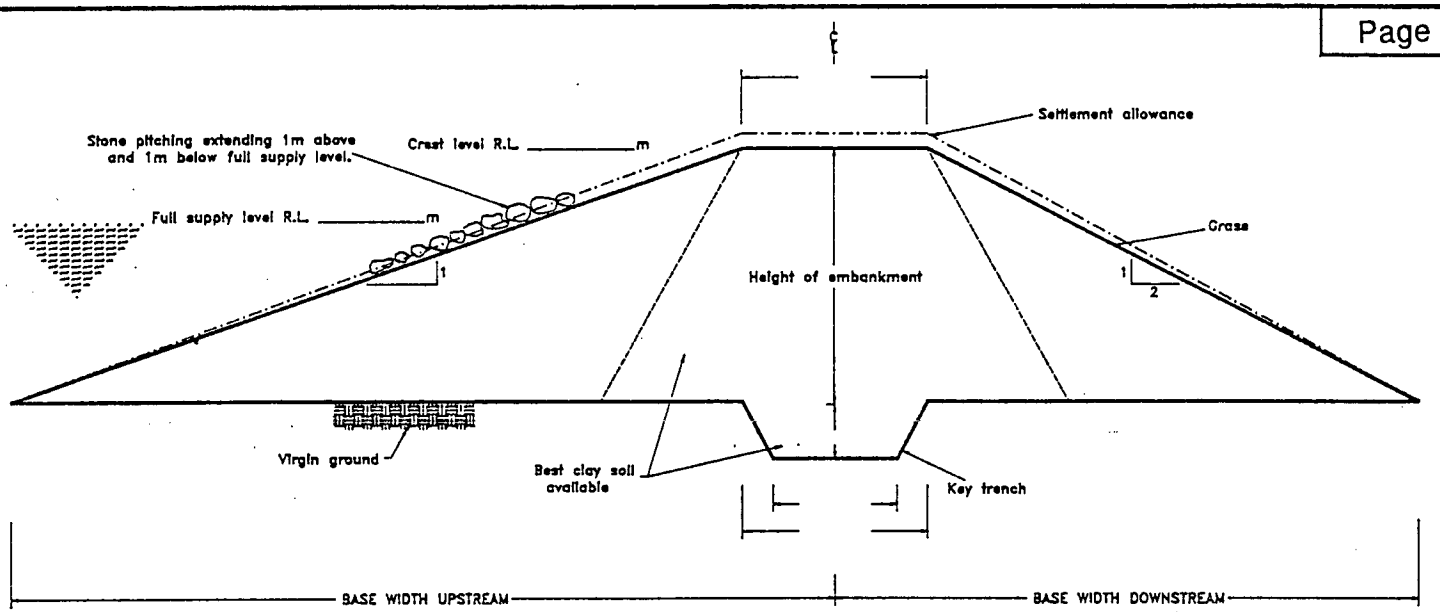
13 A basin survey taken through the return-to-stream will be supplied whenever the maximum water depth exceeds 3 metres. A table of contour line value (depth) vs. capacity will then be supplied with the topo-map of the basin, which will then serve as a motivation for the size of the dam.

14 Bench mark. At least one suitable and durable bench mark, properly identified on the plan and sited well away from the construction site, will be set up. Two bench marks, one on either side of the valley would be preferable.

15 Documentation.
A plan, long and cross sections on a standard work sheet and a schedule of materials and costing are required. Note that the standard worksheets have three different options for the cross section.

16 Minimum fencing requirement.
Embankment, spillway and return-to-stream will be fenced off, although it is considered preferable to fence the entire dam off and provide clean water at a drinking trough well away from the dam. This latter preference is, however, not mandatory.

17 Stabilization of site.
The spillway area, embankment and any other disturbed area above the waterline will be planted to a suitable grass. Where the throwback is greater than 150 metres, the design will include a specification for protecting a band at least 2 metres wide straddling the full supply level along the embankment, from wave action.

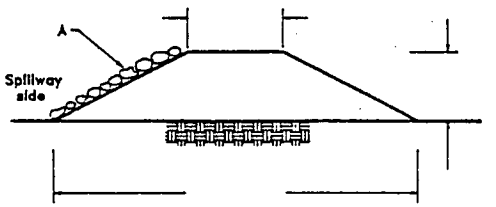


CROSS SECTION OF BANK

(not to scale) See page 2 for other dimensions

Notes:

1) Attached pamphlet entitled "Brief specifications for the construction of earth dams" form an integral part of this report.
2) All organic material & topsoil to be removed from base before construction commences. Stockpile & use for the settlement allowance.
3) Approximate moisture content of soil required for maximum compaction:_____%
4) Applicant must call for an intermediate inspection of the site when the:–
   - Key trench has been dug & before it is filled
   - Bank is half completed
   - Bank is completed, but before commencing with grassing & stone pitching.
5) The whole bank & spillway must be established to a good grass cover on completion: Use _____
5) Fencing of embankment, basin, spillway & return to stream area must be carried out as indicated on the plan.
7) This work will only be subsidised if it is built STRICTLY according to these specifications & the instructions contained in the attached documents. Any alterations may only be made after written approval is obtained.
8) Establish common reed (Phragmites) in the stream bed at the dam inlet.
9) Concrete mix:– 1 Pocket cement:_____litre sand:_____litre stone (20mm stone)

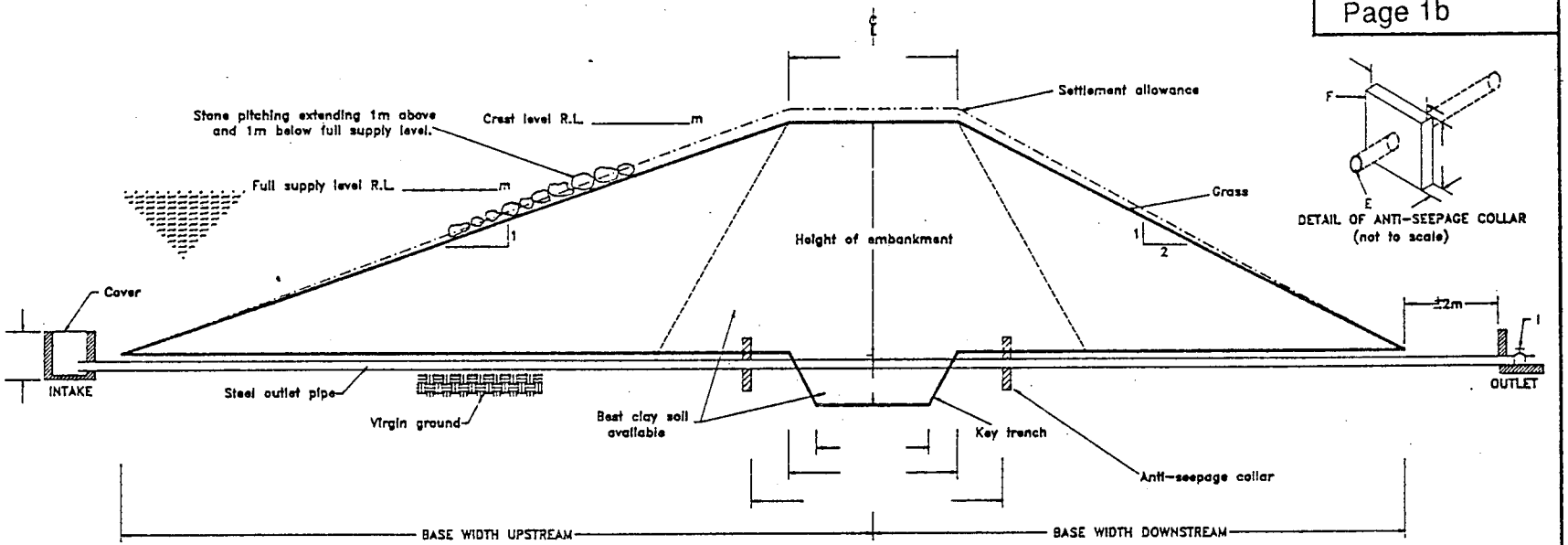


CROSS SECTION OF WINGWALL

(not to scale)

CATCHMENT PARTICULARS	BUILDING MATERIALS	
Area _____ha Q _____m^3	SITE	DIAGNOSTIC MATERIAL
Return period for Q _____yrs.	Foundation	
Basin capacity _____m^3	Core	
Water source _____	Embankment	
	Spillway	
	Basin	

DEPARTMENT OF AGRICULTURE	CEDARA A. D. INSTITUTE		
Extension Office:		Mag.District:	
Owner:		Farm Unit:	
Earthen dam for stockwatering			
Surveyed	Designed	Drawn	Checked
Reference No.:			Work No.:
Annexure to attached forms BLW 23/24, BLW 23/21			



DETAIL OF ANTI-SEEPAGE COLLAR
(not to scale)

CROSS SECTION OF BANK
(not to scale) See page 2 for other dimensions

Notes:

1) Attached pamphlet entitled "Brief specifications for the construction of earth dams" form an integral part of this report.
2) All organic material & topsoil to be removed from base before construction commences. Stockpile & use for the settlement allowance.
3) Approximate moisture content of soil required for maximum compaction:_____%
4) Applicant must call for an intermedicte inspection of the site when the:–
   - Key trench has been dug & before it is filled
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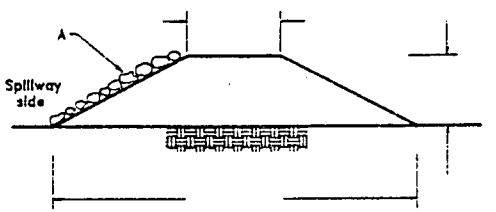
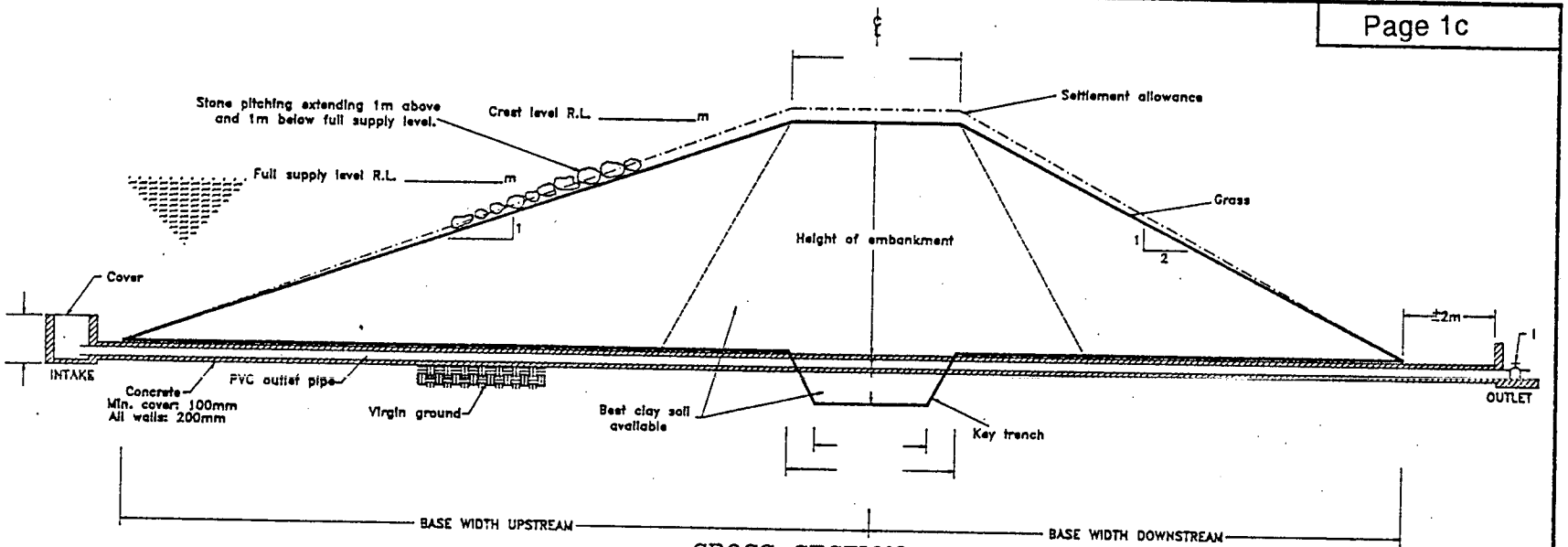
8) Establish common reed (Phragmites) in the stream bed at the dam inlet.
9) Concrete mix:– 1 Pocket cement:_____litre sand:_____litre stone (20mm stone)



CROSS SECTION OF WINGWALL
(not to scale)

CATCHMENT PARTICULARS	BUILDING MATERIALS	
Area _____ha Q _____m^3	SITE	DIAGNOSTIC MATERIAL
Return period for Q _____yrs.	Foundation	
Basin capacity _____m^3	Core	
Water source _____	Embankment	
	Spillway	
	Basin	

DEPARTMENT OF AGRICULTURE CEDARA A. D. INSTITUTE			
Extension Office:		Mag.District:	
Owner:		Farm Unit:	
Earthen dam for stockwatering			
Surveyed	Designed	Drawn	Checked
Reference No.:			Work No.:
Annexure to attached forms BLW 23/24, BLW 23/21			



CROSS SECTION OF BANK

(not to scale) See page 2 for other dimensions

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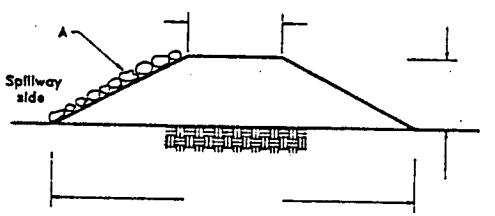
1) Attached pamphlet entitled "Brief specifications for the construction of earth dams" form an integral part of this report.
2) All organic material & topsoil to be removed from base before construction commences. Stockpile & use for the settlement allowance.
3) Approximate moisture content of soil required for maximum compaction:_____%
4) Applicant must call for an intermediate inspection of the site when the:–
   * Key trench has been dug & before it is filled
   * Bank is half completed
   * Bank is completed, but before commencing with grassing & stone pitching.
5) The whole bank & spillway must be established to a good grass cover on completion: Use _____
5) Fencing of embankment, basin, spillway & return to stream area must be carried out as indicated on the plan.
7) This work will only be subsidised if it is built STRICTLY according to these specifications & the instructions contained in the attached documents. Any alterations may only be made after written approval is obtained.
8) Establish common reed (Phragmites) in the stream bed at the dam inlet.
9) Concrete mix:– 1 Pocket cement:_____litre sand:_____litre stone (20mm stone)



CROSS SECTION OF WINGWALL

(not to scale)

CATCHMENT PARTICULARS	BUILDING MATERIALS	
Area _____ha Q _____m^3	SITE	DIAGNOSTIC MATERIAL
Return period for Q _____yrs.	Foundation	
Basin capacity _____m^3	Core	
Water source _____	Embankment	
	Spillway	
	Basin	

DEPARTMENT OF AGRICULTURE CEDARA A. D. INSTITUTE

Extension Office: Mag.District:

Owner: Farm Unit:

Earthen dam for stockwatering

Surveyed	Designed	Drawn	Checked

Reference No.: Work No.:

Annexure to attached forms BLW 23/24, BLW 23/21

EARTHEN DAM FOR STOCKWATERING

Work No._____
Reference No._____

Refer to attached pamphlet "BRIEF SPECIFICATIONS FOR THE CONSTRUCTION OF SMALL EARTH DAMS"

BENCH MARK
R.L._____
location_____

description_____

A STONE PITCHING
minimum of 225mm thick, well jointed.

B SETTLEMENT ALLOWANCE
10% of bank height extra.

C WINGWALL
see cross section on pg. 1

D KEY TRENCH – fill with:
- heavy clay well puddled
- best available clay soil.

E OUTLET PIPE
Type:_____
Diameter:_____mm
Length:_____m
Laid on firm, undisturbed virgin ground.
As shown on page 1.

PLAN OF EMBANKMENT Scale 1:____

PEG NUMBER	
REDUCED LEVEL	
HEIGHT OF EMBANKMENT	
BASE WIDTH UPSTREAM	
BASE WIDTH DOWNSTREAM	
DISTANCE BETWEEN PEGS	

F ANTI – SEEPAGE COLLARS
around outlet pipe.
Spacing:_____m
as shown on page 1.

G DRINKING TROUGH/S
length:_____
width:_____
depth:_____

H CONNECTING PIPE/S
type:_____
length:_____
diameter:_____

I WHEEL VALVE

J FENCE see note 4.

SPILLWAY EXCAVATIONS

EARTHWORK VOLUMES
Clay core_____m^3
Wall_____m^3
_____m^3
TOTAL_____m^3

LONGITUDINAL SECTION Scale Horizontal 1:____ Vertical 1:____

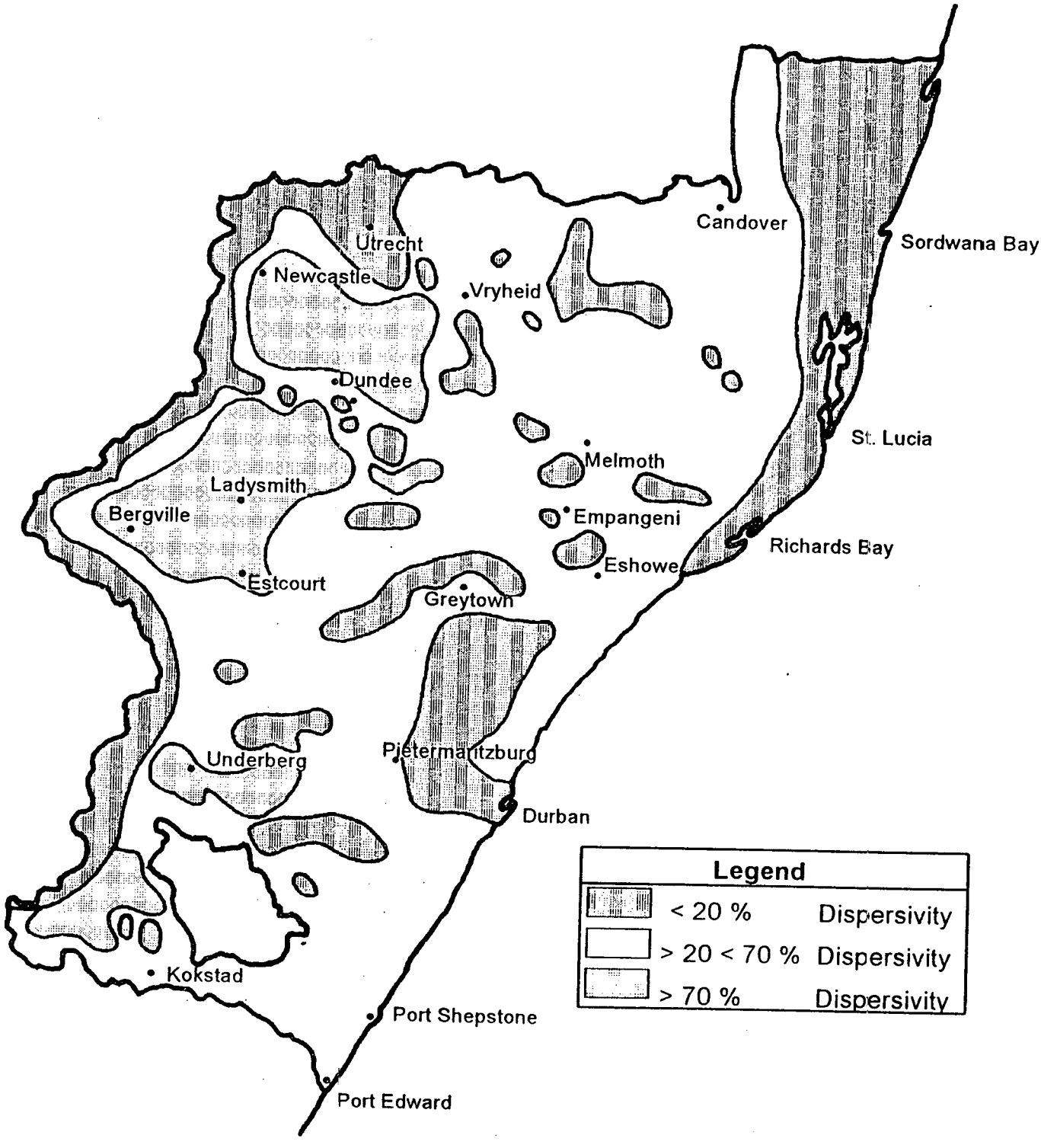


Figure 1. Approximate Distribution of Dispersivity In KwaZulu-Natal

(Taylor, H. M. 1981 Note on Dispersive/Erodible Soils Natal Roads Department)

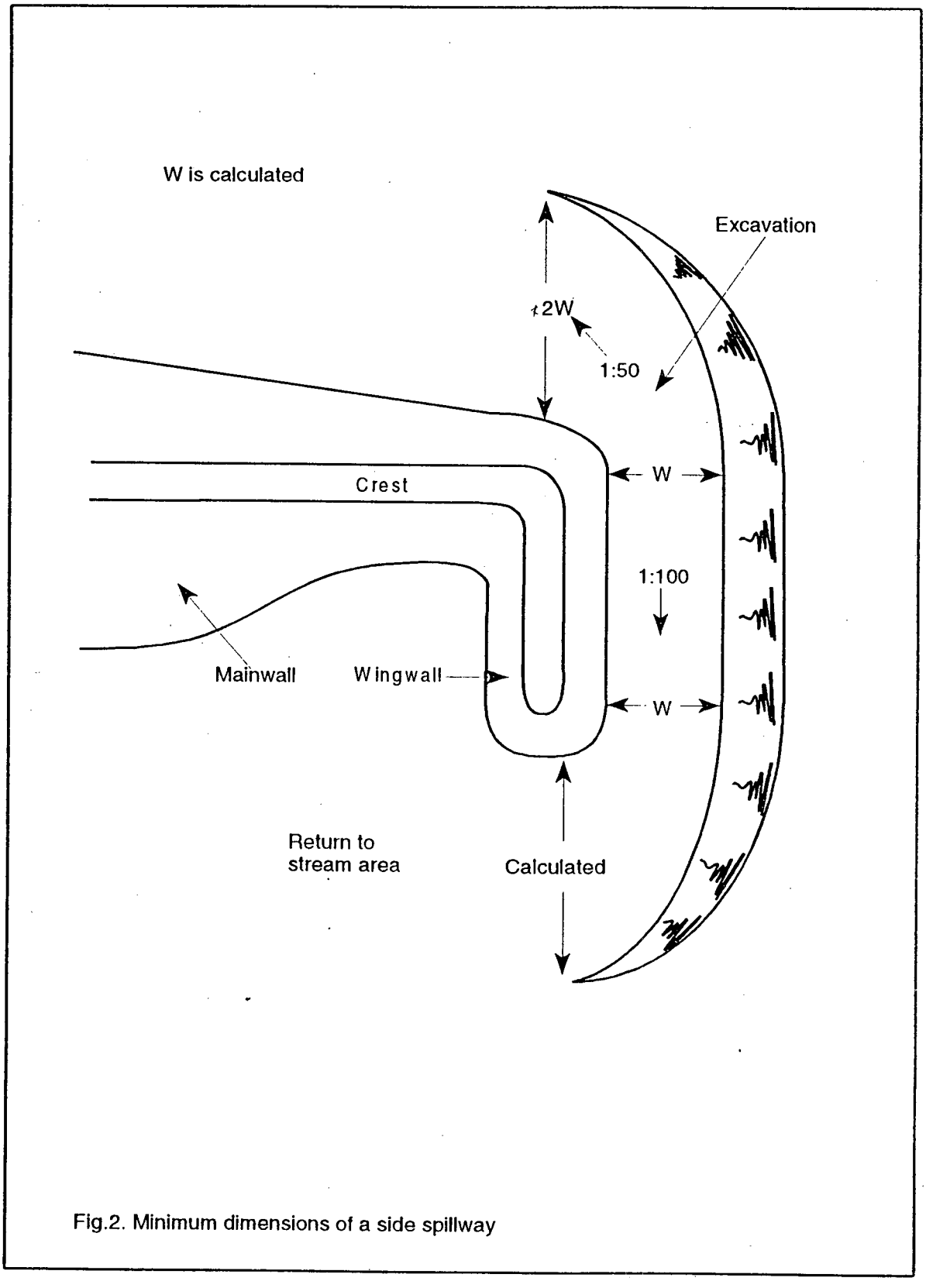


Fig.2. Minimum dimensions of a side spillway

Table 6 PHYSICAL PROPERTIES OF SELECTED DIAGNOSTIC SOIL MATERIALS (Scotney, M° Phee and Russell (1975): Proc. SAIAE.)

DIAGNOSTIC SOIL MATERIALS		SOIL PROPERTIES								
TOPSOIL HORIZON	FORM	Particle size analysis				Textural class	Shrink - swell potential	Dispersion coeff. %	Proctor values	
		Clay %	Silt %	Sand					Dry density kg/m^3	Optimum moisture content %
				%	Grade					
MELANIC	Bonheim	41,6	11,4	47	f	sandy clay	high	83,3	1 550	20,5
	Milkwood	53,8	17,2	29	f	clay	very high	20,0	1 305	31,5
VERTIC	Rensburg	63,6	12,4	24	f	clay	very high	81,3	1 370	28,0
	Rensburg	53,0	14,0	33	f	clay	very high	24,5	1 455	24,0
ORTHIC	Kroonstad	9,1	4,9	86	m	loamy sand	low	57,1	1 879	9,1
	Kroonstad	10,2	3,8	86	m	loamy sand	low	5,0	1 877	9,9
	Estcourt	19,4	6,6	74	f	sandy loam	low	56,2	1 877	10,3
	Avalon	27,2	9,8	63	f	sandy clay loam	low	31,1	1 715	14,5
	Glenrosa	29,6	14,4	52	m	sandy clay loam	low	0	1 714	17,0
	Kroonstad	45,0	23,0	32	f	clay	low	58,1	1 433	20,6
SUBSOIL HORIZONS										
E - HORIZON	Cartref	10,3	4,7	85	m	loamy sand	low	46,7	1 867	9,4
	Cartref	27,1	11,9	61	f	sandy clay loam	low	48,8	1 855	12,0
	Estcourt	23,3	16,7	55	f	sandy clay loam	low	24,4	1 815	12,5
G - HORIZON	Willowbrook	37,3	13,0	49,7	f	clay loam	high	58,1	1 650	19,0
	Katspruit	48,6	19,0	32,4	f	clay	high	5,3	1 470	23,3
	Rensburg	55,4	10,6	34	f	clay	very high	18,9	1 545	23,0
RED APEDAL B	Hutton	9,9	3,1	87	m	loamy sand	low	3,5	1 840	12,0
	Hutton	21,2	6,8	72	f	sandy clay loam	low	12,3	1 842	12,4
	Hutton	15,6	1,4	83	m	sandy loam	low	10,0	1 867	11,5
	Hutton	37,4	14,1	48,5	f	clay loam	high	11,9	1 650	19,0
	Hutton	40,6	6,9	52,5	f	sandy clay	low	4,2	1 720	17,8
	Hutton	59,5	6,5	34	f	clay	low	22,5	1 400	28,9
	Hutton	62,5	11,5	26	f	clay	low	0	1 390	33,0

Table 6 : continued...

Table 6 continued...

DIAGNOSTIC SOIL MATERIALS		SOIL PROPERTIES								
TOPSOIL HORIZON	FORM	Particle size analysis				Textural class	Shrink-swell potential	Dispersion coeff. %	Proctor values	
		Clay %	Silt %	Sand					Dry density kg/m^3	Optimum moisture content %
				%	Grade					
RED STRUCTURED B	Shortlands	39,9	8,1	52	f	sandy clay	very high	13,9	1 368	31,9
	Shortlands	60,2	7,8	32	f	clay	very high	92,6	1 420	27,0
YELLOW BROWN APEDAL B	Avalon	9,2	0,8	90	m	sand	low	13,2	1 668	16,3
	Avalon	24,0	2,0	74	f	sandy clay loam	medium	7,8	1 820	13,5
	Avalon	37,0	12,0	51	f	clay loam	low	0	1 580	22,0
	Avalon	22,8	7,2	70	f	candy clay loam	low	2,3	1 850	13,0
	Clovelly	50,3	13,7	36	f	clay	low	5,9	1 475	24,5
	Clovelly	58,2	12,8	29	f	clay	low	27,0	1 463	24,8
SOFT PLINTHIC B	Avalon	3,1	0	96,9	m	sand	low	66,7	1 653	15,1
	Avalon	17,2	6,0	76,8	f	sandy loam	low	10,4	1 975	11,0
	Avalon	31,0	4,0	64,7	f	sandy clay loam	low	5,9	1 665	18,0
	Avalon	21,6	8,4	70	f	sandy clay loam	low	0	1 655	19,5
GLEYCUTANIC B	Kroonstad	17,4	6,4	76,2	m	sandy loam	low	55,6	2 073	8,7
	Kroonstad	57,3	10,0	32,7	f	clay	low	83,3	1 638	20,3
PRISMACUTANIC B	Estcourt	47,3	6,0	46,7	f	clay	very high	85,5	1 630	20,5
	Sterkspruit	60,4	7,0	32,6	f	clay	very high	38,5	1 457	26,1
PEDOCUTANIC B	Bonheim	37,7	4,3	58	f	sandy clay loam	very high	10,4	1 619	21,7
	Bonheim	69,8	12,7	17,5	f	clay	very high	31,3	1 400	29,0
	Bonheim	52,2	9,8	38	f	clay	very high	45,2	1 576	22,2
LITHOCUTANIC B	Glenrosa	42,5	13,5	44	f	clay	high	14,8	1 565	22,0
NEOCUTANIC B	Oakleaf	29,2	13,8	57	f	sandy clay loam	high	83,3	1 697	18,3
	Oakleaf	48,2	15,8	36	f	clay	low	10,2	1 640	20,9

Note: Some of the soils mentioned are not suitable for dam construction. They are however mentioned for the sake of completeness.

6. DESIGN OF WATER RETICULATION FOR STOCKWATERING

1 Boreholes :
Maximum extraction rate may not exceed ⅔ of the tested six hour delivery.

2 Fountains :
Three quarters of the total 24 hour delivery may be utilized in a design if measured during August to October, or half of the 24 hour delivery if measured during November to July. Flow will be regulated by a float valve.

3 Main reservoir :
The minimum size of a main reservoir shall be no smaller than that sufficient to store a minimum of ten days supply of water for the total number of stock units calculated according to the grazing capacity of the veld for which the reservoir must supply stock water. Anything smaller will need a special motivation. Anything larger than that holding a 14 day supply will also need a motivation.

4 Buffer reservoirs :
The minimum size of a buffer reservoir shall be no smaller than that sufficient to store water for a two day period for the number of stock units calculated according to the grazing capacity of the veld for which the buffer reservoir must supply stock water. The maximum size relative to the main reservoir is a matter of economics. The amount of water that is to be stored in buffer reservoirs may be used to reduce the size of the main storage reservoir.

5 Drinking troughs :
The minimum size of drinking trough shall be dependent on the herd size: 100 mm space per LSU for horned animals and 75 mm space per LSU for dehorned ones. Minimum length of trough will be 2,5 m, minimum diameter 1,5 m, and minimum depth 150 mm.

6 Number of watering points per camp :
One : must supply 100 % of the daily need.
Two : each must supply 66 % of the daily need.
Three : each must supply 50 % of the daily need.

7 The minimum drinking requirements for use in reticulation design will be 50 litres per large stock unit and 5 litre per small stock. Where dairying on veld is practised, this may be increased by fifty to one hundred percent. A safety factor of 1 will be used, except where secondhand piping is used, when a value of 1,2 will be required.

8 All profiles will be plotted on graph paper, to a suitable scale, and the design done by the graphical method.

9 The maximum pumping rate for subsidy purposes will be calculated so as to supply the necessary daily requirements within a five hour period. The minimum pumping rate will be calculated so as to supply the necessary daily requirements within a ten hour period.

10 The friction head generated in the pumpline shall not exceed one third of the static head, unless

the overall profile gradient is less than 10 %, in which case the velocity of flow in the pumpline shall also not exceed 1,5 m/s.

11 A storage reservoir will not be necessary if the source of water is a fountain, whose water is delivered under gravity, the delivery of which meets the requirements as specified in para 7 above, and when there is no need to pump the water to a higher level. A reservoir will be needed if the delivery of the fountain is less than the required rate over the 5 hour drinking period. The reservoir will then be sized to hold the daily difference between that delivered and that required, multiplied by the number of days per grazing period.

12 Piping:

* Type to applicants preference, class to meet actual working head requirement.
* The diameter of any pipeline shall not exceed 65 mm, and the total working head may not exceed 120 metres, without approval from the SCE.
* Minimum diameter when pumping is 25 mm for electrical power, and 32 mm for diesel and wind power. Minimum diameter on gravity lines will be 20 mm.

13 The delivery rate at drinking troughs shall not be less than 0,1 litre/second, and shall be calculated to water the required number of stock within a five hour period.

14 In seeking to reduce the rate of delivery to a trough by making use of the water already in the trough, only ⅔ of the capacity of the trough may be used for this purpose.

15 Having checked that the hydraulic gradient will not cut the profile line at any point when the design drawn-off takes place, the designer will check for the same when maximum draw-off takes place, and include the necessary precautions in the design if it will take place.

16 Documentation :

A standard worksheet of the f0rm as illustrated overleaf will be used, and the pamphlet 'Standard Specifications for the Construction of Circular Reservoirs and Drinking Troughs' will be attached as an addendum thereto.

LAYOUT OF PIPELINE SCHEME

SCALE 1: _____

DEPARTMENT OF AGRICULTURE				CEDARA A. D. INSTITUTE			
Extension Office:				Mag.District:			
Owner:				Farm Unit:			
Pipeline, reservoir/s and troughs for stockwatering.							
Surveyed		Designed		Drawn		Checked	
Reference No.:						Work No.:	
Annexure to attached forms BLW 23/24, BLW 34/21, LA 7-57E							

DESIGN DETAILS:

1. Water Source: [Private] [Public] [G.W.C.A.]

Storage dam capacity _____ m^3 Fountain delivery _____ l/h
Stream/river delivery _____ m^3/s
Borehole: Total depth_____m Depth to waterlevel_____m
Tested 6 hr. delivery _____ l/h
Power source:_____

2. Water Requirements: Large stock units _____ 50 litres per day
Small stock units _____ 5 litres per day
Safety factor_____
Drinking period _____hrs./day

Herd No.	Size(l.s.u/s.s.u)	Camp Nos.	Trough Nos.	Daily (litres)

3. System Components: See pamphlet LA 7-57E for construction and materials.

Item	Diameter/Width(m)	Depth(m)	Length(m)	Capacity(l)	R.L.
Main Reservoir					
Buffer Res. No.1					
Buffer Res. No.2					
Trough No.1					
Trough No.2					
Trough No.3					
Trough No.4					
Trough No.5					
Trough No.6					

4. The Pump Installation:
Type of pump _____
Max. pumping rate _____l/h Min. pumping rate _____l/h
Weekly pumping period _____hours
Static head _____m Friction head _____m
Operating head _____m
The pumping rate may not be exceeded without prior written permission from this Department.

5. Delivery at Troughs:
2/3 of trough capacity used/not used, to reduce delivery rate to troughs.

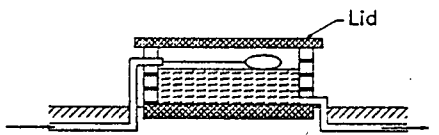
Trough No.	Delivery(l/h)
1	
2	
3	
4	
5	
6	

EXPLANATIONS: See page 1 of 2

1. Symbols used for piping:
S: Galvanized steel P: Black polyethelene K: Klambon
A: Asbestos cement V: Rigid U.P.V.C.
Lower case numerals indicates pressure class of pipe
eg. P_6 : Black polyethylene, class 6.

2. Piping must be buried to a minimum depth of 300mm, or as specified.

3. Details of Pressure Breaker: (Brick and/or concrete)



SECTION

4. Schedule of piping required:

Length(m)	Diameter and type	Class

5. State subsidy:
* Approx. subsidy payable R_____ if specified piping carries the SABS mark
*Final inspection will only be made when the system is operative and no leaks are evident

DEPARTMENT OF AGRICULTURE CEDARA A. D. INSTITUTE			
Extension Office:		Mag.District:	
Owner:		Farm Unit:	
Pipeline, reservoir/s and troughs for stockwatering.			
Surveyed	Designed	Drawn	Checked
Reference No.:			Work No.:
Annexure to attached forms BLW 23/24, BLW 34/21, LA 7-57E			

7. AUTHORITY FOR THE TECHNICAL APPROVAL OF PLANS, SPECIFICATIONS AND COMPLETED WORKS.

1 No non-standardised plans or specifications may be provided to a client without them having been checked and approved by a senior officer, *irrespective of whether the work is to be subsidised or not.*

2 Authority for approving the technical correctness of plans and specifications is shown in the table overleaf.

3 The officer who compiled the preliminary report may not carry out the final inspection.

4 Control Soil Conservation Officers (C.SCO's) will carry out all final inspections. The local officer will, however, have made preliminary enquiries, before the inspection, to verify that the completed work meets the minimum design specifications, before the C.SCO visits the farm, in order to obviate time-wasting.

AUTHORITY FOR TECHNICAL APPROVAL OF PLANS AND SPECIFICATIONS.

RESTRICTIONS TO THE TECHNICAL APPROVAL OF PLANS AND SPECIFICATIONS				
Approval authority	Basic requirements	Control Soil Conservation Officer	Soil Conservation Engineer	Chief Engineer
Systems:	The following documents must be sent to the Chief Engineer: SC & DS, along with a copy of the Letter of Approval if the normal subsidy exceeds the amount listed below: * Working plan * Design of the system or structure * Specifications * Cost sheet/Preliminary report Further requirements are listed below:	Systems for which the amount of normal subsidy is less than the values listed below may be approved by the Control Technician, provided that: * the engineer has laid down the technical requirements * the catchment where applicable does not exceed 5 km^2 Further requirements are listed below:	Systems for which the amount of normal subsidy falls within the values listed below must be referred to the Engineer together with the following documents, for technical approval: * Working plan * Design of the system or structure * Specifications * Cost sheet/Preliminary report Further requirements are listed below.	Systems for which the amount of normal subsidy exceeds the values listed below must be referred to the Chief Engineer: SC & DS together with the following documents for technical approval in principle: * Working plan. * Design calculations of the system or structure. * Specifications. * Cost sheet/Preliminary report (in quadruplicate).
1 All fencing (incl. internal camp and erosion control fencing).	Not required, irrespective of the amount of normal subsidy.	No restrictions	Not applicable	Not applicable.
2 Standardised stockwatering systems.	Not required, irrespective of the amount of normal subsidy.	Up to R5 000 without restrictions. If the normal subsidy exceeds R5 000 it should be considered to be a non standardised stockwatering system.	Not applicable	Not applicable.
3 Non standardised stockwatering systems (including earthen dams for stockwatering).	R6 000. Additional documentation : * longitudinal section of the work.	Up to R20 000. Additional requirements in the case of an earthen dam: * Maximum water depth may not exceed 4,5 m and the capacity must be less than 50 000 m^3 * Soil for the construction of the wall must be suitable * Depth of flow through spillway must not exceed 750 mm.	Between R20 000 and R30 000 or in the case of a pipeline if the pressure head exceeds 120 m irrespective of the amount of normal subsidy. Additional documentation: * Longitudinal section if a pipeline * If a dam: # Lab. analysis of construction material # Topo-survey of terrain.	Over R30 000. Additional documentation: * None apart from those required by the Soil Conservation Engineer.
4 Subsurface drainage systems.	Required in all cases irrespective of the amount of normal subsidy. Additional documentation: * The discharge point must always be shown and described.	No authority to approve at all irrespective of the amount of normal subsidy or surface area of the system.	Up to R16 000. Additional documentation: * Longitudinal section of the main collector and representative branch drains. * Water table map coloured-in, in the prescribed way.	Over R16 000. Additional documentation: * None apart from those required by the Soil Conservation Engineer,
5 Soil conservation structures (including waterways, contour banks, gulley stabilization structures and earthen embankments).	Required in all cases irrespective of the amount of normal subsidy. Additional documentation: * None.	Up to R25 000. Additional requirements: * In the case of earthen embankments the soil for construction must be suitable * Foundations may in no way be suspect. * Stormwater drain design up to 10 ha. * ROCP's covering one farm only, and a maximum of 100 ha area.	Between R25 000 and R60 000. Additional documentation: * Longitudinal section of the water course. * Cross-section at key sites for weirs. * ROCP for waterways. * Stormwater drains with catchment areas >10 ha. * ROCP's covering more than one farm and more than 100 ha.	Over R60 000. Additional documentation: * All documentation required by the S.C.E. * In the case of soil conservation weirs the anticipated effect of the work must be indicated on the site plan and longitudinal section (in colour) with a short description of the conservation situation in the catchment area, extent of erosion, cause thereof and steps which have been taken to improve the situation.

8. MINIMUM REQUIREMENTS FOR FINAL / CONTROL INSPECTIONS

Final inspections will be carried out by the C.SCO, and control inspections by the local SCO. The following checks must be made against the information supplied in the preliminary report:

1 In general (and including pipeline schemes and subsurface drainage):
A check will be made on all dimensions given, all numbers of items specified, and as far as possible, on the strength and durability of the structure as required in the design. That the correct concrete mix was used can only be gauged by querying the amounts of cement and aggregate used.

2 Fences :
As required in the standard control inspection sheet.

3 Grassed waterways :
* A cross-sectional measurement of width (to nearest 100 mm) and depth (to nearest 10 mm) every 250 m in the length of the waterway
* A random basal cover measurement every 250 m in the length of the waterway : a minimum basal cover of 10 % for sodforming grasses and 5 % basal cover for bunch grasses is required.
* A check on the total length of the structure (to nearest 1 metre).

4 Contour banks :
* The total number of structures built
* The length of every fifth structure (to nearest 10 metres)
* The cross sectional area (to nearest 0,1 square metre)and depth (to nearest 10 mm), at one random point, on every fifth structure (settled height)
* The settled height of banks (to nearest 10 mm) where they cross gulleys
* The adequacy of outlets

5 Earthen dams :
* The reduced level (to nearest 50 mm) of both the crest and spillway levels, against that specified
* The length of the embankment, as well as its crest width, to the nearest 1 metre
* The side slopes
* The dimensions (to nearest 0,5 metre) of, and levels (to nearest 10 mm) in, the spillway
* Leakages : no approval may be given if the dam is found to leak (the dam must be at least half-full during inspection)
* The specifications and length of fencing (to nearest 10 m) around the embankment, spillway and return-to-stream

6 Failure of the structure to meet specifications :
Any discrepancy found which will lead to the rejection of a claim on subsidy will be pointed out to the applicant in writing by the inspecting officer (normally the C.SCO), and a maximum period of 30 days (after expiry date) granted for him to bring the structure up to specification, if this is feasible. If not feasible, the structure is not subsidisable, and he must be advised of the reason in writing.

9. PROCEDURE FOR PROCESSING APPLICATIONS IN TERMS OF REGULATIONS 2, 3, AND 7 OF THE CONSERVATION OF AGRICULTURAL RESOURCES ACT (NO 43/83)

1. Introduction

Sub article (1) of Regulation 2 of Act 43 of 1983 states:

"Except on authority of a written permission by the Executive Officer, no land user shall cultivate any virgin soil: Provided that such authority shall not be required in respect of virgin land for which an approval has been granted in terms of Section 4A of the Forest Act (68 of 1972)".

There is a similar restriction on the draining of wetlands. In other words, anyone who wishes to cultivate virgin land, or any other portion of land ***which has not been cultivated for the last ten years***, must apply to his local Agricultural Extension Office for permission to do so. Although the Act excludes land under 20% in slope to be put down to timber plantations, in fact, an internal arrangement between the Directorates of Resource Conservation (Dept. of Agric.) and of Forestry (Dept. of Water Affairs and Forestry) does require that a proper investigation be carried out in this instance. Authority for granting permission to do so has been delegated to the Deputy Director (Soil Conservation) for the Institute. The inspecting officer will be a local Departmental Officer who is competent to assess soil suitability according to the norms laid down in sections 3 to 6 of this document, to prepare a Runoff Control Plan (ROCP) for erosion control on the area involved (where necessary) as laid down in the departmental manual on the subject, and to provide specifications for all the erosion control/drainage structures should the piece of land require them. This will therefore normally be the task of the Industrial Technician (Soil Conservation), but does not exclude any other competent officer from carrying out the investigation. It is further required that these applications will be treated as a fairly high priority.

2. Recording System

All correspondence in connection with the application will be filed on the relevant computerized file number allocated to the farm under the Soil Conservation Scheme. At Head Office ref. no. 18/3/4/1 will be used for Reg. 2 and 3 permits, 18/8 for Reg. 7 permits, and 20/1/2/1 for forestry permits. In the case of an unplanned farm a new file must be opened. In the case of a smallholding where there is no probability of financial aid being requested, the general file (18/3/4/1) will be used.

All applications will be recorded on a 1:50 000 scale topo-cadastral map kept specifically for this purpose at the local extension office. The shape and size of the proposed area will be marked on it as accurately as possible in red ink, irrespective of whether the application was successful or not.

A special register will be kept in the local office for all applications, giving dates, reference number, result of application, etc.

NB. Applications for the cultivation of wetlands must be kept separated from normal arable land, but the same set of maps may be used.

3. The Field Inspection

While this will not necessarily entail a soil survey in the accepted sense of the word, it will be necessary to investigate the profile for each homogeneous soil type. It is therefore a requirement

that a stereoscopic planning for soil pit siting and ROCP be made, and the applicant requested to have the pits dug by the time of the proposed visit. See section 7 for the considerations which apply in deciding on whether a soil is arable or not.

Where the farm has been planned, an aerial photo map will be available. If the application appears to be successful, the proposed land must be numbered, the proposed layout of stormwater drains, waterways and contour banks/drainage works drawn in on the map, and the structures given work numbers. Refer to Chapters 2 and 3 for further requirements.

In some instances the applicant will not require financial aid. A formally approved ROCP is still required however, and a map of the section of land plus the surrounding area is therefore also required on which the proposed layout and its effect on the surrounding area is clearly indicated.

A considerable amount of attention will be paid to ensure that the virgin land, for which permission under the Act is granted, will be suitably utilized and protected from erosion. It is a further requirement that an indication of the erosion status *on all other arable land on the farm unit* be reported on by the inspecting officer. The delegate of the Minister, when corresponding with the applicant on the outcome of his request, will then make comment on the need to improve conservation on any other lands on the farm unit requiring it. It is envisaged that, in the event of badly washed existing lands, permission to cultivate virgin land will be withheld until such time as improvements to existing lands have been effected.

4. The recommendation by the field officer will be sent via his Regional office (where it will be checked for correctness) to DD(SC) for further processing. The various applications are dealt with separately below:

Applications for Regulation 2 instances excepting timber planting: The following documentation is required in single fold except where otherwise indicated.

* the original application form, (see Table 8), signed by the land user
* an A4 sized copy of the general locality at a scale of 1:250 000
* the Letter of Permission duly filled in and ready for signature (Table 9)
* a profile description: (see Table 3)
* a photostat copy of an aerial photo showing farm boundaries and the relevant site if the farm is not planned
* a standard work sheet for contour bank systems and full specification for any erosion control structures deemed necessary
* a covering letter (i) commenting on the erosion status of all other lands on the farm, and (ii) making recommendations as to approval/rejection of the application.

Applications to cultivate virgin land in order to plant timber:

* all permits under Regs. 2 and 3, must in future be authorised either by the Deputy Director (Soil Conservation) or via him (see section below) by the Director, Resource Conservation (D.R.C.). The permit forms must therefore be completed in the normal manner and sent to the former for signature and posting.
* although Act 43/1983 has not yet been amended, DRC and Forestry Development (FD) have concluded an agreement that requires a Reg. 2 permit for the cultivation of virgin land for the purposes of afforestation on land even with a slope of less than 20%

* the applicant must submit the following to the Forestry Extension Officer (F.E.O.) when applying for an afforestation permit:
  (i) completed application forms - i.e. for afforestation and for cultivation of virgin land
  (ii) 1 X 1:50 000 locality map covering the relevant property
  (iii) 5 X orthophoto, mosaic or acceptable map (usually to a scale of 1:10 000 (2 for Forestry, 1 for the agricultural Region, 1 for Head Office, and 1 for E.O./S.C.O.) on which the area for permit consideration is clearly demarcated in soft pencil
  (iv) Title deed information
* The E.O./S.C.O. may be requested to assist with the procuring of the maps. The applicant is responsible for obtaining them and sending them to the F.E.O.
* The F.E.O. contacts the local E.O./S.C.O., Natal Parks Board (N.P.B.) Zone Officer and the Dept. of Water Affairs with a view to arranging a combined visit.
* The E.O./S.C.O. in consultation with the local Conservation Committee advises F.E.O. of a suitable date. The F.E.O. then liaises with N.P.B., Dept. of Water Affairs and other interested bodies, fixes the date and informs the participants.
* If, however, combined visits can not be arranged the E.O./S.C.O. must advise F.E.O. of any sensitive issues so that the F.E.O. pays particular attention to these during the inspection. These issues must be pointed out to F.E.O. within 14 days of notification of application.
* Water courses, wetlands, areas too steep and too shallow for afforestation, indigenous forests, exotic invaders etc. within the area being considered for permit allocation must be indicated on the map.
* In the case of separate visits, the F.E.O. must submit his map to the E.O./S.C.O. so that all details are shown on the maps to be drawn up by the E.O./S.C.O. and re-submitted to the DD(SC) for permit purposes. Suggestions, comments and recommendations, must be submitted in writing, with the other submissions to the DD(SC) via the Regional office. Any instances of disagreement will be resolved by DD(SC), F.E.O. and the Rescon. Inspector. Submission by the E.O./S.C.O. to Head Office will comprise, in single fold except for the maps, the following:
  (i) Letter of permission to cultivate with recommendations for land preparation (Table 9), and specifications of conservation structures if needed
  (ii) Profile description (Table 3)
  (iii) Forestry inspection form (Table 4)
  (iv) 5 orthophoto maps (or mosaics etc) showing details as listed above.
  (v) Recommendations (see Table 6 for land preparation norms) comments, objections etc.
* The applicant for a forestry permit will receive both his planning permit and his permit under Act 43/1983 in the same envelope. All permits will be issued by the Directorate of Forestry Development, Pretoria, after consideration of all the submissions by Water Affairs, N.P.B. and the Department of Agriculture. DD(SC) will, therefore, submit all Reg. 2 and Reg. 3 permit approvals to Forestry Development, Pretoria for distribution along with their afforestation permit.
* On the instruction of the Director, Resource Conservation (DRC), no permit may be processed or approved where the applicant has already commenced breaking up virgin land without permission. The case must be reported immediately to the Chief Inspector (DRC), who will investigate and report on the case to his head office.

* The delegated authority to grant permission to break new land is limited to a maximum land slope of 30%, Applications to break land over 30% may only be granted by DRC. In this case DD(SC) will send the documentation to DRC, Pretoria, for attention.
* Upon receipt of the permit the F.E.O. issues a copy to Head office. This ensures that the E.O./S.C.O. knows when permits are issued and what directives are included.

5. Procedure for applications to cultivate wetlands (Regulation 7)
   * Authority for approval has been retained by the Executive Officer (Act 43/83).
   * Local staff are required to inspect the site and gather all relevant information, including the opinion of local Conservation Committee members.
   * The following procedures must be followed when an application is made to cultivate a wetland:
     * The appropriate application form is to be completed by the farmer and lodged at the Extension Office (Table 8).
     * The soil conservation/extension officer will visit the site and gather all relevant information, learn of the intended plans for development from the farmer, and assess the desirability or otherwise for development in terms of Regulation 7 of Act 43/83. The local Conservation Committee could be involved with this visit.
     * The inspecting officer will complete the attached information sheet (Table 7) and submit a copy, together with a firm recommendation via the Regional office to the DD(SC). It is accepted that the soil conservation officer and extension officer will jointly discuss the application in considering its merits before submission to DD(SC) but no commitment should be given to the farmer at this stage.
     * The DD(SC) will send copies of the inventory to members of the Wetland Advisory Committee, which includes the Resource Section of the Department of Agriculture, Directorates of Water Affairs and of Forestry, Town and Regional Planning, KwaZulu-Natal Parks Board, and the Resource Conservation Inspector. They will supply him with recommendations. DD(SC) will summarise this information and send it to Director, Resource Conservation (Rescon) with recommendations.
     * Director (Rescon) will advise applicant of the decision, with copies to DD(SC) and the Region concerned.
     * Accurate records of all applications must be kept by the local office in terms of the procedure laid down in this chapter i.e. on 1 : 50 000 maps and in a separate register. A report on the state of wetland development in each extension ward will be required by Head Office on an annual basis (to be included in the annual report.
     * Any approved development will be monitored by the local office and the Rescon Inspector.
     * Transgressions of the regulations concerning wetlands must follow the same procedure as indicated for the cultivation of virgin land.

6. Development in the coastal bottomlands : For many years the coastal bottomlands have been heavily encroached upon by farmers, especially during drought periods. During wetter years the drainage ditches are opened up, and ridge-and-furrow drainage is attempted. The following is the procedure that will be adopted in future:

* Stabilization of these areas is the first consideration, and is to receive top priority. Every effort must be made to protect and increase the wetland resources if possible.
* No existing and undisturbed wetlands may be drained or otherwise interfered with, without a permit issued by the Director of Resource Conservation in terms of Act 43/1983 , and then only after the members of the Wetland Advisory Committee have made their individual recommendations to him via the chairman of said Committee. The permit (if granted) will state clearly and unequivocally to what extent drainage may take place.
* Where bottomland areas had been planted up prior to inception of Act 43/1983, and as long as no erosion is taking place, the *status quo* may be maintained. Only maintenance by hand labour will be allowed and no alteration to the drainage may be carried out unless approval to do so has been obtained.
* Examples of instances where an approved plan will be necessary include:
    * Attempts to improve the original drainage system by an alteration of drain layout, extension of existing drains, or the deepening thereof.
    * Installation of cambered beds.
* An approved plan may be drawn up by a competent officer of either the Directorate of Resource Conservation, the KwaZulu-Natal Department of Agriculture, or the SASA Experiment Station, after consultation between the parties. In each case copies of the plan, drawn up by one organization, will be forwarded to both of the alternate organizations in order to keep each other aware of developments.
* In the event of a dispute regarding the suitability of a plan, the Director of Resource Conservation will be the final arbiter.

7. Processing the recommendations (Reg. 7 permits and those for tree planting excluded):

* The requisite number of copies will be made at Cedara.

* If the report is unfavourable the DD(SC) will advise the applicant in writing, offering reasons for the rejection. Copies will be sent to the field office and Region concerned, and the former will mark the area on the relevant index map with a cross.

* If the report is favourable the DD(SC) will sign the Letter of Permission and distribute copies to the applicant, Region, AEO and Resource Conservation Inspector. The local office, on receiving their copy, must arrange for any necessary surveys. Both S.C.O. and Regional offices must pend their respective files to ensure a follow-up visit to check on constructed dimensions.

* Should the applicant not complete the required structures within the specified time period he may be granted a reasonable extension of time to do so. This will be at the discretion of the DD(SC) upon written reasons by the applicant as to the cause of the delay. Any evidence of blatant disregard on the part of the applicant to meeting the conditions of the permission must result in the case being handed over to the Resource Conservation Inspector for further action.

8 Guidelines for processing applications to cultivate virgin soil.

Introduction : The following guidelines are intended to assist field officers in their recommendations concerning the cultivation of virgin land and wetland areas. While the criteria do provide a useful guide to determine the suitability of soils for irrigation (i.e. land up to and including Class III) it is recommended that assessments should be made in close consultation with the Resource and Soil Science Sections at Cedara. See paragraph 3 in this regard. This applies especially to Irrigation Board and State Schemes.

Cultivation of virgin land in general: The main object of control is to prevent farmland degradation as a result of the cultivation of non-arable land. To determine non-arable land it is necessary to classify land according to certain criteria. The main characteristics used to determine the initial land classes are slope, texture of the topsoil, effective depth and permeability of the upper subsoil. In addition other factors such as rockiness, erodibility of the soil, crusting of the soil surface, wetness and chemical properties are considered which may further degrade the initial classes. See Table 1. As the annual rainfall decreases over a region so its variability and the erodibility of the soil increases, with a resultant decrease in vegetational cover. This leads to greater runoff and soil loss, and necessitates the imposition of more stringent limitations in the classification of soils in drier climates. Consequently, in areas with a lower MAP, and for a given capability classification, the upper limit on slope is decreased, a greater clay content and effective soil depth is required, and the permeability criteria of the upper subsoil are relaxed.

There are four arable classes, and *any land which does not meet the minimum requirements of the different criteria is deemed non-arable.* Table 1 provides a means of determining the arability of land within three major groups of bioclimatic regions. The intensity of use for arable land will depend on the degree of limitations and hazards as defined in Table 2: A Land Capability to Guide Farm Planning in KwaZulu-Natal.

Table 1 Determining Land Capability Classification

Rating the resource properties	1	2	3	4
* % Surface rockiness (R)	<10	10 - 20	20 - 50	>50
* Effective soil depth (D)	>900	500 - 900	250 - 500	<250
* Soil erodibility (Fb)	≥6,0	5,0 - 5,5	3,5 - 4,5	2,0 - 3,0
* Overall drainage (W)	Moderate to well	Poorly	Very poorly	Excessively wet
* % Land Slope (S) for: Humid areas (B/C 1-4) Subhumid (B/C 6-8) Semi-arid (B/C 9-11)	A 0 - 3 0 - 3 0 - 2	B 4 - 8 4 - 7 3 - 5	C 9 - 15 8 - 12 6 - 8	D 16 - 25 13 - 20 9 - 15
Capability class	I	II	III	IV
Resource properties	Minimum resource rating required for capability class indicated			
R D Fb W S	1 1 1 1 A	1 2 2 2 B	1 3 3 3 C	2 3 4 3 C

Table 2 A land capability classification to guide farm planning in KwaZulu-Natal

LAND CAPABILITY CLASS			DEFINITION OF CLASS	CONSERVATION NEED	USE-SUITABILITY
Uplands	Arable	I	Very high potential for intensive arable use, with low limitations and very low erosion hazard	Safe use with ordinary good agronomic practices. Contour banks needed on long slopes	Annual cropping
		II	High potential for arable use, slight limitation and low erosion hazard	Easily applied conservation practices, eg contour tillage and contour bank structures	Annual cropping with occasional ley or special tillage
		III	Moderate potential for arable use, moderate limitations and hazard of erosion	Special conservation practices for safe use: Contour bank structures and conservation tillage	Regular rotation of annual crops with ley crops
		IV	Low potential for arable use, severe limitations and high erosion hazard	Intensive conservation practice using both mechanical and biological methods	Long term leys with only occasional annual cropping
Bottomlands	Arable	Ib	Land comprising deep alluvial soils of high potential for many uses but subject to occasional flooding	Protection required against the hazard of flooding	Occasional crop production, pastures or trees
	Non-arable	Vb	Land comprising hydromorphic wetland soils with unique management needs. With adequate drainage and protection against erosion, utilization may be intensified	Requires total protection of key areas and complete control of water table	Established to permanent pastures, or Poplar trees
		VIIb	Bottomlands. Because of severe limitations or special needs, they require to be left in their natural state	Total protection from agricultural use	Wildlife

Table 3 Profile Description : Assessment for Arability

Farm Name :	Owner :
Ref. No :	Address :
Extension Ward	
Land No :	Area in ha.:

ITEM	1	2	3	4	5
Pit number					
Location					
Slope					
Topsoil texture (% clay)					
Effective depth (mm)					
Permeability of upper subsoil					
Rockiness					
Soil erodibility F_b rating					
Soil surface crusting					
Wetness					
Chemical status					
Class					
Form					
Series					

REMARKS

Inspecting Officer

Date

Definitions of Symbols used in Land Classification.

The following definitions apply to the criteria used in Table 1.

Effective Depth

This is the depth of soil that can provide a medium for root development, retain available water and supply nutrients. In most cases it is the depth at which gravel, weathering rock, impervious clay, hardpans and waterlogged horizons occur and limit root proliferation. Chemical criteria (*e.g.* Al toxicity) may also limit rooting depth but it is not taken as a limitation to downgrade a class as with good management this can be rectified. Limitations of this nature should be recorded by use of a suffix Al *e.g.* Class 11 Al.
It will be noted that the depth restrictions vary for each of the three broad climatic regions.

Soil Texture of Topsoil (Ploughing depth up to 250 mm)

The following textural classes and related clay limits are in terms of the binomial classification system.

Textural Class	**Clay Percentage**	**Description (Sausage Method)**
Sand	0 - 5	Cannot form a shape
Loamy Sand	5 - 15	Can form a sausage
Sandy Loam Sandy Clay Loam	15 - 35	Sausage can bend
Clay Loam Sandy Clay	35 - 55	Sausage can bend into semi-circle
Clay Heavy Clay	> 55	Will form a circle

Permeability of Upper Subsoil

Permeability is the ability of a soil **horizon** to transmit water or air. The permeability to be recorded normally refers to the zone between 250 mm to 500 mm depth. Permeability criteria used in Table 1 is defined as follows:

Symbol 7: Excessively rapid: open gravels without soil, and coarse sands.

Symbol 6: Rapid:
- a) Sandy red and yellow apedal horizons (0-15% clay)
- b) Regic sands
- c) Sandy E's

Symbol 5: Good:
- a) Red and yellow apedal sandy loams and sandy clays (15-35% clay)
- b) Neocutanic red structured and humic horizons
- c) Stratified alluviums

Symbol 4:	Slightly restricted:	a)	Moderately developed, fine structured pedocutanics
		b)	Clayey E's (>35% clay)
		c)	Melanic horizons (<35% clay)
Symbol 3:	Restricted:	a)	Strong, coarse structured pedocutanics
		b)	Soft plinthics, but penetrated by roots
		c)	Lithocutanics with slight root penetration
		d)	Vertic and melanic horizons (>35% clay)
Symbol 2:	Severely restricted:	a)	Loamy prismacutanics (15-35% clay)
		b)	Hard plinthics with only slight root penetration
		c)	Gleyed, weathered rock
Symbol 1:	Relatively impermeable:	a)	G and Gley-cutanic horizons
		b)	Clayey prismacutanics (>35% clay)
		c)	Hard rock

Wetness

The following criteria are used to define the degrees of wetness in a landscape:

Symbol 1: Wet for relatively short and infrequent periods:

a) Mainly upland sites
b) There is generally no sign of mottling in the topsoil
c) Only slight mottling in the subsoil horizons. On lighter textured soils this mottling may be indistinct.
d) A periodically waterlogged horizon is not necessarily present, but if so, usually occurs **below** 500 mm.
e) Choice of crop is little affected.

Symbol 2: Frequently wet for considerable periods

a) Usually a vlei margin or better drained bottomland.
b) Periodically waterlogged horizon **above** 600 mm.
c) Slight mottling tends to occur in the topsoil.
d) Choice of crop limited *e.g.* pasture, poplars or rice.

Symbol 3: Very wet for most of the season

a) Wetland within a water course that is saturated to within 150 mm of the surface for the major part of a rainfall season of average or above average rainfall.
b) Mottles or rust-like stains in root channels within 150 mm of the surface.
c) An organic horizon may be present.
d) A dark grey or black heavy clay, showing considerable surface cracking when dug, may be present.
e) Normal cropping precluded and is best left to natural vegetation. This is normally the 'true vlei'.

Soil erodibility

Soils which tend to have a high erosion hazard possess the following characteristics:

a) A sandy textured topsoil - especially fine grained.

b) A low organic status.
c) A surface soil with poor infiltration.
d) Restricted permeability of the upper subsoil.
e) Poor drainage.
f) High base status - especially of sodium.

Symbol	Erodibility	F_b Rating
1	Very low	>6.0
2	Low	5.0 - 5.5
3	Moderate	3.5 - 4.5
4	High	2.5 - 3.0
5	Very high	< 2.0

Soil Surface Conditions

Soils which compact or crust at the surface result in reduced infiltration, poor aeration and reduced seedling emergence, and increased runoff and erosion.

Unfavourable characteristics occur in the following:

a) Clay or clay loams with a high silt content.
b) Sandy loams, sandy clay loams and sandy clays with a fine grained sand fraction or high silt content.
c) Soils with greyish or yellowish colour. (Low organic matter and iron oxide levels).

Symbol T1: Slightly unfavourable physical conditions. The soil has a tendency to compact at the surface and a good tilth is not easily obtained.

Symbol T2: Unfavourable physical conditions. Compaction and sealing of the surface soil is more severe. A hard crust forms when the bare soil is exposed to rain and sun. On ploughing large, hard clods are turned up. Under natural vegetation, the grass cover is generally sparse.

Rockiness

Symbol	% surface rock	Hazard degree
1	0 - 10	Slight
2	10 - 20	Moderate
3	20 - 50	Severe
4	50	Very severe

TABLE 4 FORESTRY INSPECTION FORM

Farm Name	Owner	S.C. District

Land No.	1	2	3	4	5	6	7	8	9	10
Area (ha)										
Average slope (%)										
% Clay										
Effective soil depth (mm)										
Erodibility (F_b)										
Minimum standard (No. *) **OR**										
Ridging / Benching										
Virgin (V) / Existing (E)										

Observations : e.g. importance of farm as a water source, presence of wetlands, etc.)

RECOMMENDED / NOT RECOMMENDED

Officer
Date

* insert number according to Table 6:

Land preparation norms for soil and water conservation in timber plantations.

SOILS SUITABLE FOR IRRIGATION: Apart from a minimum of Class III Capability Classification, the following also apply:

* Depth to an impervious layer which restricts water drainage must be at least 450 mm. This includes both the A and E horizons. An impervious layer includes the following:

  (a) The B horizon in a duplex soil which has a prismatic or blocky structure, where the structure is strong and ped size medium to coarse (e.g. Sterkspruit or Valsrivier).

  (b) Poorly drained gleyed clay (e.g. Rensburg or Kroonstad). In such soils, which are likely to require subsurface drainage, the depth to hard rock must be at least one metre.

  (c) Hard rock (e.g. Mispah or Glenrosa).

* The salt status must fall within acceptable limits, and in all instances where the MAP is less than 750 mm per annum, a soil sample must be taken from the lower limits of the 600 mm depth for analysis. The following chemical characteristics must then also apply:

  (a) In the upper 600 mm depth, the Electro Conductivity saturation extract must not exceed 150 milli-lemens per metre (i.e. total salts must not be excessive). The Sodium Absorption Ratio saturation extract must not exceed 15 in red and other well drained soils, 10 in black clays and 6 in poorly drained grey and duplex soils (i.e. the sodium content of soils must not be high).

  (b) In the 600 - 1000 mm depth, the Electro Conductivity saturation extract must not exceed 300 milli-iemens per metre. The Sodium Absorption Ratio must not exceed 15 in any soil type.
  The Cedara Soils Laboratory will carry out the necessary analysis at the approved tariff.

* The depth to the water table must be at least one metre. This restriction may be overcome if the water table can be successfully lowered by drainage.

* Slopes must not normally exceed 12% unless special soil conservation measures are implemented (e.g. bench terraces or a mulch).
  For permanent pasture crops a minimum effective soil depth of 250 mm is required.

* Upper slope limits and land preparation requirements for planting sugarcane:
  See Table 5.

* Land preparation norms for soil and water conservation in timber plantations:
  See Table 6.

Table 5 Norms for upper slope limits on new sugarcane land

LAND PREPARATION AND CONSERVATION PRACTICES	Soil Erodibility:	High	Moderate	Low
	SLEMSA Fb rating	2 - 4	4,5 - 5,5	6 - 7
	USLE K value	0,9 - 0,4	0,39 - 0,21	0,2 - 0,1
		Maximum Slope (%)		
1. Conventional tillage with contour banks, trash burnt and tops scattered		10	15	20
2. Conventional tillage with contour banks and full trashing at harvest		15	20	25
3. Minimum tillage with contour banks, trash burnt and tops scattered		20	25	30
4. Minimum tillage with contour banks and full trashing at harvest		25	30	30
5. Conventional tillage, strip planted, with spillover roads and full trashing at harvest		15	20	25
6. Minimum tillage, strip planted, with spillover roads and full trashing at harvest		-	-	30 - 40

The following should be noted:

1. Spacing of contour banks must be in accordance with the S A SEX nomograph.
2. "Full trashing" means just that - the practice of burning standing cane and spreading the tops does not qualify in this context.
3. Strip planting means adjacent contour bank intervals planted up with a six-month difference in age.
4. 30% land slope is considered to be the maximum on which satisfactory structures can be constructed and maintained.
5. If a practice (e.g. full trashing) is not a tried and accepted method in an area (e.g. KwaZulu-Natal Midlands), then it can not be chosen.

Table 6 Land preparation norms for soil and water conservation in timber plantations.

% LAND SLOPE (Degrees)				
* Soil Erodibility				
High	Low	MINIMUM STANDARDS ***		
1 - 8 (0,5° - 4,5°)	1 - 12 (0,5° - 7,0°)	**	1	Full preparation with any implement, but preferably leaving as rough a surface as possible. Weed control should be aimed at leaving a mulch on the surface.
8 - 15 (4,5° - 8,5°)		**	2	Full cultivation with tined implements only. Strip cultivation with any implement, with an area of at least one metre width between strips which may only be ripped, or treated with herbicides. Weed control should be aimed at leaving a mulch on the surface.
	12 - 20 (7,0° - 11,0°)	**	3	Full primary cultivation with any implement followed by secondary cultivation in a restricted strip one metre wide along the tree line. Weed control should be aimed at leaving a mulch on the surface.
16 - 25 (8,5° - 14°)	21 - 30 (11° - 17°)	**	4	Full primary cultivation with tined implements only. Planting must take place within two months of land preparation. No mechanical weed control may take place. Spray treelines with herbicides or hand hoe around the individual trees a maximum of 1,5 m in diameter.
26 - 30 (14° - 17°) Max	31 - 40 (17° - 22°)	5		A single tined rip along the tree line. No mechanical weed control may take place. Spray tree lines with herbicides or hand hoe around the individual trees a maximum of 1,5 m in diameter.
	41 -50 (22°-27°) Max	6		In grassveld a swath 1 m wide should be sprayed along the tree line prior to pitting. Pitting only, with a maximum of 1,5 m diameter pits. Weeds to be controlled by herbicides (full cover) or hand hoeing of the pit area only.

*	High soil erodibility for these norms is simplified as being any one of the following :
•	Less than 500 mm effective soil depth. Soil depth is considered as being restricted by strongly structured, gleyed or hard plinthic horizons.
•	Less than 15% clay in the topsoil on a slope greater than 8% (4,5°)
•	All soils having E horizons.
	All other situations are regarded as having a low erodibility.
**	All cultivation across the slope.
***	These are the minimum standards of cultivation and weed control that will apply for a given set of conditions of slope and soil erodibility. It does not preclude the use of a lower order of standard.

Table 7 INVENTORY REPORT FOR PROPOSED WETLAND DEVELOPMENT

Reference No.

1. Applicant

2. Farm Unit

3. Wetland details:
   - (a) Dominant soils (form and series)
   - (b) Present usage of wetland
   - (c) Status of erosion, vegetation, etc., of wetland
   - (d) Percentage slope
   - (e) Extent of wetland irrespective of farm boundaries
   - (f) Extent of wetland on applicant's farm
   - (g) Extent of wetland affected by proposed development
   - (h) Nature of proposed development (i.e. pastures, poplars, dams, etc.)
   - (i) Importance as a water source area

4. Catchment Details:
   - (a) Bio-climate
   - (b) Mean annual rainfall
   - (c) Approximate extent
   - (d) Topography
   - (e) Approximate areas under various uses (i.e. cultivation, veld, forestry, etc.)
   - (f) State of soil conservation
   - (g) Water use and storage above proposed development
   - (h) Water use and storage below proposed development

5. Hazards that proposed development may present (i.e. erosion, pollution, downstream and on-site flooding, nesting sites, etc.)

6. Benefits of proposed development

7. Envisaged effect of development downstream

8. Recommendations

9. Sketch or map

Table 8 **CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT 43 OF 1983)**
APPLICATION TO CULTIVATE LAND - REGULATION 2 OR 3

IMPORTANT

Complete the first portion in full as well as one or more of the applicable portion A to B, whereafter the application must be submitted to the Extension Office for the area in which the farm unit is situated.

Owners of the farm unit (initials & surname) .....

Postal address .....

Farm unit .....

Magisterial District .....

Particulars of the portions of the farm unit to which the application hereunder refers:

Location (eg K3) ..... Slope ..... depth of soil .....mm

Intended crop .....

A **A**

APPLICATION TO CULTIVATE VIRGIN SOIL (Regulation 2)

I, the undersigned, hereby apply for permission to cultivate virgin soil on the above-mentioned farm unit, located as indicated above. The area for cultivation i.r.o. which application is now made, is:-

(a) for dry lands ..... ha (b) for irrigation.....ha

_____ _____

Signature Date

B **B**

APPLICATION TO CULTIVATE SOIL WITH A SLOPE OF MORE THAN 20% OR SOIL (TABLE 1) OF A SPECIFIC SOIL FORM AND SERIES WITH A SLOPE OF MORE THAN 12%. **(Regulation 3)**

I, the undersigned, hereby apply for permission to cultivate soil of the soil form .....

..... and the soil series ..... with a slope of

more than ..... % on the above-mentioned farm unit, located as indicated above.

1. Area for cultivation i.r.o. which application is now made, is:-

   (a) for dry lands ..... ha (b) for irrigation ..... ha

2. Cultivated areas where conservation measures

   (a) have been taken ..... ha (b) are still needed..... ha

_____ _____

Signature Date

C C

APPLICATION TO CULTIVATE LAND IN A WETLAND / WITHIN THE FLOOD AREA OR WITHIN 10 METRES HORIZONTALLY OUTSIDE THE FLOOD AREA OF A WATER COURSE (Regulation 7)

I the undersigned hereby apply for permission to cultivate land situated .....

..... on the above-mentioned farm unit, as indicated above.

1. The area for cultivation i.r.o. which application is now made, is :

   a) for dry lands ..... ha b) for irrigation ..... ha

2. Reasons for cultivation : .....

   .....

   .....

   .....

_____ _____

Signature Date

D D

APPLICATION TO CHANGE THE FLOW PATTERN OF RUNOFF WATER (Regulation 8)

I the undersigned hereby apply for permission to divert runoff water on the above-mentioned farm unit from its natural flow area located as indicated above, to another natural flow area.

1. Will the water be diverted to another water course across one or more farm units ? .....

2. If so, have arrangements been made in writing with the owners concerned ? .....

3. Reasons for changing the flow pattern : .....

   .....

   .....

   .....

_____ _____

Signature Date

Table 9 KWAZULU-NATAL DEPARTMENT OF AGRICULTURE

..... Ref. No. .....

..... P/BAG X9059

..... PIETERMARITZBURG

Postal Code 3200

Mr/Mrs/Miss

CONSERVATION OF AGRICULTURAL RESOURCES ACT (No. 43/1983)

Permit to Cultivate: * Virgin Soil (Regulation 2)

* Soil with a slope in excess of 20% (Regulation 3)

FARM UNIT: .....

MAGISTERIAL DIST .....

1. With reference to your application dated ..... permission is hereby granted to cultivate land on the following portions of the above-mentioned farm unit, subject to the conditions mentioned hereunder :

CAMP / LAND No.	EXTENT (ha)	SOIL DEPTH mm	CLAY %	SOIL FORM	DRYLAND/ IRRIGATION

2. The attached map ref ..... dated ..... forms an integral part of this permit.

3. Conditions under which the permit is granted are:

3.1 Crop to be planted: .....

3.2 Method of establishment: .....

.....

.....

3.2 Soil conservation works (see attached specifications) must be constructed to the satisfaction of the executive officer within one year of breaking of the new land.

3.4 * Others : .....

.....

4. **NOTE:** By not complying with these conditions you could be liable to prosecution.

Office

Date

Stamp

Executive Officer : Act 43/1983

* **Delete when not applicable and initial.**

Table 9 KWAZULU-NATAL DEPARTEMENT VAN LANDBOU

..... Verw. Nr .....

..... P/Sak X9059

..... PIETERMARITZBURG

Poskode 3200

Mnr/Mev/Mej.

WET OP DIE BEWARING VAN LANDBOUHULPBRONNE (Nr. 43/1983)

Toestemming om te bewerk: * Nuwe grond (Regulasie 2)

* Grond met 'n helling steiler as 20% (Regulasie 3)

PLAASEENHEID: .....

LANDDROSDISTRIK .....

1. Met verwysing na u aansoek gedateer ..... word toestemming hiermee verleen om die volgende stukke grond op bogenoemde plaaseenheid te bewerk, onder die ondergenoemde voorwaardes:

KAMP / LAND Nr.	GROOTTE (ha)	GROND-DIEPTE (mm)	KLEI %	GRONDVORM	DROëLAND / BESPROEIING

2. Die aangehegde kaart verwysing ..... gedateer ....., vorm 'n integrale deel van hierdie permit.

3. Voorwaardes waaronder die permit toegestaan word:

3.1 Gewas wat geplant mag word: .....

.....

3.2 Metode van vestiging: .....

.....

.....

3.3 * Grondbewaringswerke (sien aangehegde spesifikasies) moet binne een jaar van braak van die grond tot die tevredenheid van die uitvoerende beampte opgerig word.

3.4 * Ander: .....

.....

4. **LET WEL:** Indien die bogenoemde voorskrifte nie nagekom word nie kan u u blootstel aan vervolging.

Kantoor

Datum

Stempel

Uitvoerende Beampte : Wet 43/1983

* **Indien nie van toepassing, skrap en parafeer.**

10. **CHECKLIST FOR IN-SERVICE TRAINING REQUIREMENTS**
SOIL CONSERVATION OFFICERS

Part 1: Orientation

The new recruit must be taught, either by his mentor or by the Supervisor for the Subregion, the rules and regulations pertaining to general administration within the Public Service. The date on which the officer completed the study of the rules, and the date on which the supervisor satisfied himself that the new officer understood the rules, must be given in the columns provided. The supervisor is responsible for ensuring that the items identified are learnt within the first six month period of the pupil technician's appointment. The completed documents must be placed on the officers personal file.

Name of Officer :.....Extension Ward :.....

Name of Supervisor :.....Date of Appointment :.....

	OFFICER		SUPERVISOR	
	Date	Initial	Date	Initial
Departmental organisations				
Office discipline				
Aid Schemes : Pension				
Medical				
Subsidised housing				
Leave privileges				
Subsistence claims				
Correspondence and communication				
Staff evaluation system				
Transport regulations				
Filing systems : Regional				
Soil conservation				

Certificate of Competence
This is to certify that the above-mentioned officer has been tested in his knowledge of office rules and regulations, as described above, and has been deemed to be satisfactorily competent therein.

DIRECTOR : CADI

DATE

CHECKLIST FOR IN-SERVICE TRAINING REQUIREMENTS
SOIL CONSERVATION OFFICERS

Part 2: Functional training

The officer will have received a good deal of formal training by the time he is appointed to the permanent staff. He will however, need a great deal of in-service training throughout his career in order to improve his expertise and cater for new technology. This checklist is meant to guide both the officer and his supervisor in determining in-service training requirements.

The list is to be completed annually in April in respect of all Soil Conservation Officers, using a five-point Ability, Skills and Knowledge (ASK) scale as follows:

1 Officer has only heard of the technique.
2 Officer can perform the task only with assistance.
3 Officer can perform the task independently, but makes regular mistakes.
4 Officer can perform the task independently and with few mistakes.
5 Officer has full knowledge of the task and can teach the technique.

Name of Officer :.....Extension Ward :.....

Name of Supervisor : .....Date of Appointment :.....

1 **General Principles of Resource Classification and Conservation.**	A S K Rating	
	Officer	Ward
1.1 The erosion process and principles of soil conservation		
1.2 Soil classification		
1.3 Determination of soil potential		
1.4 Veld condition assessment		
1.5 Veld management		
1.6 Herd management		
1.7 Conservation tillage		
1.8 The use of soil loss equations and statistics		
1.9 Conservation farm planning		
1.10 Soil and water conservation norms in forestry		
1.11 The KwaZulu-Natal Conservation Status Inventory		
1.12 Control of bush and alien invaders		

		A S K Rating	
		Officer	Ward
2	**Legislation (Acts and Permits)**		
2.1	Conservation of Agricultural Resources		
2.2	Water		
2.3	Forestry		
2.4	Subdivision of Agricultural Land		
3	**Maps and Mapping**		
3.1	Indexing system for published maps		
3.2	Indexing system for aerial photos		
3.3	Ordering mosaics and aerial photos		
3.4	Use of the stereoscope		
3.5	Interpretation of maps and aerial photos		
3.6	Use of dot, polar and digital planimeters		
4	**The Financial Aid Schemes**		
4.1	The Soil Conservation Scheme		
4.2	The Flood Relief Scheme		
4.3	The Drought Aid Scheme		
4.4	The Bush Control Scheme		
4.5	The Weed Control Scheme		
4.6	The Borehole Drilling and Pumping Scheme		
4.7	The Irrigation Scheme		
4.8	The Loan Schemes		
5	**Survey Techniques**		
5.1	Use of the dumpy level		
5.2	Booking and reducing level surveys		
5.3	Use of the theodolite		
5.4	Booking and reducing theodolite surveys		
5.5	Use of the telescopic alidade		
5.6	Use of the abney level		
5.7	Use of the Total station		
5.8	Topographic surveys		
5.9	Survey of contour bank layouts		
5.10	Survey of pipelines		
5.11	Location and setting out of waterways		
5.12	Location and setting out of earthen dams		

			A S K Rating	
			Officer	Ward
6	**Hydrology**			
	6.1	The Rational method of Q prediction		
	6.2	The S.C.S. method of Q prediction		
	6.3	Use of Mannings formula		
7	**Protection of Cultivated Land**			
	7.1	Runoff control planning		
	7.2	Determination of soil erodibility		
	7.3	Design of waterways		
	7.4	Design of stormwater drains and canals		
	7.5	Setting of ploughs		
	7.6	Construction of waterways and contour banks		
	7.7	Subsurface drainage		
	7.8	Bench terraces		
8	**Draughting and Specification**			
	8.1	Draughting materials		
	8.2	Draughting techniques		
	8.3	Specification techniques		
	8.4	Computer assisted draughting:		
		Surveys		
		Profiles		
		Digitizing		
		Drawing		
9	**Water Supply**			
	9.1	Pumps		
	9.2	Design of pipeline reticulation		
	9.3	Design of earth dams with side spillway		
	9.4	Design of mass gravity weirs		
	9.5	Design of buttress weirs		
	9.6	Design of arch weirs		
	9.7	Irrigation :		
		Basic principles		
		Scheduling		

		A S K Rating	
10	**Gulley Stabilization**	Officer	Ward
10.1	Concrete technology		
10.2	Design and construction of gabion work		
10.3	Design and construction of chutes		
10.4	Design and construction of drop inlets		

11	**Communication**		
11.1	Letter / report writing		
11.2	Camera work		
11.3	Public speaking (with visual aids)		

Part 3: Annual Training

1 The officer was given the following training during the report year :

_____

_____

Cost :

Total no. of days _____

Salary _____

Working capital _____

Total costs of in-service training for the past year. _____

2 It is recommended that the in-service training for this officer for the forthcoming year include :

_____

_____

_____ _____

Control Soil Conservation Officer Date

11 JOB DESCRIPTION FOR SOIL CONSERVATION OFFICERS IN KWAZULU-NATAL REGION

Name of Officer: .....

Extension Ward: .....

Official designation : Industrial Technician (Soil Conservation)

As a Soil Conservation Officer your primary and overall task is to assist farmers in the following aspects of the Conservation of Agricultural Resources Act (Act 43/1983):

* Help them meet their obligations under the said Act and immediately draw their attention to any transgressions of the regulations of the Act,
* Process applications for permits under the Regulations of the Act,
* Assist them in obtaining financial assistance under the various schemes in terms of the Act.

1 As an officer in charge of the ..... Extension Office, you must accept responsibility for its proper functioning, and are directly responsible to the Assistant Director ..... Region, for the supervision and motivation of the following staff;

.....

.....

and/or, as a Soil Conservation Officer you are responsible to the Control Soil Conservation Officer, ... Region, for the supervision, motivation and training of the following staff members in the office:

.....

.....

2 You must be fully conversant with the Conservation of Agricultural Resources Act (No. 43/1983) and its related Regulations. You must also ensure that the land users in the Ward are aware of their responsibilities under this Act, and take all necessary steps to ensure that the objectives of the said Act are achieved.

3 You are responsible for the tasks outlined in the attached "Basic Duty Sheet for Industrial Technicians (Soil Conservation)" in your Ward.

4 You must maintain, on a daily basis, an appropriate appointment book in which is recorded all requests for resource conservation assistance, as well as other programmed activities.

5 You must report monthly to your supervisor on your activities of the preceding month, supplying him with a statement of expenditure incurred. Please note that you may **not** overspend on your budget of operating capital, and must report any possibility of it to your supervisor without delay.

6 The files held in the office under the Soil Conservation Scheme are your personal responsibility and you must ensure that they are kept up to date and in an acceptable state.

7 You must know and understand the Regional policy and associated administrative procedures applicable to the post of an Industrial Technician (Soil Conservation) in the Public Service, and must ensure that you have available an up-to-date collection of Management Instructions. You must also have continually updated versions of the administrative regulations pertaining to the financial aid schemes applicable to your job.

8 You must know and understand the significance of the climatic factors, the soils and the vegetation (including planted crops) in your ward and their significance to agricultural resource conservation and degradation.

9 You are responsible for the organization of, and assistance to, the..... Conservation Committees. Apart from organizational responsibilities, you must ensure that all the Conservation Committees in the Ward are adequately trained in resource conservation matters, and must actively involve them in your work.

10 You must constantly monitor the state of conservation in your Ward, and

* compile annually a list in priority order, of the conservation needs of the Ward,
* update monthly the State of Conservation Inventory of the farmland in your Ward, and
* bring to the notice of your supervisor any conservation problems that need researching.

11 You must assist in the judging of conservation of farmland in your Ward in whatever project or competition such judging is applicable (e.g. Themeda Award, Ten Ton Maize Club, etc.)

12 You must ensure that you are trained to understand all the technology that you are required to use in promoting resource conservation, and you must annually complete, in collaboration with your supervisor, a prescribed form stating your training requirements based on the various needs dictated by the requirements of your Ward.

13 You must know and understand certain activities carried out in the ward that are not directly related to conservation of the resources. These include:

13.1 Agricultural Credit Committee work

13.2 Disaster relief schemes

13.3 Conversion of marginal cropping land to pastures

13.4 Subdivision of Agricultural Land Act, Change of Use of Land Act, and related ordinances and procedures

13.5 Drought Aid schemes

14 You must ensure that the best information available is used to meet requests for information, advice and assistance (of a resource conservation nature) by land users in the ward.

15 You must annually, and by the date so instructed,

* prepare an evaluation of your previous year's work,

* taking into account the conservation priorities of the Ward, plan a program of activities for the forthcoming year,

* compile a realistic assessment of your budgetary requirements for the forthcoming year, and

* (see item 12) in consultation with your supervisor, complete an assessment of your state of expertise and training requirements for the forthcoming year.

16 You must serve on *ad hoc* committees and work groups, as required by the Director: KwaZulu-Natal Region.

17 You must inform your supervisor of anything which might be worthy of reporting in the media.

18 In an emergency, and as directed by your supervisor, you must take responsibility for any urgent work which would normally be the responsibility of other officers.

19 A special Agricultural Development file (ADP file) must be kept containing all the relevant information about the ward as well as a complete index system on all files in the office. You are co-responsible with the Extension Officer for ensuring that this is kept up to date.

20 You must carry out any other task given to you by the Head of the Department.

_____

Head of the Department

_____

Date

12 JOB DESCRIPTION FOR CONTROL SOIL CONSERVATION OFFICERS IN KWAZULU-NATAL REGION.

Name of Officer .....

Subregion .....

Official Designation : Control Industrial Technician (Soil Conservation)

As a Control Soil Conservation Officer you are responsible to the Deputy Director (Soil Conservation) for the satisfactory progress of soil conservation matters in your Region. You are responsible to the Director of the Region for disciplinary matters. Your primary and overall tasks are as follows:

1 Supervise and assist the Soil Conservation Officers in the Region in the execution of their duties. For this purpose you are referred to the personal Job Description of each of your subordinates.

2 Control the standards and norms used by them in the conservation of farms, and in the planning, survey, design, and specification of all soil conservation works undertaken by them. You are to ensure that the minimum standards of quality and technical correctness are maintained at all times.

3 Complete, annually on the 31st March, the prescribed form regarding the level of soil conservation expertise pertaining to each and every officer under your supervision, indicating also the in-service training requirements of each one for the forthcoming year. You are to do this for yourself as well. This is to be forwarded to the Deputy Director (Soil Conservation) for his attention. You must at the same time and in collaboration with the Deputy Director (Soil Conservation) take steps to ensure that both you and your subordinates receive the necessary in-service training in order to maintain a high standard of expertise.

4 Complete at the end of March and September each year a prescribed Staff Evaluation form in respect of each officer under your supervision. This is to be sent to the Deputy Director (Soil Conservation) for his information.

5 Ensure the monthly completion of a statement of the preceding months' activities by each subordinate.

6 You must annually, and by 3oth November each year, draw up a Regional statement of estimates of working capital required for the Subdirectorate in the Region.

7 At the request of the Head of Department, compile on the prescribed form a Merit Assessment of each subordinate.

8 You must be fully conversant with the Conservation of Agricultural Resources Act (No 43/1983) and its related regulations. You must ensure that the land users in the Region are aware of their responsibilities under this Act, and take all necessary steps to ensure that the objectives of the Act are achieved.

9 You must report monthly to the Deputy Director (Soil Conservation) on your activities for the preceding month, supplying him with a statement of expenditure incurred and subsidy funds committed. Please note that you may **not** overspend on your budget of operating capital, and must report any possibility of it to Deputy Director (Soil Conservation) without delay.

10 The files held in the Regional Office under the Soil Conservation Scheme are your personal responsibility and you must ensure that they are kept up to date and in an acceptable state.

11 You must know and understand the Departmental policy and associated administrative procedures applicable to the post of a Control Industrial Technician (Soil Conservation) in the Public Service and must ensure that you have available an up-to-date collection of Management Instructions. You must also have continually updated versions of the administrative regulations pertaining to the financial aid schemes applicable to your job. This applies equally to the technical manuals issued.

12 You must know and understand the significance of the climatic factors, the soils and the vegetation (including planted crops) in your Region and their significance to agricultural resource conservation and degradation.

13 You must ensure that the best information available is used to meet requests for information, advice and assistance (of a resource conservation nature) by land users in the Region.

14 You must annually, and by the date so instructed,

* prepare an evaluation of your previous year's work,
* taking into account the conservation priorities of the Region, plan a program of activities for the forthcoming year,
* compile a realistic assessment of your budgetary requirements for the forthcoming year.

15 You must serve on *ad hoc* committees and work groups, as required by the Head of Department.

16 You must inform the Liaison Officer of anything which might be worthy of reporting in the media.

17 In an emergency, and as directed by Deputy Director (Soil Conservation), you must take responsibility for any urgent work which would normally be the responsibility of other officers.

18 You must carry out any other task given to you by the Head of Department.

_____

Head of Department

_____

Date