Environment & Planning

Infrastructure

Highways & Transport

Water

Power

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY

Natural Heritage Trust

Helping Community Helping Australia

Best Practice Principles and Standards for Drainage in Dryland Catchments

SMEC

December 2002

DOCUMENT RELEASE INFORMATION

Client	Goulburn Broken Catchment Management Authority
Project Name	Best Practice Principles and Standards for Drainage Controls in Dryland Catchments
Document Number	44925-gga10gm2.doc
Document Title	Best Practice Principles and Standards for Drainage in Dryland Catchments
Revision Status	Final Rev 2 – Dec 2002

Document prepared by:

SMEC VICTORIA PTY LTD
ABN 64 069 699 467
39 Casey Street (PO Box 233), Tatura, Victoria 3616
Telephone (03) 5824 3266 Facsimile (03) 5824 3277

Prepared by:	Reviewed by:
Stuart Nield / Ben Ross Project Officers	Glen McAliece Project Manager

TABLE OF CONTENTS

1 INTRODUCTION

The Goulburn Broken Catchment Management Authority (GBCMA) role in regard to drainage in dryland areas of the catchment is primarily:

- The co-ordination / management of:
  - regional rural drainage schemes; and
  - local "on-farm" drainage.
- The protection of catchment and water health from the potential adverse impacts of rural drainage.

This document provides a framework for a suite of best practices for rural drainage in dryland areas of the Goulburn-Broken catchment. Further detailed information can be found in the *Best Practice Principles and Standards for Drainage in Dryland Catchments - Background Report*.

Rural drainage in the context of this report is defined as the removal or transfer of surface or sub-surface water from those dryland rural areas within the region by man-made or significantly man-altered systems.

1.1 The Goulburn Broken Catchment

The Goulburn Broken Catchment (refer to Figure 1-1 following page) covers 17% of Victoria and houses more than 200,000 people. The region supports major agricultural (dryland and irrigated) food processing, forestry and tourism industries.

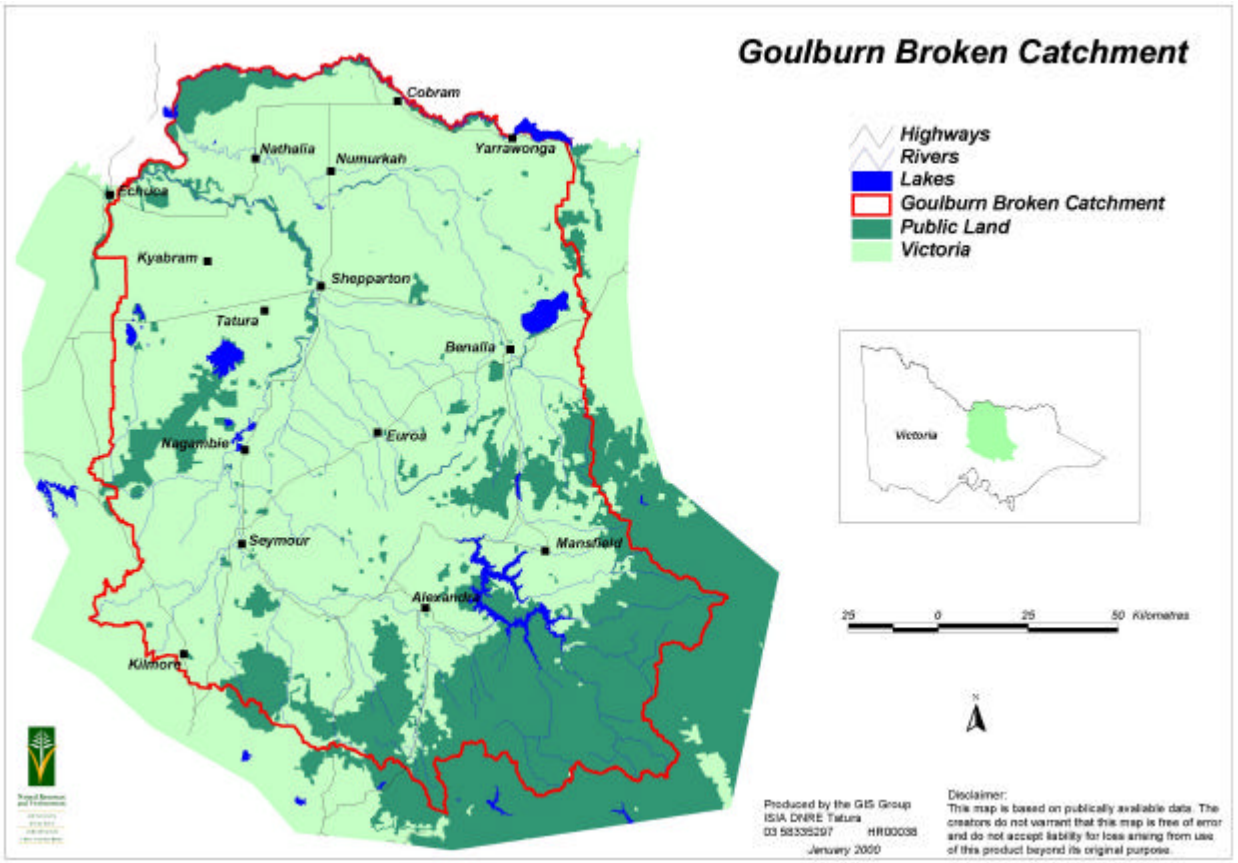
Although only 2% of the Murray Darling Basin's land area, the catchment generates 11% of the basins water resources. It contains Victoria's largest and arguably most important water supply catchment (Eildon) and includes the municipalities of Moira, Campaspe, City of Greater Shepparton, Mitchell, Delatite (now Mansfield and Benalla Rural City), Murrindindi and Strathbogie.

1.2 Environmental overview of the Goulburn Broken Catchment

The Murray Darling Basin is a naturally saline environment, but the exacerbation of these conditions as a result of human activities has created a totally different situation. High salinity levels are causing significant problems for all users, agricultural, domestic and industrial. The natural processes have been exacerbated by drainage flows from irrigation areas and rising groundwater levels due to irrigation and inappropriately located evaporation basins. More recently, problems have emerged in much more extensive areas of dryland farming, with rising watertables bringing saline groundwater close to and to the surface, resulting in land salinisation.

Land salinisation occurs naturally in parts of the Murray Darling Basin, such as the Goulburn-Broken Catchment, in the form of saline seepage and scalds. The concern here is with secondary or induced salinisation that results from European type land use activities. Changes to the vegetation cover, primarily the removal of native shrubs, grasses and trees has also changed the water balance. The removal of deep rooted native vegetation and its replacement largely by shallow rooted annual crops and pastures has resulted in a significant increase in infiltration to groundwater recharge. As the groundwater rises, naturally occurring salts are dissolved and brought to the surface.

Figure 1-1 – The Goulburn-Broken Catchment



In terms of dryland salinisation, rising watertables and consequent dryland salinisation are affecting much of the basin's arable and pasturelands. A 1993 basin wide study conservatively estimated that at least 200,000 ha of land in the basin is now grossly affected and more than 1 million ha are at risk from dryland salinity. The current and potential consequences are very serious not least in terms of land actually lost to agricultural production and the reduced capacity of the land, but the fact that the area of land affected is likely to expand by 300 to 500 percent over the next few years. This is combined with rising river salinity levels over much of the basin.

Other environmental issues, such as nutrients, sediments, water quality, biodiversity, river, floodplain and wetland management, form an integral part of catchment sustainability.

The Goulburn-Broken dryland is a major source of salt entering the Murray River system. The catchment currently contains about 4,500 hectares of salt discharge areas where saline groundwater has evaporated to leave heavily saline soaks or salted ground. This area is growing at 5% per year and will ultimately increase to 38,000 hectares in 50 years if nothing is done. The major impacts of increased salinity in rivers and streams over the next 30 years will be increased salt loads (downstream) and the destabilisation of banks through groundwater discharge. Inappropriate clearing of dryland areas and replacing deep rooted vegetation with annual pasture has increased agriculture production, but has also dramatically increased groundwater recharge.

The catchment exports on average 180,000 tonnes of salt from the dryland catchment to either the irrigation region or the River Murray (Approx. 45%). This will double if remedial action is not taken.

Blue green algal blooms occur frequently in and downstream of the catchment. Reduction in nutrients, particularly phosphorous is the most effective way to reduce the likelihood of the blue green algal blooms. Nutrient loads leaving the catchment have ranged from 615 tonnes (93/94) of phosphorous to 256 tonnes in 94/95. The range of nitrogen is equally dramatic with a range of 5121 tonnes (93/94) to 1613 tonnes in 94/95.

The catchment waterways have undergone major changes since settlement. These changes and increased use of the stream and adjacent floodplains have resulted in many problems including stream instability, bank erosion, protection of public and private assets, which are threatened by stream damage, flood protection and preparedness, stream frontage protection and habitat protection.

From a biodiversity perspective catchment habitats have been substantially modified since settlement through development of primary industries, including agriculture, mining and forestry. Riverine grassy woodland, box iron bark forest and Montane grassy woodland are among the vegetation types most affected. Dry foothill forest on private land, river/riparian and wetland ecosystems are also subject to ongoing pressures. There is a gradual decline of roadside and stream vegetation in the catchment and a fragmentation in habitat.

1.3 The Need for Planning Controls for Drainage Works

The GBCMA commissioned a report Broken Creek Management Strategy (SKM) which identified concerns about dryland drainage raised by landholders within the lower reaches of

the Broken Creek, and to a certain extent by agencies involved in land and water management in the catchment including:

- Quicker response times of rainfall runoff events;
- Water quality and sedimentation;
- Discharge of irrigation tailwater to creek lines and wetlands, and problems associated with the changed hydrology regimes in these systems;
- Impacts within the catchment due to ongoing erosion of the drain, and the spread of weed species along drainage lines;
- Impacts at the point of discharge to natural waterways in terms of damage to the riparian zone and erosion of banks at the point of outfall.

With the increase in dryland salinity, management of erosion-prone land within the upper catchment will become more vital, not only to the health of the waterways in that area, but also to the whole of the Goulburn-Broken Catchment.

The cumulative impact of numerous incremental modifications becomes significant, with increased runoff (volumes and peak flows) and increased loads of sediment, nutrients and dissolved solids (salts). Of concern is the channelisation of natural depression/gully systems, and the unplanned nature of these works. There are several poor examples of past drainage works in the upland areas. Natural meandering, vegetated gullies were replaced by linear, hydraulic efficient drains. Soil erosion and land degradation were the results. Downstream impacts were often ignored. This type of drainage development should not gain approval today, as the adverse impacts of these past examples is very clear.

1.4 Objectives

A fundamental principle for the adoption of best practice and policy guidelines including planning controls is that farming operations within the catchment must not modify the catchment drainage without proper investigation of the impacts of the proposed earthworks and consideration of alternatives.

The objectives of the planning controls are:

- to reduce the incidence of poorly planned earthworks and drainage which cause significant impacts on receiving land and or water,
- to minimise the amount of sediment, salt and nutrient discharges from dryland areas to the receiving waters therefore minimising impacts on water quality;
- to ensure that drainage works do not reduce the environmental values of wetlands, depressions and waterways;
- to ensure that drainage works retain the productive capacity of surrounding agricultural and public land.

2 PLANNING PROCESSES

In August 1993, the Minister for Planning and Local Government announced a program of significant reforms to the planning system in Victoria. The Department of Infrastructure with local government and others has subsequently developed a new format for planning schemes on a more strategic focus.

The new format for planning schemes sets out a framework which:

- Emphasises the importance of strategic planning. Each municipal council is required to prepare a Municipal Strategic Statement for its municipality and to review it regularly.
- Enables a set of State standard provisions known as the Victoria Planning Provisions to be created and implemented.
- Establishes the new format for planning schemes.

The Victoria Planning Provisions contain a comprehensive set of planning provisions for Victoria. It is not a planning scheme and has no direct application. Rather, it is the source document from which new format planning schemes are constructed. It includes the State Planning Policy Framework and the State standard zones, overlays, particular provisions, general provisions and definitions. In preparing new planning schemes, Local Government has drawn from the Victoria Planning Provisions:

- Those provisions which are mandatory in all planning schemes in Victoria. These include the State Planning Policy Framework, the Particular Provisions applying to specified categories of use and development (such as car parking and advertising signs), the General Provisions and the Definitions.
- Other provisions which are relevant to or give effect to Council's Municipal Strategic Statement and Local Planning Policies including the relevant State standard zones and overlays to be applied in this scheme. Some of these zones and overlays include local provisions as schedules to the zone or overlay.

The Victoria Planning Provisions provide a consistent set of planning tools for all new format-planning schemes across the state. An amendment to a provision may automatically amend any planning scheme, which contains that provision.

2.1 What are the features of the new format for planning schemes?

The following figure shows the parts of a new format-planning scheme.

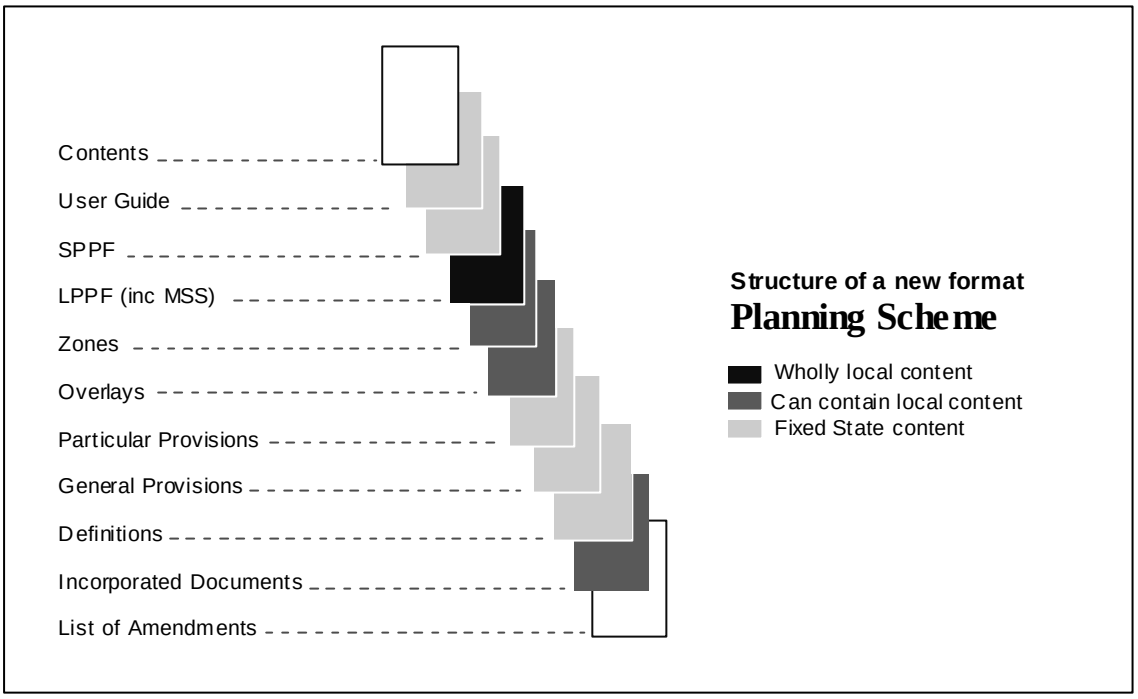


Figure 2-1 – New Format for Planning Schemes

Each of the seven municipalities within the Goulburn-Broken Catchment has developed new VPP planning schemes. The municipal strategic statements within each of the municipalities identify environmental issues, such as salinity, erosion and flooding. Not all Councils have been able to map these issues due to the lack of mapping data. The mapping issues are to be resolved as more information is prepared by both the Department of Natural Resources and Environment and the Catchment Management Authorities.

2.2 What are the Planning Processes for Drainage Works in Dryland Catchments

Details of the planning processes for drainage works in dryland areas are provided in Sections 7 and 8.

In short, all regional drainage schemes will require a planning permit, as they affect multiple properties and therefore will require consideration and detailed analyses. Local (on-farm) works not other than those detailed in **Table 7.2**, and therefore exempted, will also require a planning permit.

Section 4 details the principles and standard requirements applied in formulating these processes.

3 OVERVIEW OF BEST PRACTICE PRINCIPLES AND STANDARDS FOR DRAINAGE

Nutrient and sediment transport and associated processes are interrelated issues. Nutrients are bound within the soil and sediment layers on the land surface either in their elemental form or as decaying animal or vegetation matter. These nutrients, together with the sediments are bound in a location by the vegetative cover and may be mobilised if this cover is removed or disturbed. The rate of mobilisation will depend upon the soil type, flow velocities, nutrient content of the soil, the type of vegetative cover and the land use as well as the nature of the disturbance occurring on that site. Increased levels of nutrients and sediments in the Goulburn-Broken waterways is evidence that past and current land activities have, and are still, contributing to this deterioration. The Goulburn-Broken Water Quality Strategy examined and identified the sources of nutrients and sediments. The Water Quality Strategy contains Action plans to address each of the sources of nutrients and sediments. This project aims to address nutrients and sediments contributed by drainage works throughout the dryland catchment area.

Unfortunately salt discharge from dryland areas is increasing. Dryland drainage controls are therefore necessary to minimise the amount of salt that is moving from the dryland regions of the Goulburn Broken catchment to the Murray River. Under the MDBC's Basin Salinity Management Strategy 2001-2015 end of valley targets (limits) have been agreed for changes in salinity and salt load for each major river system. The targets have been tentatively set as "no increase" for the Goulburn River at Goulburn Weir and "up to 36% increase" for the Broken River at Casey's Weir. The GBCMA will be responsible for ensuring that these targets are met after taking into account both naturally occurring increases and any increases caused by drainage works.

The introduction of uniform drainage controls across the irrigation region has had significant success. The need to address salinity issues facing the dryland areas is just as important, if not more important to agriculture, the economy, the community, and the natural environment of the Goulburn-Broken Catchment.

All municipalities within the Goulburn-Broken catchment have used the Rural Zone from the VPP and schedules controlling earthworks and dams have now been inserted into their planning schemes.

Given the identified environmental issues caused by dryland salinity, and nutrient and sediment transfer within the catchment, the development of uniform controls for all municipal areas is now required.

This approach is required so that: -

- drainage works in dryland areas do not impact on adjoining landowners or on the receiving land and / or waterways;
- the discharge of saline water and nutrients can be managed and reduced in accordance with the Murray Darling Basin Commission targets; and
- landowners, Landcare Groups, Municipal Councils and the Catchment Management Authority can achieve an increased level of certainty in terms of drainage and development control using a common application and assessment process.

The important step is linking appropriate controls to the schedule under the rural zones. The formulation of planning controls **(Section 2)** has been based on a range of best practice principles and standards applicable for:

- Works in dryland catchments on a property scale; and
- Drainage Schemes on a regional scale.

The linkages of best practice planning controls with the schedules are set out under **Section 4.**

A range of adopted practices follow that are deemed to be sound in terms of agricultural and engineering outcomes. These are recommended as best practice principles and standards, or simply best practice.

3.1 Water Act, 1989

Obligations under Section 16 of the *Water Act, 1989* requires that drainage works should not interfere with a reasonable flow or create an unreasonable flow of water.

There are no set universal procedures to determine “reasonable or unreasonable flow.”

Drainage disputes between neighbours may be determined under the provisions of *the Water Act, 1989* by the Victorian Civil Appeals Tribunal (VCAT). The tribunal has to consider each case on its merits and considers *“Matters to be taken into account in determining whether flow is reasonable or not reasonable”* under Section 20 of the *Water Act, 1989*.

This reactionary approach is undesirable as it generally relies on aggrieved parties trying to demonstrate to VCAT that works are unreasonable. In contrast, the pro-active planning approach outlined throughout this document applies the principle of proponent onus, i.e. the applicant wanting to carry out the works must demonstrate that the works have no impact and/or comply with best practice.

Therefore, where best practices have been followed as adopted under this document, drainage works are deemed to have no unreasonable impacts to adjoining neighbouring properties. The affected landholder consent is required as outlined in **Section 6** where proposed works do not conform to this document.

3.2 Planning Controls for Earthworks in the Shepparton Irrigation Region

In December 1992, 13 municipalities (Municipalities against salinity in Northern Victoria - MASNV) within the Shepparton Irrigation Region (SIR) adopted uniform local government planning regulation for salinity controls works within the SIR.

The guidelines require landholders to obtain a planning permit before carrying out works, which affect the flow of water over a property boundary. Such works included:

- altering the direction of existing drainage flows
- unreasonable change in the flow of drainage across a property boundary
- alter the point at which drainage flows across a property boundary

In regard to the issues over change in the flow of drainage across a property boundary, "Reasonable flow" was determined using the same criteria as provided within Section 20 of the *Water Act, 1989*. At the time of this study for the general purposes of planning assessment, reasonable change in flow was taken as less than 20% in irrigation areas and 10% in dryland areas.

Councils have used these uniform guidelines for the past 7 years. They have also been included within the new planning schemes for Campaspe, City of Greater Shepparton and Moira as incorporated documents.

3.3 Community Surface Drainage Schemes – Guidelines for Design

The principles contained in these guidelines were originally based on practices developed by SR&WSC / RWC and documented in 1990. The guidelines have since been progressively reviewed and updated in 1997 and again in 1999.

The purpose of these schemes is to:

- Prevent waterlogging, hence increase production;
- Reduce accessions to the watertable, hence reducing potential salinisation and groundwater control costs;
- Provide a catalyst for improvement of farm management practices and other works which improve production; and
- Reduce road construction and maintenance costs.

The following summarises standards and principles outlined in the Guidelines for Design of Community Surface Drainage Schemes.

Drainage designs are based on 24-hour summer rainfall with a 2-year ARI and a five-day runoff removal period are considered to be appropriate for community drainage schemes. This is now adopted for Goulburn-Murray Water drains (1992).

Community schemes must consider maintenance, environmental, social, economic and archaeological issues prior to drain design details.

Details such as catchment details, outfall capacity, inter-catchment drainage, location, entry and exit locations must all be considered. Salinity issues such as depth to groundwater, soil types and accession to watertable must be investigated prior to design of the drains

Environmental assessment and protection procedures developed for these schemes are universal for any environment consideration and are equally applicable for dryland areas. This is to be adopted as best practice for regional dryland drainage schemes.

The Development of a Drainage Management Plan for the Black Dog Creek Improvement Trust (ID&A, 1994) is another document that has been utilised in setting regional standards for regional dryland drainage schemes.

3.4 Integrated Approach

Planning controls for drainage activities in dryland catchments must be handled in an integrated approach, regardless whether the proposal is on a regional or private property basis.

The National Dryland Salinity Program identified the following key messages:

- An integrated catchment management approach is needed to tackle dryland salinity problems, and this approach should rely on strong regional and industry networks and linkages.
- Dryland salinity is a natural resource issue that needs to be considered in context with other resource issues such as river health, riparian management, soil acidity, erosion, and vegetation decline.

Integration is emphasised within this document. For example, drainage should not be considered in isolation without consideration of other environmental factors and on farm management practices.

3.5 Catchment Management Approach for Drainage Solutions

It is best practice to adopt catchment management options before considering any drain construction. Options for treating drainage at the source should be explored.

The requirements for constructed drainage must be limited to particular locations with existing drainage or soil salinity problems that cannot be controlled by improved management practices, or be associated with public infrastructure, and must be subject to proper planning controls.

In dryland areas, it is best practice to allow natural waterways and depressions to function without modification as far a practicable. For example, these areas should be identified as part of any drainage design (farm and regional scale). Where considering drainage on a farm scale a Natural Resource Plan (a simple collation of readily available information, ie wetlands, remnant vegetation, roads etc – refer **Section 4.2.2**) must be prepared and submitted for Council consideration (refer Flowchart in Section 7.1.)

3.6 Farm Management Practices

In respect to on farm activities there are a number of identified approaches to maintain or improve the environmental values. The adoption of these practices are integral with integrated catchment management solution outlined above, which will minimise the need for excavated drains or other works.

Better land use planning will minimise the need for drainage works, which then avoids the potential downstream impacts of increased flows and changed water quality. This approach is easy to implement and requires a low capital investment to implement.

Possible impediments to adopting buffer zones are lost income and weed invasion. These issues can be minimised with good farm management and some allowance of minor drainage works as described in **Section 4.2.2**.

The various approaches to modifying farm practices and their benefits to both landholders and the region are shown in Table 3-1: On Farm Best Management Practices. These are based on industry research on agricultural studies and engineering principles.

Table 3-1: On Farm Best Management Practices

Farm Activity	Landholder Benefit	Regional Benefit
Productive Areas		
Minimum tillage practices	Improve soil structure Reduce costs	Less sediment runoff Restore natural rate of runoff
Contour ploughing	Retention of soil moisture Retention of topsoil	Restore natural rate of runoff Less sediment runoff
Gypsum & deep ripping Lime application	Improved profitability Improve soil structure	Reduced runoff
Controlled grazing on hills	Protect soil structure Retain topsoil	Reduce sediment runoff
Buffer Zones (along waterway and depressions)		
Grass filter strips along depressions in cropping areas	Reduce crop losses	Minimise sediment and nutrient runoff
Fencing of waterways and drainage lines	Minimise stock disease	Minimise erosion
Fencing of Streams to exclude stock	Reduced erosion of land	Improved water quality
Revegetation	Provide stock shelter Utilize excess rainfall Provides aesthetic values Enhance Ecosystem Services	Improve biodiversity Reduce groundwater accessions

Adoption of these practices will result in less sediment reaching river and stream, depression and wetland systems, and prevent the physical and biological degradation of waterway systems.

Further investigation is needed to quantify the effects, and monitoring of selected sites is proposed.

3.7 Farm Dams

The *Water (Irrigation Farm Dams) Act 2002* was passed by Parliament on 26 March 2002. It amends the *Water Act 1989* and extends licensing arrangements to cover all irrigation and commercial use in the catchment. Irrigation or commercial use of water from new dams must be licensed, whether or not the dam is located on a waterway. Use of water from soaks or springs must also be licensed.

The changes to the Water Act followed a review undertaken by the Victorian Farm Dams (Irrigation) Review Committee chaired by Mr Don Blackmore, Chief Executive of the Murray Darling Basin Commission.

The Government was keen to make sure that that the community was fully consulted throughout the review process and consequently 45 public meetings were held around Victoria. The review committee considered over 1,000 public submissions before it made its final recommendations to Government.

This issue is particularly relevant where farmers need to make plans secure in the knowledge that someone immediately upstream is not going to construct an unlicensed catchment dam that will capture their summer flow. There are also environmental concerns that unlicensed catchment dams can affect stream health.

There will be some farmers who currently use water for irrigation or commercial purposes that do not have a take and use licence. As from 1 July 2002 these farmers will have the choice of registering their usage or obtaining a standard licence.

Existing users will have 12 months from 1 July 2002 to obtain a Registration Licence or a Standard Licence. If they use water after 30 June 2003 and have not obtained a licence they will be guilty of an offence under the Water Act.

The bill also establishes planning processes for the management of unregulated catchments (Water Supply Protection Areas, and Permissible Annual Volumes of diversion) and management plans for stressed catchments (Stream Flow Management Plans).

The Irrigation Farm Dams legislation and its supporting procedures and guidelines provide a strong policy commitment to the sustainable use of all water resources, including groundwater.

4 BEST PRACTICE PRINCIPLES AND STANDARDS FOR DRYLAND DRAINAGE

The previous chapter discussed best practice that has been developed in other areas. The following sections provide best practice and technical standards that should be applied when considering regional and local (on-farm) drainage works in the Goulburn-Broken dryland catchment.

Regional Schemes are those which service more than one property whilst local "on-farm" drainage works are those that are contained on a single farm or on contiguous land owned by one landowner.

4.1 Best Practice Principles for Dryland Drainage Works

Despite the integrated catchment management and on farm management best practices, it is recognised drainage may be required in special circumstance to remedy existing drainage and saline problem areas. In these circumstances, the fundamental drainage principles regarded as best practice are as follows:

- Drainage to remain in natural catchments and sub-catchments to prevent cross catchment transfer of surface drainage.
- Point of drainage outfall over a property boundary is to remain unchanged.
- Changes in flow rate and volume over a property boundary should not be unreasonable.
- Discharge of saline groundwater should not be unreasonable.
- Storage areas are to be preserved.

It is further recognised that the introduction of any drainage works will generally have some changed impacts. Therefore, when considering these fundamental principles the question arises as to when drainage work impacts become unreasonable, or intolerable by adjoining owners.

Drainage Design Standards

In dryland areas, the requirement for constructed drainage schemes should be limited to:

(i) Particular locations with existing drainage or soil salinity problems associated with regional dryland drainage schemes, or be associated with public infrastructure such as roads.

(ii) Minor private or on-farm drainage works in accordance with best practice as described in **Section 4.2.2**.

Sub-Catchment Flow Transfers

Transfer of water away from natural drainage lines or across sub-catchments should be avoided in principle.

On Farm Scale

On farm drainage works ***must not*** cause transfers of surface water from natural drainage lines or across sub-catchments.

Regional Dryland Drainage Schemes.

Transfers should only be permitted where the environmental, economic and social benefits for the downstream area from which water is being transferred are very clearly greater than the possible disbenefits for the area to which water is being transferred, and when the impacts on any receiving stream to which water is transferred are minor.

Point of Discharge across Property Boundaries

In the case of on farm drainage, unrestricted outfalls across the property boundary is not permitted. All private or on-farm drainage or land forming works must include best practice outfalls (refer **Section 4.2.2**) that mimic natural flow conditions either at the property boundary or close to it.

Preservation of Storages

The design of any drainage activity must preserve natural storage where practicable. In cases where this is not possible, ie large regional drainage schemes the objective should be to compensate for the effect of loss of natural catchment storage and retardation in natural drainage paths by incorporating storage within the drainage system in order to minimise or avoid downstream impacts on receiving streams and waterways. Downstream impacts to be minimised or avoided include increases in storm runoff discharge, and increased sediment loads and exports of nutrients.

On Farm Scale

For on farm scale drainage work activities, the natural storage must be preserved. Some drainage works are permissible however when implemented in accordance with Best Practice as described in **Section 4.2.2**

Regional Dryland Drainage Schemes

Concentrated storages, or retardation basins, are one way of achieving storage preservation, but storage may also be included as follows:

- Linear storage may be created in the form of wetlands along drainage paths. Regulators to control flow past specific points such as roads, irrigation channels, access crossings, *etc*. can act to pond water upstream during higher drainage flows, and the vegetation, which develops in such areas, can trap nutrients and sediment.

- Variation in bed slope and cross-section of drains also creates more storage, retard flows, provide better aesthetics and promote growth of native vegetation and viable habitat for native species. These features will increase the cost of construction and maintenance, but are offset by reduction in the losses incurred in transforming natural depressions into geometric drains with low biological diversity, and the cost of downstream impacts on receiving waterways.
- Where natural depressions exist, construction of separated low capacity drains, with provision for overflow into the natural depression would preserve the environment of the depression and provide more effective storage.

Sub-surface Drainage

- If any proposal including groundwater pumping is submitted to Local Government they should ensure that the appropriate groundwater licence has been obtained from G-MW.
- All tile drainage proposals should require permits, and any proposals should be assessed to determine salt loads, and referred to CMA to consider whether or not the salt discharge might be allowed and, if so, to set any conditions including monitoring and costs which might apply.
- Unless tile drains are to be installed solely for control of shallow waterlogging, and it is clear that the tile drains will not intercept any groundwater, monitoring of both effluent flow and effluent salinity be required.

Water Quality Management

Design to accommodate drainage reuse (both on farm and from the drain) and nutrient stripping (eg constructed wetlands and grassed swaled depressions) to reduce their impact on the water quality.

All large drains outfalling to streams and waterways should incorporate online or offline wetlands or storage, which act to trap nutrients and weed stock and to deposit sediment.

Outfall Protection and Outfall Capacity – Regional Dryland Drainage Schemes

Apart from designing outfalls to reduce capacity, drainage outfalls should be designed to reduce velocities of flow entering the riparian zone of receiving waters and minimise the risk of erosion.

As a general principle for drainage in all areas, design should include measures to retain storage within the sub-catchment to be drained. Outfalls to receiving streams should be designed with similar capacity as the existing or former capacity of the undrained catchment.

4.2 Best Practice Technical Standards for Dryland Drainage Controls

The section provides a set of standards to be followed for the implementation of Dryland Drainage Works.

4.2.1 Regional Dryland Drainage Schemes

The standards described below have been derived from the Community Surface Drainage Scheme (SKM, 1999), Development of a Drainage Management Plan for the Black Dog Creek Improvement Trust (ID&A, 1994) and the Regional Strategy for Rural Drainage Management - North Central Catchment Management Authority.

Regional dryland drainage schemes must be designed by suitably qualified consultants and become an "approved scheme" (refer **Section 7**).

Firstly, regional dryland drainage schemes must be consistent with the best practice principles outlined above, including:

- Integrated Approach (refer **Section 3.4**)
- Catchment Management Approach for Drainage Solutions (refer **Section 3.5**)
- Farm Management Practices (refer **Section 3.6**)
- Best Practice Principles and Standards for Dryland Drainage (refer **Section 4**).

Where a regional dryland drainage scheme is to be investigated, the scheme must address the following:

- Design rainfall for drainage design
- Allowable inundation period
- Allowable flow velocities in drainage channels (to prevent erosion or sedimentation)
- Drain alignment
- Groundwater conditions particularly with regard to drain depths, possible groundwater accessions and salt loads
- Possibility of in-drain treatment (water quantity and quality)
- Drainage maintenance
- Economics

Regional Design Standards apply for the following:

- Longitudinal drain slope
- Drain cross section
- Drain capacity
- Drain outfall
- Water quality control
- Existing wetlands
- Fencing and revegetation
- Heritage and cultural sites.

Regional Standard 1 – Longitudinal Drain Slope

The slope of a drain and its surface roughness, will determine the rate at which water will flow. This parameter therefore is related to other regional standards including rate and quantity. A design standard for the longitudinal drain slope is required to limit potential erosion within the drain and to limit the deposition of silt within the drain.

The longitudinal drain grades are to be limited such that the full flow drain velocity does not cause drain erosion to occur. This grade will vary with soil type but for general conditions velocity should not exceed 1 m/s

The longitudinal grade of a drain will be governed by the natural slope of the ground. Where possible, the design bed grade should be within the limits shown in Table 4-1. It may however not be possible to achieve the minimum grade in particularly flat areas. In these areas the additional maintenance cost associated with increased siltation and subsequent weed growth will be unavoidable.

Table 4-1 - Longitudinal Bed Grades

Description	Flow Capacity	
	0-50ML/d	**> 50 ML/d**
Optimum Bed Grade	1/1200 (0.08%)	1/1600 (0.06%)
Minimum Bed Grade	1/2500 (0.04%)	1/4000 (0.025%)
Clay loam soils (max bed grade)	1/500 (0.2%)	1/600 (0.17%)
Sandy or dispersive soils (max bed grade)	1/700 (0.14%) with clay lining	1/1000 (0.1%) with clay lining

A further requirement, which relates to the longitudinal grade, is a limitation on the stream (drain) power. The power of channel flow often determines the rate of erosion. The findings contained a report The Distribution and Management of Channelized Stream in Denmark, in Regulated River (Brookes, 1987) concluded that stream power in excess of 35 W/m^2 for bank full flow was closely associated with erosion.

Stream power is determined as follows:

$$P = \mu g Q s / W$$

Where:

μ = specific gravity of water (kg/m^3)
g = force due to gravity (m/s^2)
Q = bank full discharge (m^3/s)
S = slope (m/m)
W = top width of flow (m)
P = Stream Power (W/m^2)

Drains should not be constructed with longitudinal grades, which result in stream power exceeding 35 W/m^2.

In addition, particular care must be taken to avoid the construction of drains within erosive soils. Erosion will lead to a reduction in downstream water quality, impact adversely on infrastructure, cause sedimentation in downstream drains and waterways and create a highly efficient channel possible leading to increase in downstream flood peaks. In some cases, soil profiles are prone to erosion regardless of slope, and therefore must be well vegetated.

In summary, the design standards to apply in relation to longitudinal grades in rural dryland drainage schemes are as follows:

- Longitudinal grades are to be limited such that bank-full flow velocities do not exceed 1 m/s.
- Longitudinal grades are to be limited such that stream (drain) power with the drain does not exceed 35 W/m^2.

Regional Standard 2 – Drain Cross Section

Shape

A trapezoidal section has been universally adopted as the cross section, which offers the best compromise between hydraulic efficiency and construction and maintenance requirements.

Drains which have a bed/depth ration between 1 and 3 have been recommended for Community Surface Drainage Scheme – Guidelines for Design (SKM, 1999) for the following reasons:

- The area of weed growth and its effect on hydraulic capacity of the drains is reduced;
- The drain is more efficient over a wide range of flows. Low flow velocities are higher and siltation is reduced;

- Drain maintenance, desilting and weed spraying are easier to perform; and
- Less land is required for the drain.

Natural waterway systems typically have a width/depth ratio of around 10. A midway standard between community drain within irrigated areas and natural systems is recommended. This standard has been chosen to achieve better environmental outcomes within and along the drain.

The design standard to apply in relation to depth to width ratio in dryland rural drainage schemes is to be at least 5 (1:5).

Drain Depth

The bed depth of a drain is dependent on the design flow, velocity design constraints, command requirements for drainage of land, soil types and surface elevations along the drain route.

The following standards must be applied to the selection of drain depth:

- Avoid intersection with the groundwater table;
- Allow for 0.1 metre below lowest point to be drained and a minimum grade of 1/2500 from the low point to the drain being designed; and
- Avoid drain depths exceeding 1.0 metre for stability reasons.

Bed Width

The following standards must be applied to the selection of drain width:

- Minimum bed width of 1.0 metres
- Maximum bed width of 2.5 metres

Batter Slopes

The selection of the batter slopes is made on the basis of depth of cut and soil type. Table 4-2 shows the maximum batter slopes, which are to be adopted to prevent batter slippage.

Table 4-2 – Drain Batter Slope Selection

Depth of Cut (m)	Minimum Batter Slope (Vertical:Horizontal)	
	Clay Loam/ Clay Soils	Dispersive or Sandy Soils
Less than 1.0	1:1.5	1:2.0
Greater than 1.0	1:2.0	1:2.5

Banks (spoil banks)

Should be avoided. If used restrict as follows

Banks along drains are primarily provided to prevent runoff directly entering the drain and eroding the batters. Banks along drains are however in general not encouraged as they can impede flows during major floods. Where banks are present, the drain bed depth be reduced to limit the drain capacity to the relevant design discharge. Furthermore, buffers must be provided between the top of the drain and the toe of the bank batter.

Dimensions of banks can vary according to the amount of excavated material available, however, where banks are provided, the following standards apply:

Bank height above natural surface	0.3 metres maximum
Freeboard	Nil
Crest Width	1.0 metre
Batter Slope	In accordance with **Table 4.2**
Buffer from top of drain to bank toe	1.0 metre or 0.3 times drain top width, whichever provides the greater buffer

Regional Standard 3 – Drain Capacity

The construction of drains has the potential to increase peak flows within downstream drains and waterways leading to increased flooding on adjoining properties. It is essential then that rural drainage works are designed to limit peak flows and avoid adverse impacts on downstream landowners.

The primary capacity design standard which is to apply to rural dryland drainage scheme design is that drains are to have a maximum capacity equivalent to the 1-year average recurrence (ARI) design flood flow.

Designers may use Australian rainfall & Runoff (AR&R – 1987) as follows:

$$Q_1 = 0.278CIA$$

Where

Q_1 is the 1-year ARI design flow (m^3/s)

C = the coefficient of runoff

I = average rainfall intensity (mm/h) for a 1-year ARI design storm and the calculated time of concentration of the catchment serviced.

A = catchment area (km^2)

The drain capacity is calculated using the Manning formula, which can be written as follows

$$Q = (AR^{2/3}S^{½})/n$$

Where

Q = drain capacity
A = drain cross sectional area (m^2)
R = hydraulic radius – ie area/wetted perimeter (m)
S = is the friction slope approximated by bed slope (m/m)
n = Manning's roughness coefficient

The recommended Manning's roughness coefficient values for use are given in Table 4-3.

Table 4-3 – Manning's "n" Values for Rural Drains

Flow (ML/d)	Roughness Coefficient "n"
Less than 20	0.045
20 – 75	0.040
Over 75	0.030

The Manning formula estimates the depth of flow, which occurs under uniform flow conditions in a drain. This depth is known as the normal depth and is constant for and unique to any given set of uniform flow condition, cross section and grade.

In practice, uniform flow is rarely achieved due to the presence of culverts or change in cross section, bed grade and channel roughness. Where flow conditions are altered the water surface will transition upstream to the new normal depth. The distance over which this transition occurs can be long and other changes to flow conditions will often occur before uniform flow is again achieved. Backwater curve computations allow the actual water surface profile along the drain to be calculated for any given flow conditions. These computations may only be undertaken by suitably qualified consultants.

Regional Standard 4 – Drain Outfall

The primary standard in relation to outfalls for rural dryland drainage schemes is that the point of outfall must be located at the point (low point) where the natural flow path exists.

The outfall of proposed rural dryland drainage schemes onto road reserves and onto private land will not be permitted.

The outfall must have capacity to receive the drainage water from the proposed works including drainage of the catchment contributing to the outfall.

It may be necessary to provide retardation to reduce peak flows discharged by the drainage works to meet downstream capacity constraints and/or if increases in peak flows resulting from the increase drainage efficiency result in a significant increase in flooding on downstream properties. Retardation basins involve the temporary storage of runoff for release at a controlled rate to reduce outflows to a targeted level. Storage basins can also be used for permanent water storage (ie, incorporate artificial wetlands) as long as the required active storage component is provided.

Retardation of flows to be discharged by proposed rural dryland drainage works must be provided where:

- The outfall drain or waterway does not have sufficient capacity to accept the proposed rural drain's design discharge; and
- The proposed rural drainage works cause an increase in downstream peak flows, which lead to a significant increase in flooding of downstream properties.

The retardation basin design is to consider the total upstream catchment inflow, not just the catchment collected by the proposed drainage works.

Regional Standard 5 – Sub Surface Drainage

Groundwater pumping, tile drainage or mole drainage can provide sub-surface drainage.

Groundwater pumping almost always mobilises significant salt loads, and any off-site disposal of groundwater without an appropriate off-set is likely to require an SDE. However any groundwater pumping, other than for Domestic and Stock purposes, must be licensed by G-MW. It is therefore G-MW's responsibility that off-site disposal does not occur unless an SDE or appropriate off-set is available. However Local Government should ensure that the appropriate groundwater license has been obtained from G-MW, if any proposal including groundwater pumping is submitted to them.

Tile drainage may be installed for control of surface waterlogging, for protection of land from shallow watertables, or for reclamation of saline land. It is unlikely to mobilise significant salt loads if installed solely for control of shallow waterlogging, but is likely to require an appropriate off-set if installed for other purposes. However, even where installed solely for control of shallow waterlogging significant salt loads may be mobilised if a shallow watertable is present. It is therefore recommended that a permit be required for any tile drainage proposal, and that all proposals be assessed to determine what salt loads might be mobilised, and whether an SDE might be required.

It is also recommended that monitoring of both effluent flow and effluent salinity be required unless the drains are to be installed solely for control of shallow waterlogging, and it is clear that the tile drains will not intercept any groundwater.

Regional Standard 5A – Salinity Issues

If the depth limits specified in Regional Standard 2 have been satisfied it is assumed that no additional salt loads will be mobilised, although there may be some change to the timing of salt discharge from the catchment. It is assumed, at this time, that any downstream salinity impacts will be insignificant. However, if council considers that the drain is to be constructed through a discharge area or catchment considered to have a high risk of salinity problems (i.e. identified in G-MW's priority mapping project), it should seek advice from the CMA prior to approval of the works.

Regional Standard 6 – Water Quality

Water quality impacts need to be carefully assessed to minimise mobilisation of sediment, nutrient and saline discharge.

The following standards are to form part of the rural dryland drainage design:

- Provide revegetated minimum width buffer strips and stock proof fencing either side of the proposed rural drains (see **Regional Standard 8 – Fencing and Revegetation Buffers**)
- Provide selected vegetation species within the proposed drain itself which promote the filtration of nutrients (little research at present)
- Maintain maximum longitudinal grade controls and velocity limits on drains to limit erosion and the subsequent export of sediment to downstream receiving waters (see
- **Regional Standard 1 – Longitudinal Drain** Slope)
- Incorporate constructed wetlands where possible into proposed drainage schemes to reduce the export of nutrients and sediment to downstream wetlands and receiving waterways
- Maintain the natural wetting/drying cycle of existing wetlands effected by the proposed rural dryland drainage works (see **Regional Standard 7 – Existing Wetlands**)

Opportunities for the inclusion of constructed wetlands would be particularly present where retardation basins are required for rural dryland drainage works. Generally, it would be relatively low cost to modify the retardation basin arrangement to incorporate dead storage for a wetland in addition to the active storage required for peak flow retardation purposes.

Regional Standard 7 – Existing Wetlands

Rural dryland drainage schemes must be designed as far as possible such that the natural wetting/drying cycle of existing wetlands are maintained. Methods for achieving this are discussed in detail in the Community Surface Drainage Scheme – Guidelines for Design

(1999, SKM). These methods are comprehensive and must be incorporated in any propose rural dryland drainage scheme.

The requirements of the "Environment Protection and Biodiversity Conservation (EPBC) Act" (1999) must also be considered at all times.

In addition, the following standards should be applied where rural drainage impacts on existing wetlands:

- Wetlands of Significance – A permit for rural drainage works should not be issued where the proposal is deemed to impact adversely on wetlands listed under the Convention on Wetlands of International Importance (Ramsar Convention);
- Other Wetlands – No drainage activity is to occur within 30 metres of any identified wetland area and / or wetland areas delineated by a municipal Planning Scheme Environmental Overlay.

Regional Standard 8 – Fencing and Revegetation Buffers

As part of the development of a rural dryland drainage scheme, the incorporation of fencing and revegetation to create a buffer strip must be provided on both sides of proposed rural drains.

The construction of fencing, and associated revegetation, will provide a number of water quality control functions. The concentration of nutrient levels and suspended soils entering drains will be reduced. Restricting stock access to drains will protect revegetation areas and reduce batter and bed erosion within the drain. Fenced drains and associated buffered area will also provide habitat corridors for a range flora and fauna.

Fencing and buffers

Rural Drains are to be protected by the provision of stock proof fencing and required to be permanent.

Fences will be under considerable pressure from stock when feed in the adjacent paddocks is scarce. Security against stock ingress is particularly difficult where fences must cross drainage lines. These pose real problems in the practical revegetation program and landowner cooperation is essential.

The buffer width on each side of the drain for rural dryland drainage schemes must be a minimum of:

- 1.5 times the top width of the constructed drain channel; or
- at least 5 metres from the constructed drain bank.

Fencing should be located outside this width but also having regard to the need for access for maintenance.

Revegetation

Revegetation of the buffer strips between drains and adjoining fencing is to be provided.

For maximum environmental benefit, emphasis is put on planting of indigenous species, preferably grown from locally collected seed. Effort is typically concentrated on shrubs and tree species but the importance of native grasses, sedges and reed is gaining increasing recognition and should be incorporated in rural dryland drainage schemes.

Regional Standard 9 – Heritage and Cultural Sites

Heritage and cultural sites of significance require protection from drainage and associated earth activities. Construction methods, drain alignment, etc may cause damage or destroy significant sites.

The requirements of the EPBC Act (1999) must also be considered at all times.

Areas of significant heritage or cultural significance should be identified and delineated by Aboriginal Affair Victoria, Heritage Victoria, and the Australian Heritage Commission (AHC).

Rural drainage works should not proceed within 30 metres of sites identified as having cultural or heritage significance.

Regional Standard 10 – Community Support

Approval of regional drainage schemes should be sought from adjoining and affected downstream landholders.

4.2.2 Private Local" On Farm" Drainage and other Earthworks

it is recognised that minor drainage works are "as of right" or permissible provide work is carried out in accordance with best practice outlined below.

Whilst it is recognized that minor drainage and other earthworks on a local "on farm" scale may be considered "as of right", it is important to consider the impacts of these works on the receiving land and waterways within the catchment. Such works will be permitted provided that they are in accordance with the following Local Standards.

Local on farm drainage works must be consistent with the best practice principles outlined above, including:

- Integrated Approach (refer **Section 3.4**)
- Catchment Management Approach for Drainage Solutions (refer **Section 3.5**)
- Farm Management Practices (refer **Section 3.6**)
- Best Practice Principles and Standards for Dryland Drainage (refer **Section 4**)

The design and the implementation of local on farm drainage works is intended to be undertaken by the landholder based on the following best practice.

Local Standards apply for the following:

- Catchment Management Approach (Natural Resource Plan)
- Longitudinal drain slope
- Drain cross section
- Drain outfall across property boundaries
- Water quality control
- Existing wetlands
- Fencing and revegetation
- Heritage and cultural sites.

Addressing each of the above local standards has been designed to be simple and quick to assemble all the necessary information.

A Landowner **MAY** submit an application for a permit for any local / on farm works which do not satisfy the criteria **but MUST** be able to demonstrate to the relevant authorities why such works should be permitted.

Local Standard 1 – Catchment Management Approach (Natural Resource Plan)
Prior to consideration of any local "on farm" drainage or other earthworks, the landholder must apply the principles under **Section 3.5** and **Section 3.6**.

Where changes to drainage lines and topography of land are proposed it is considered mandatory that a Natural Resource Plan be prepared to enable a full assessment of any adverse environmental impacts.

A Natural Resource Plan is defined as a minimum standard for natural resource planning at the property scale. It merely draws upon readily available information currently held in GIS at the Department of Natural Resources and Environment and/or GBCMA and soon will be available on the Regional Data Net.

The purpose of a Natural Resource Plan is to:

- Ensure sound integration all natural resource management issues as well as land management practices to ensure long-term land use sustainability
- Enable site specific targeted works, which are well planned and prioritised, which will enhance responsible use of public money;
- Increase environmental protection and enhancement works;
- Provide a gateway and awareness to other outcomes, eg best practices, productivity, business planning;

This approach has been gaining wider acceptance in recent times in achieving multiple objectives in natural resource management activities, ie waterway, salinity, pest plant and animal management, etc. The preparation of Natural Resource Plans would also provide a sound planning tool and assist in managing the farm operation, ie sustainability.

Natural Resource Plans may form part of the granted works for cost sharing purposes, which can be linked into Environmental Management and Waterway Grant Programs. These plans will be used to record work, future works, and enable cost sharing to be assessed in an efficient and integrated manner.

Natural Resource Plans must consider the following:

- Salinity – recharge and discharge areas;
- Native vegetation – existing remnants, riparian (streamside) vegetation;
- Water quality – impact of land management (fertiliser application, cropping practices, water supply)
- Erosion – waterway, gully and sheet erosion;
- Drainage – impacts on water quality and impact on adjoining properties; and
- Pest plant and animals – impact on neighbours.

The first step in the preparation of a Natural Resource Plan requires the collection of readily available information known as the base components: The Base Components which must be collected and the methods and responsibility for collection are set out in Table 4.4 below.

Table 4-4 – Base Components for a Natural Resource Plan

Base Component	How	Who
Land Class and Land Capability	Field	LH/ Officer
Remnant Vegetation (Ecological Vegetation Class)	GIS	Officer
Land Degradation Issues	Field/ GIS	LH/ Officer
Groundwater Salinity and Levels (recharge and discharge areas)	GIS/Field	Officer/LH
Water Features (streams and wetlands)	GIS/Field	Officer/LH
Drainage lines • Identification of natural discharge points (local knowledge) • Identification of drainage paths (local knowledge – assisted with 1:25,000 topographical information (GIS)) • Identification of major flooding pattern (local knowledge – assisted with flood overlays) • Identification of sub-catchment areas (local knowledge – assisted with 1:25,000 topographical information (GIS)) • Identification of any flooding patterns (local knowledge – assisted with available flood overlays CMA/Council) • Identification of slope information for bed areas and depression (undertake simple spot ground level information)	Field/GIS	LH/ Officer
Access Roads	GIS	Officer
Cadastral Boundaries	GIS	Officer
Infrastructure (fences, yards, buildings etc)	Field/GIS	LH/ Officer
Native Fauna	GIS/Field	Officer/LH
Other		

LH – Landholder
Officer – NRE/GBCMA

With regard to drainage line, the information specified in **Table 4.4** is a minimum requirement. Ground Positioning System (GPS) Survey technology can now be used to provide ground level survey relatively inexpensively and should be considered for Natural Resource Plan preparation. Recent use of this technology in the Strathbogie region indicates that it is easily applied to this work.

Following the gathering of the base components and input into GIS the landowner and officer will then discuss the program of works. Where applicable, the following additional information should form part of the Natural Resource Plan:

- Current Improvements;
- Waterway/ gullies to be fenced/revegetated;

- Saline areas to be fenced/revegetated;
- Shelter requirement;
- Remnant vegetation to be fenced;
- Erosion to be controlled;
- Areas where pest, plant and animals need to be controlled;
- Changes to water supply;
- Changes to drainage lines and topography of land.

Following the completion of the Natural Resource Plan opportunities for grants may be available from a number of programs including Farm$mart and the National Action Plan.

Local Standard 2 – On Farm Environmental Buffers

Following the completion of the Natural Resource Plan, the design of on farm "local" drainage works must include the environmental buffers along natural waterway and depression systems to allow for flow filtration and retardation for introduced drainage elsewhere from the property. This may represent 2% to 10% of a property, which may be subject to occasional inundation or flooding. The remaining property would be available for cropping or grazing. Where properties are grazed, these areas should be fenced to provide controlled grazing.

The following standards must be applied where introduced on farm drainage works are to be carried out:

- Reserve areas along natural waterways and drainage lines.
- A minimum 20-metre buffer zone should apply to either side of waterways and drainage lines.

Local Standard 3 – On Farm Drain Location

The standard specifically deals with introduced drainage on a property scale (on farm). Introduced drainage must outfall into the buffered areas set aside under Local Standard 2 – On Farm Environmental Buffers.

The following standards must be applied for introduced drains on a property scale:

- Drains must not transfer water across sub-catchments
- Drains are not to be constructed within areas with unstable, dispersive or erodible soils/subsoils.
- Drains are not to be constructed within saline discharge areas.

Local Standard 4 – On Farm Longitudinal Drain Slope

This standard has been introduced with other standards to ensure mobilisation of sediment, nutrient and saline discharge is minimised. (Drains should not be constructed within saline discharge areas).

The following standards must be applied for on farm drains:

Table 4-5 – Longitudinal Bed Slope for On Farm Drain

Clay loam soils (max bed grade)	1/500 (0.2%)
Sandy or dispersive soils (max bed grade)	1/700 (0.14%)

For Raised Bed Cropping steeper bed grades are permissible as follows due to resultant low flow and associate flow velocities. The following standards must be applied for Raised Bed Cropping:

Table 4-6 – Longitudinal Bed Slope for Raised Bed Cropping Areas

Stable heavy clay soils (max bed grade)	1/66 (1.5%)
Clay loam soils	1/100 (1.0%)
Silty clay soils (max bed grade)	1/200 (0.5%)
No steeper than natural slopes (ie, no cutting)	

Note: Areas with unstable, dispersive or erodible soil/subsoil should not be developed for raised bed cropping.

Local Standard 5 – On Farm Drain Shape

The following standards must be applied for introduced on farm drains:

- Drains must not protrude into any identified groundwater table
- Drains must not exceed 300 millimetres below the general natural surface elevation
- Drain depth to width ratio must be a least 5
- Batters slope of drains must be no steeper than 1 (vertical) : 5 (horizontal)

Local Standard 6 – On farm Drain Outfalls

The following standards must be applied for introduced on farm drains:

- Drain outfalls must enter the buffered waterway/depression areas at their natural point of entry (as far as possible)
- Drain outfalls are not to be constructed closer than 20 metres of the downstream property boundary

Local Standard 7 – On farm Water Quality

In addition to the areas set aside along natural waterways and depressions (Local Standard 2 – On Farm Environmental Buffers), the following standards must be applied for on farm drains:

- In-line sumps are incorporated on drains upstream of buffered waterway and depression areas. Sumps may be placed within buffered natural depressions.
- Sumps are to be constructed to provide 0.5ML storage capacity per 40 hectares of drained areas.

- At least 75% of area with proposed drainage improvements is to outfall via sump/s
- Sumps are to be aligned in the direction of flow with the width the length ratio of at least 5.
- Sump outfalls are to be beached with rock spalls.

Local Standard 8 Sub Surface Drains

As discussed in Section 3, the MDBC's Basin Salinity Management Strategy 2001-2015 has set end of valley targets (limits) for changes in salinity and salt load for each major river system. The targets have been tentatively set as "no increase" for the Goulburn River at Goulburn Weir and "up to 36% increase" for the Broken River at Casey's Weir. The CMA will be responsible for ensuring that these targets are met after taking into account both naturally occurring increases and any increases caused by drainage works.

As a result, conditions for Local "on-farm" sub-surface drains are as follows:

- All groundwater pumps require a groundwater license and Council officers will ensure that the appropriate groundwater licence has been obtained from G-MW.
- All tile drainage proposals require a planning permit, and are likely to need the same approvals as groundwater pumps.
- Mole drains should not intersect the watertable.
- All proposals will be assessed to determine salt loads, and referred to CMA to consider whether or not the salt discharge might be allowed and, if so, to set any conditions including monitoring and costs which might apply.

Local Standard 9 – Natural Storage and Wetlands Area

The following local standards applies:

- The introduction of private on farm drainage works are not to be closer than 30 metres of any identified wetlands area or areas delineated by a municipal Planning Scheme Environmental Overlay.
- Natural storage areas (basins), other than wetlands should become part of the waterway or depression buffer. Opportunities for constructed wetlands should be explored in accordance with the Community Surface Drainage Scheme – Guidelines for Design (1999, SKM).

Local Standard 10 – Fencing and Revegetation

The following local standard applies:

- Depressions and buffer areas are to form vegetated grassed waterways. (planting of native trees, shrubs and native grasses preferably from local seed sources).
- Introduced drains are sown preferably from local native seed sources.
- All buffer areas are to be protected by the provision of stock proof fencing and are required to be permanent
- It is preferable that drains be fenced.

Local Standard 11 – Heritage and Cultural Sites
Section 4.2.1 Regional Standard 8 is to be applied for on farm drainage works.

Local Standard 12 – Community Support
Not required if Local Standards 1 to 10 are met.

Design Response Statement
Following consideration of the above policies, principles and standards a design response Statement is to be prepared in accordance with **Section 6**.

5 MANAGEMENT RESPONSIBILITIES

5.1 Legislation

Under various legislation CMAs, municipalities and owners have varying responsibilities in natural resource management within the catchment. These are summarised as follows:

Catchment Management Authority

Under the Water Act 1989, Catchment Management Authorities are able to undertake defined Regional Drainage functions as an "Authority". In this situation the Minister may grant the CMA the right to provide, operate and protect drainage systems and to investigate, promote and conduct research into matters relating to its drainage functions.

As part of the GBCMA dryland program, the Authority is tackling a range of dryland natural resource issues including:

- soil acidity
- soils structure decline
- soil erosion
- turbidity and sedimentation
- salinity of both land and water
- waterlogging
- regional drainage and floodplain management

A strategic planning approach both at the local and catchment level is crucial to the successful implementation of the dryland program. Local Area Planning is to be supported by Geographic Information Systems (GIS). Through empowerment of both landholder groups and key players (eg municipalities), the most suitable land use and best management practice for the various land types and enterprises in the catchment are to be implemented.

A positive outcome of this approach will be the development of strong linkages and partnerships between stakeholders including community groups, local government and catchment and water management authorities.

Local Government

Under the Local Government Act, 1989 municipal councils are able to undertake drainage schemes and administer these schemes under a local law. Modifications to the Planning and Environment Act, 1987 and the introduction of Rural Zones enable municipal councils to control Rural Drainage and other activities under their Planning Schemes.

Under the Victorian Planning Provisions (the VPP), the Rural Zones provide Council with the power to control rural drainage and other activities. The CMA can be specified as a Referral Authority where works have the potential to alter the drainage characteristics of an area. Council must consider referral authorities comments before issuing a permit for works.

The opportunity is therefore available for the CMA to ensure that its policy and objectives for natural resources management in the catchment are met, and guidelines followed. The CMA is responsible for developing necessary guidelines, standards, principles and policies from time to time.

Planning Process for new drainage works

Under the Planning and Environment Act, 1987 the proponents for works are responsible for lodging an application with responsible authority (council) for a permit to undertake the works, where required.

The CMA through its encouragement of the Local Area Plan concept will enable landowners who are members of the Landcare network to participate in natural resource management at a sub catchment level. This is particularly relevant for regional schemes.

Table 7.2 and Check List (Appendix 1) encourages a self-assessment and referral to be completed by the applicants or their consultant. This would entail the applicant preparing a Natural Resource Plan (refer **Section 3**) and an explanation of the purpose of the works, which is accompanied by the design response statement. It is expected that the applicant/designer would design drainage works in accordance with this document and lodge (if required) an application for permit to the responsible authority. The design response statement and plan identifies how the drainage or works options were derived. If proposed works are consistent with **Table 7.2**, a permit is NOT required.

Council responsibilities are:

- to determine if the works are in accordance with this document;
- to advertise the application (where appropriate); and
- to consider and determine the application.

A mediation meeting is held where consent from adjoining landholders/occupiers has not been obtained or where the proposed works are considered to be contentious.

Where applications are for works other than those listed in **Table 7.2**, the applicant is referred to the CMA as a mandatory referral authority. Applications are referred to, or advice may be sought from, other authorities where the proposal may impact on their assets or responsibilities. These authorities may include:

CMA	Works in a flood overlay / Salt Disposal
CMA/NRE	Works affecting wetlands
G-MW	Surface / Groundwater Licensing Pumping
NRE	Removal of native vegetation
Parks Victoria	Works on Public Land
RWA, VicRoads, V/Line	Works affecting agency assets
WA	Works affecting water supply catchments

5.2 Implementation

Under the proposed planning controls the responsibilities (refer Flow Chart Section 7.1) for works can be summarised as follows:

(a) Local "on farm" Drainage and other Earthworks

Application and Design

- Landowner, or their agent, as proponent is responsible for preparation of application and Natural Resource Plan for on farm earthworks and/or design in accordance with this document.
- Council / CMA assesses plan against check list.
- Landowner agent and/or consultant incorporates requirements of referral authority into design.
- Local Government issues certificate or planning permit.

Construction

- Landowner is responsible for construction in accordance with an approved scheme or Natural Resource Plan
- The issue of certification of construction (by enforcement or checking) by
  - Municipality/CMA either employee or by contract
  - Designer or
  - Landowner

Operation and Maintenance

- Landowner/s is responsible for operation and maintenance of their own works

(b) Regional Drainage Scheme

Regional Drainage Schemes can be established under the Water Act or the Local Government Act. For smaller community schemes the Water Act allows for groups to manage their own scheme to retain a sense of ownership and control. Larger community schemes involving 10 or more landowners, the Local Government Act or the Water Act can be utilised whereby a scheme can be constructed and maintained by Council/CMA including rating.

Landholders associated with Landcare Groups will be encouraged to develop Local Area Plans for regional drainage schemes, where appropriate. In these situations the Landcare Group or CMA would act as the proponent.

For regional works involving large sub-catchments, the CMA/Municipality may take responsibility for design, construction, operation and maintenance of the works.

Given the complexity of regional schemes, a suitable qualified consultant is required to carried out all necessary investigations and designs in accordance with this document.

The introduction of controls incorporating best practice policies, principles and standards is the first part of a long process of working towards a strategic solution for dryland salinity. Ultimately there would be no need for control if all landowners and occupiers understood the current environmental issues associated with the Goulburn Broken Catchment and how drainage works impact on the adjoining properties and the surrounding environment.

In the long term it is envisaged that the need for control will be reduced, as Landcare groups and the community prepare drainage plans on a sub catchment basis as part of their Local Area Plans. The preparation of drainage plans for individual properties within these catchments would then be approved having regard to compliance with the approved Landcare drainage plan.

6 IMPLEMENTATION ARRANGEMENTS

The overriding philosophy behind the introduction of the planning controls for drainage in the Dryland Catchment is to implement a level of self-assessment / self-regulation by the proponent by providing best practice policies, principles and standards. This document will allow the proponent or their agent (engineer or surveyor) to assess whether the works require planning approval.

6.1 Referrals

Where proposed earthworks are considered to minor and are in accordance with Table 7.2, a permit is not required. Other proposed works requiring a planning permit and applications will need to be referred to relevant referral authority: -

Table 6-1 Referral Authority Disciplines

Referral Authority	Discipline
DNRE	Vegetation Habitat Assessment
G-MW	Surface and Groundwater/Subsurface
CMA	Drainage & Floodplain Assessment Water Quality
Service Providers (Telstra, Powercor)	Location of Underground Services
Local Government	Drainage Impact on Infrastructure Adjudication on Policy

6.2 Recording of drainage and earthworks

Under the requirements of the Planning and Environment Act at Clause 49 the Council must keep a register in the prescribed form of-

- All applications for permits
- All decision and determinations relating to permits
- The responsible authority must make the register available during office hours for any person to inspect free of charge

Most planning registers list the following types of information: -

- application number
- applicant - name and address
- address of land
- date received
- proposed use and development
- type of decision - approval, refusal, appeal
- date of decision and permit number

This register however only records data in a text file. What is required is the recording of information on a map base so that the CMA, Councils and consultants can view the location of other drainage works within the catchment that may impact on site analysis and design issues. The recording of information on a GIS. is also required so that referral authorities, Councils and consultants can provide an overall assessment of both approved and proposed works, with respect to: -

- affect of proposed drainage works on a particular site and environment.
- combined affects on drainage works across a region or sub catchment
- a trend in the types of works and location in a particular area

All this information will enable further refinement and improvements to the drainage controls to be undertaken within the catchment and may also provide valuable data on the preparation of regional and sub-catchment drainage plans. The recording of approved Local Area Plans for Landcare groups is currently being undertaken as part of the Goulburn Broken Dryland Salinity Heartlands Project by NRE at Benalla.

6.3 Approving drainage works

The approval of drainage works can occur in two ways, that is: -

- the issue of a planning permit by the Council, after referral to Referral Authorities
- the certification by Council that drainage works do not require a planning permit, since the proposed works complies with the exemptions/ criteria of the Dryland Drainage controls.

In regard to the latter, Clause 97N of the Act states as follows:

97N Application for certificate

(1) Any person may apply to the responsible authority for-

(a) a certificate stating that an existing use or development of land complies with the requirements of the planning scheme at the date of the certificate: or

(b) a certificate stating that a proposed use or development (or part of a use or development) of land would comply with the requirements of the planning scheme at the date of the certificate

(2) The application must be accompanied by the prescribed fee

Providing the proposed works complies with the schedule to the Rural Zone, no planning permit is required, i.e. complies with Table 7.2

However, given the significance and nature of drainage works, applicants would be advised to apply for a Section 97N Certificate from Councils where they consider that the proposed works may comply with the schedule to the Rural Zone of the respective planning scheme.

Regardless on the nature of the drainage proposals all new local (on farm) and regional schemes should be recorded by the GBCMA.

6.4 Geographic Information Systems

The recording of approved drainage works (ie, regional schemes) needs to be completed on a catchment basis by the Catchment Management Authority. This would be achieved once the CMA has approved an application. This will ensure that all approved works are recorded, in preference to approvals being recorded across seven municipalities.

The recording of this information onto a Geographic Information System (GIS) is required so that proper assessment of proposals can be considered, having regard to approved earthworks and to facilitate the regular reporting of approvals. At present municipalities or the CMA have limited GIS systems in place, whilst a further complicating consideration is that there is no common computer platform across the Goulburn Broken region.

However, nearing completion is the Regional Data Net, which is a State-wide initiation through the NRE. GIS information will be available through NRE and the CMA having assess to base information with will assist in the development of Natural Resource Plan for on farm work and Landcare groups and the like undertaking regional drainage schemes. GIS layers available include:

- 1:25,000 topographical maps
- Roads
- Hydrology
- Contours
- Cadastre/Property boundaries
- Tree cover
- Public land
- Flood events
- Flood structures
- Ecological Vegetation Types
- Broad Vegetation Types
- Rare or Threatened flora and fauna
- Aerial photographs (where available)
- Satellite imagery (limited dates)
- Catchment boundaries
- Landcare group areas
- Prior on ground work sites

DNRE Offices at Benalla and Tatura have work groups specialising in the operation of GIS Systems, whilst offices at: Broadford, Seymour, Yea, Mansfield, Alexandra and Benalla have ArcView GIS and local data in the dryland. Offices at: Tatura, Echuca and Cobram have ArcView GIS and data for the irrigation land.

A number of options exist for the preparation of Natural Resource Plans (Farm Plans) utilising this information. These are as follows:

- GIS groups at Benalla and Tatura are requested to develop NRP/FP as required and provide them to the farmer.
- Officers managing the projects prepare the NRP/FP as required and provide them to the farmer
- Design Consultants are employed by the farmer to prepare the NRP/FP. This approach would be similar to the Irrigation Region Whole Farm Plan process

Officers managing the project would need to ensure that the proposed works are acceptable and that the works undertaken are in accordance with the plans. Completed works are then recorded on the GIS system by person/s who prepared the original NRP / Farm Plan.

A system of Subsidies/Grants may be available to the farmer to meet the cost of production of these plans where a nett environmental gain in biodiversity, water quality or other environmental parameters can be demonstrated to the CMA.

6.5 Compliance with permits, conditions and planning schemes

The Planning and Environment Act 1987 is divided into 11 parts. The Act is quite specific about the duties and responsibilities of councils, whilst specific provisions relating to enforcement are also listed.

Part 2, Clause 12 deals with the issues of planning schemes and the duties and responsibilities of Councils, it states -.

12 What are the duties and powers of planning authorities?

(1) A planning authority must-

a) implement the objectives of planning in Victoria
b) provide sound, strategic and co-ordinated planning of the use and development of land in its area
c) review regularly the provisions of the planning scheme for which it is a planning authority
d) prepare amendments to a planning scheme for which it is the planning authority
e) prepare an explanatory statement in respect of any proposed amendment to a planning scheme

(2) In preparing a planning scheme or amendment, a planning authority-

a) must have regard to the Ministers directions and
(i) must have regard to the Victoria Planning Provisions and
(ii) in the case of an amendment, must have regard to any municipal strategic statement, strategic plan, policy statement, code or guideline which forms part of the scheme and
(b) must take into account any significant effects which it considers the scheme or amendment might have on the environment or which it

considers the environment might have on any use or development envisaged in the scheme or amendment and

(c) may take into account its social effects and economic effects

(3) A planning authority may-

a) carry out and commission reports and

b) do all thing necessary to encourage and promote the orderly and proper use development and protection of land in the area for which it is a planning authority: and

c) take any steps and consult with any other persons it considers necessary to ensure the co-ordination of the planning scheme with proposals by those other persons

14 What are the duties of a responsible authority?

The duties of a responsible authority are-

a) to administer and enforce the planning scheme and to enforce any enforcement order or interim enforcement order relating to land covered by a planning scheme for which it is the responsible authority and

b) the implement the objectives of the planning scheme and

c) to comply with this act and the planning scheme and

d) to prove information and reports as required by regulations.

Part 6 deals with issues relating to enforcement of planning schemes and permits. Clause 114 states: -

114 Application for enforcement order

(1) a responsible authority or any person may apply to the tribunal for an enforcement order against any person specified in sub section (3) if a use or development of land contravenes or has contravened or unless prevented by the enforcement order, will contravene this Act, a planning scheme, a condition of a permit or an agreement under section 173

(2) (repealed by No. 52/1998)

(3) An enforcement order may be made against one or more of the following persons-

(a) the owner of the land

(b) the occupier of the land

(c) any other person who has an interest in the land

(d) any other person by whom or on whose behalf the use or development was, is being, or is to be carried out

Although the powers of the Act are quite specific about enforcement and responsibilities, compliance with either planning schemes or permits requires staff resources. Enforcement is not routinely completed by Councils, given lack of staff within the planning field, the existing workload in processing planning permits and the contracting out of bylaws functions to external service providers. Planning enforcement is usually only initiated when a complaint has been received by Council. Enforcement Action can be undertaken by any person, as stated under 114(1).

Given the issues surrounding drainage and the possible affects to both the environment and adjacent landowners then a more responsive system needs to be developed in regard to the monitoring of approved and non-approved works.

For regional drainage schemes, it is proposed that when applications are formulated that the proposed works are identified in stages. As each stage is completed then written confirmation from the applicants consultant shall be forwarded to Council and the Catchment Management Authority certifying that all works have been completed in accordance with the approved plans. Works on later stages will not be able to be completed unless this approval has been obtained.

Appropriate conditions would be inserted into each planning permit nominating work stages and the certification of each stage to be supplied by the applicant's consultant.

For all local 'on farm" works, including works covered by Section 97N certificates, the CMA should be informed of the completion of works so that an inspection can be made. This will ensure that all works are completed in accordance with relevant conditions and that later enforcement actions are not required.

For non approved works, the surveillance of the catchment by Councils and the CMA is difficult given the size and extent of the catchment. Staff patrolling the catchment on the look out for offenders would be time consuming and costly. To ensure that works are not carried out illegally then the most appropriate course of action will involve training programs for all stakeholders, within the catchment, as part of the new Dryland Drainage Controls. This would include the following: -

- Council staff – planning, engineering, by laws, building
- CMA and Referral Authority staff involved in the planning and engineering processes
- Contractors
- Landcare Groups
- Consultants.

Increasing the knowledge and understanding of dryland drainage issues would ensure a wider appreciation of the problems that the Goulburn Broken Catchment is currently experiencing. This will assist in ensuring that landowners check with Councils, referral authorities or consultants prior to undertaking any earthworks or drainage type activities.

7 DRYLAND DRAINAGE CONTROLS

7.1 Context

The concept developed for this study into dryland drainage issues is to provide a set of best practice policies, principle and standards to be incorporated into planning scheme through the of the schedule to the Rural Zone. The set criterion enables a self-assessment and referral to be completed by the applicants or their consultant where the case requires. It involves the applicant preparing a plan showing the proposed works or activities and an explanation of the purpose of the works, which is accompanied by the design response statement (refer to Section 7.7). The design response statement and plan identifies how the drainage or works options were derived. Given the set of best practice policies, principles and standards (refer to Section 3), this process enables the applicant to take full responsibility for the application.

The procedure to be followed for all drainage and other earthworks is set out in the following Flow Chart. (Figures 7.1(a) and 7.1(b)) These have been prepared to demonstrate to all involved the process involved prior to lodging a request for approval and the process which will be followed after a planning permit application (if required) is submitted to Council.

Once the applicant has prepared the application, it should be checked against the checklist as presented in **Appendix 1**.

This checklist will enable the CMA and/or Council to determine if the applicant complies with the schedule and this document.

If in accordance with this document, Council determines that a permit is not required, the landowner may request a statement to that effect from Council under Section 97N of the Act. No further action is required.

If Council determines that a permit is required, then Council responsibilities then rest with the advertising of the application where required and for the final consideration of the application. A mediation meeting is held where consent from adjoining landholders/occupiers has not been obtained or where the proposed works are considered to be contentious.

Landowners need to understand that, whilst self assessment can be undertaken, they are encouraged to seek Council approval by means of Section 97(N) Certificate.

Figure 7.1 (a) – Proponent Process for Local (on farm) Drainage Works within Dryland Catchments

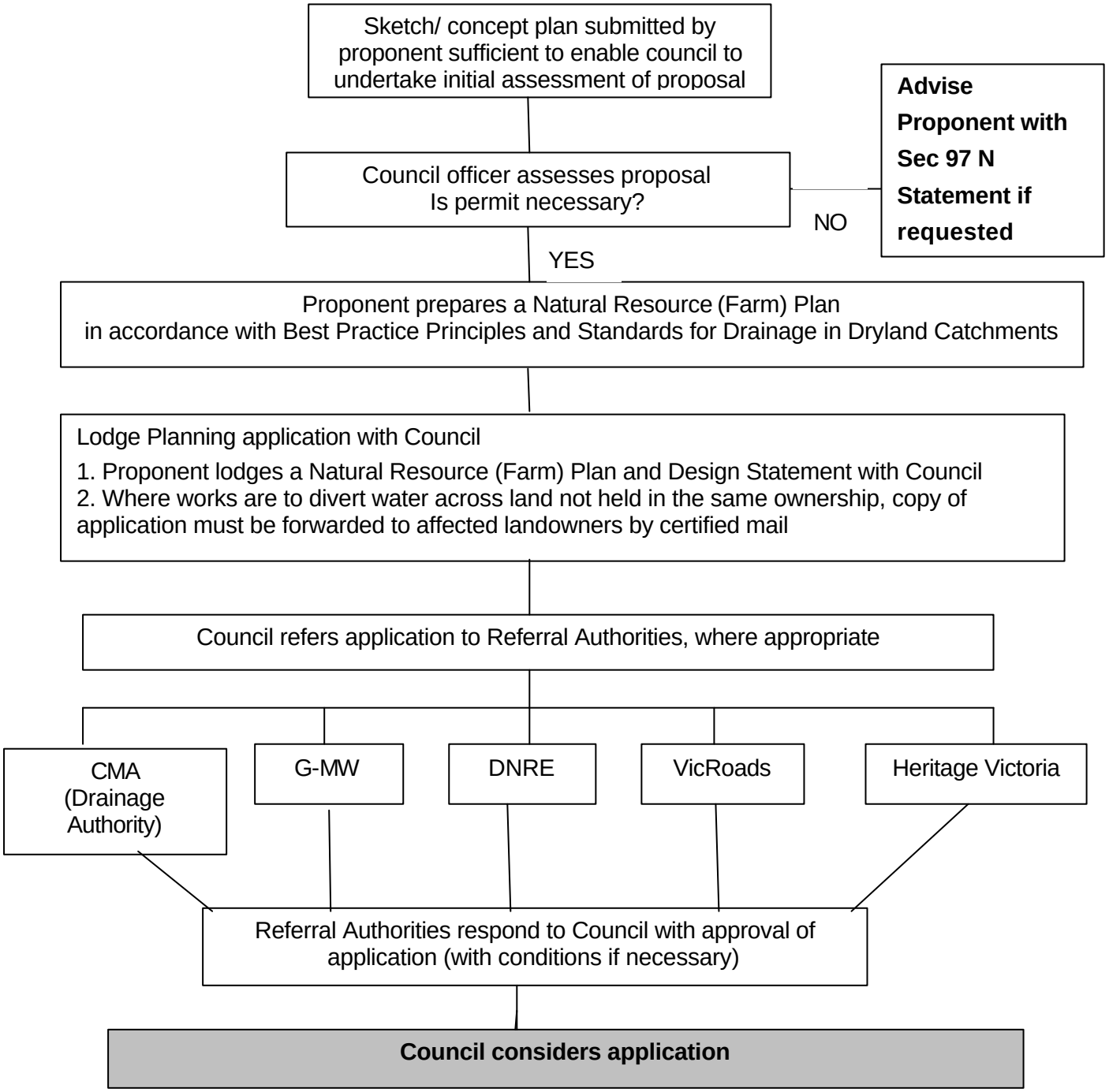
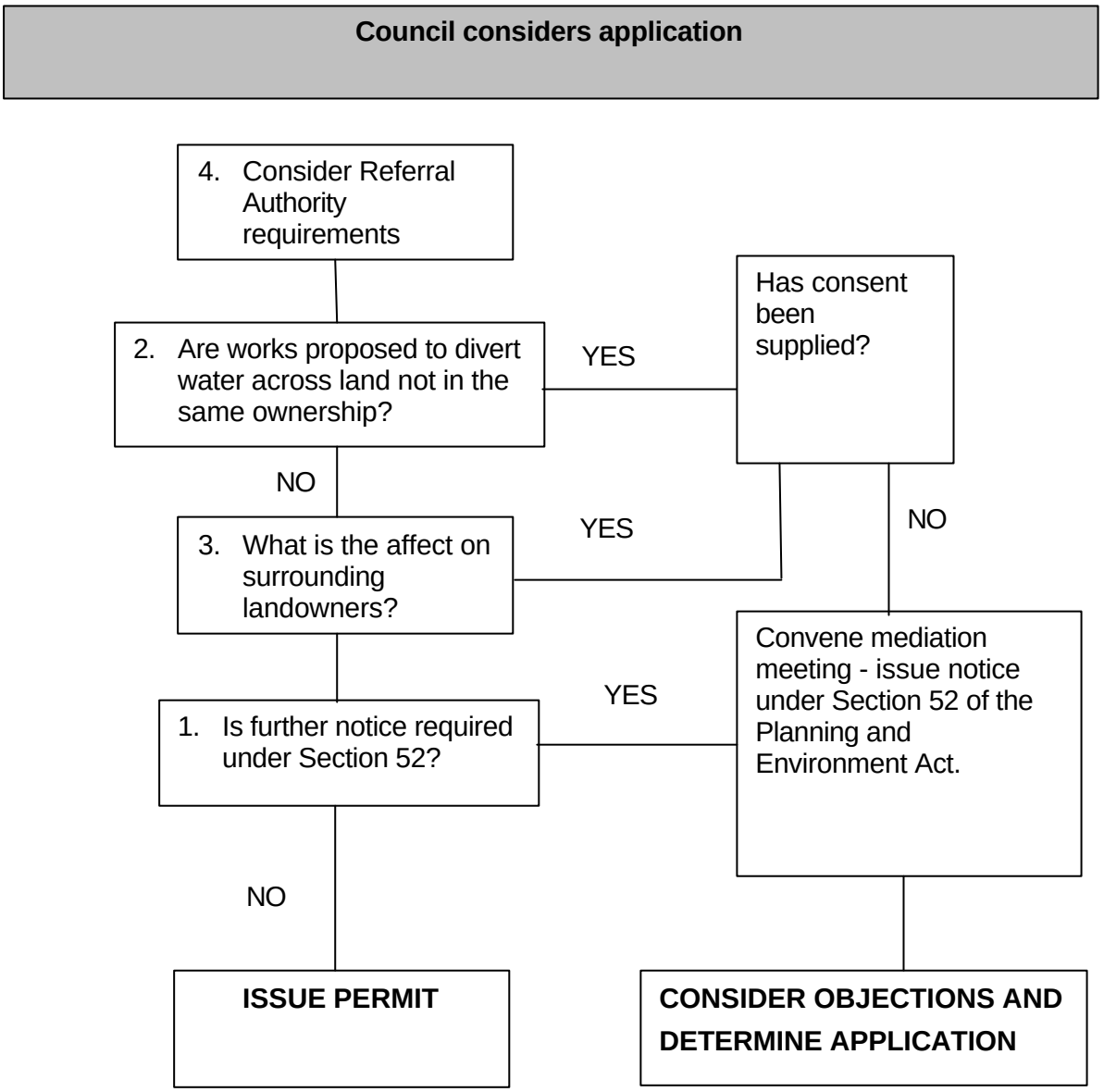


Figure 7.1 (b) – Council Process for Local (on farm) Drainage Works within Dryland Catchments



7.3 Model Planning Scheme Amendments

Overview

The model planning scheme amendments in relation to earthworks include the following:

- Municipal Strategic Statement
- Local Policy (drainage)
- Schedule to the Rural Zone
- Supporting Reference Documents

Each Council has prepared the Municipal Strategic Statements whilst the local policy, schedule and supporting document (earthworks controls) are presented in this document.

7.4 Local Policy Section (CLAUSE 22)

Policy Application

All land within the municipality outside any irrigation districts managed by Goulburn-Murray Water.

Policy basis

Dryland drainage controls are necessary to prevent poorly planned earthworks or activities from disrupting or altering local drainage and flooding patterns, to control erosion or sediment transfer and are aimed to minimise the amount of salt or nutrients that are moving from the dryland regions of the Goulburn Broken catchment to the Murray River.

Evidence of poorly planned works and activities is showing in increased flooding whilst increasing turbidity and nutrient levels have been recorded in regional streams and are contributing to increased occurrence of blue-green algal blooms within the catchment and downstream in the Murray River.

Salt disposal entitlements under the MDBC Salinity and Drainage Strategy require salt discharge to be no more than the salt that was discharged to the Murray River in 1988. With salt discharge from dryland areas increasing in recent years, dryland drainage controls are necessary to reduce salt discharge and nutrient run-off causing contamination of surface water supplies.

Objectives

- To reduce the incidence of poorly planned earthworks and drainage.
- To reduce the amount of soil sediment, salt and nutrient discharges from dryland areas to the Murray River.
- To minimise impacts on water quality.
- To ensure that drainage works do not affect the environmental values of wetlands, depressions and waterways.
- To ensure that drainage works do not impact on the productive capacity of surrounding agricultural land.
- To ensure that drainage works do not impact on the use of surrounding landholders.

A fundamental principle for the adoption of planning controls is that farming operations within the catchment must not modify the catchment drainage without proper investigation of the impacts of the proposed earthworks and consideration of alternatives.

Local Planning Policy

It is policy to:

- minimise the adverse impacts of land use and drainage and earthwork proposals with regard to the likelihood of any increased flow and saline discharge and mobilisation of nutrient and sediments and any individual or cumulative effects downstream;
- give preference to adopting catchment management options before considering any drain construction.
- encourage preservation of wetlands and the protection of nature conservation, surface and ground water quality, and areas of environmental significance;
- recognise the natural flow carrying capacity of natural streams and drainage paths, and the flood storage function of the depression systems;
- discourage accessions to the watertable to minimise potential salinisation;
- encourage adoption of better land use planning that will minimise the need for drainage works;
- give preference for constructed drainage in locations with existing drainage or soil salinity problems, or associated with public infrastructure;
- encourage new drainage and earthworks to be designed and implemented in an integrated manner;
- minimise the adverse impacts of laser grading or land forming on flooding to downstream areas by encouraging drainage and environmentally sensitive designs including compensatory or ameliorative works such as farm recycling dams;
- support Goulburn Broken Catchment Management Authority in the implementation of best practice, policies principles and standards for earthworks associated with drainage.

Policy References

- Goulburn Broken Catchment Management Authority Catchment Strategy.
- Implementation of Planning Controls for Drainage Works in Dryland Catchments.
- Shepparton Salinity Management Plan.
- Community Surface Drainage Schemes – Guidelines for Design

7.5 Schedule to the Rural Zones

The Victoria Planning Provisions introduce a schedule into the Rural Zones, which requires: -

- A permit is required to construct or carry out earthworks which in the opinion of the responsible authority change the rate of flow or the discharge point of water across a property boundary.
- A permit is required to construct or carry out earthworks, which in the opinion of the responsible authority increase the discharge of saline groundwater.

This schedule requires all planning permit applications to be made for all earthworks within the Rural Zone, including

- Rural Zone (RUZ);
- Rural Living (RLZ); and
- Environmental Rural Zone (ERZ)

The prime objective of this study is to:

(a) Define the principles and standards for works in the dryland catchment, and

(b) Document what dryland drainage developments do not require a planning permit by utilising the existing schedule to the Rural Zones and **Table 7.2**.

A checklist has been prepared (refer **Table 7.2**) of various drainage works which are considered to be minor in nature.

The earthworks part of the schedule will be modified as follows:

Table 7-1 – Earthworks Permit Conditions

Permit requirement for earthworks		Land
A permit is required to construct or carry out earthworks which in the opinion of the responsible authority change the rate of flow or the discharge point of water across a property boundary.		All lands
A permit is required to construct or carry out earthworks, which in the opinion of the responsible authority increase the discharge of saline groundwater.		All lands

7.6 Earthwork Controls

Table 7.2 outlines those drainage works that are deemed to be minor in nature and should not require a planning permit.

A measure of control has been incorporated for the larger works in these categories where the impacts extend beyond the property boundary.

Table 7-2 – Earthwork Controls: Check List (Permit not required)

Earthworks	Condition
Irrigation	
Land forming (Laser grading, Land filling)	• Cuts or fills must not be greater than 150 millimetres. • Must not be within 20 metres of any identified stream and/or depression.
Water supply development	
Dams	• Must not exceed 3 metres in height.
Diversions	• Must not exceed 200 metres in length: • Must be located within a catchment less than 15 hectares; and • May require licence from G-MW.
Soil conservation	
Banking systems (including grassed waterways)	• Must not exceed of 200 metres in length; and • Must be located within a catchment less than 15 hectares.
Diversion banks	• Must not exceed of 200 metres in length; and • Must be located within a catchment less than 15 hectares.
Gully control structures (dams, Gully plug)	• Must not exceed 3 metres in height.
Gully pushing (filling, battering)	• Must be located within a catchment less than 15 hectares.
Cropping	
Graded banks and waterway systems	• Must not exceed of 200 metres in length; and • Must be located within a catchment less than 15 hectares.
Land grading (levelling, lasering)	• Cuts or fills must not be greater than 150 millimetres; and • Must not be within 20 metres of any identified stream and/or depression.
General	
Levee banks	• Must not exceed 200 metres in length • Multiple banks must be separated by at least 100 metres • Must not be within LSIO & FO or any identified floodplain. • Within 20 metres of any identified stream and/or depression
Diversion banks	• Must not exceed 200 metres in length. • Must be located within a catchment less than 15 hectares
Groundwater disposal	• Permit always required.

Note: Water Supply Developments which don't require a permit may still require a G-MW Licence

Exemptions (provided under the Victorian Planning Provisions)

Exemptions from planning approval are:

- Routine maintenance and repairs of drains, which does not affect the original grade, shape or size of the drain.
- Drainage works constructed in accordance with the Shepparton Salinity Management Plan.
- Works carried out in accordance with a Floodplain Management Plan.

What information is required?

- The preparation of designs (regional drainage schemes or Natural Resource Plan (ie, on farm works), which identifies the characteristics and opportunities and constraints of the site (refer to **Section 3**), and then
- A design response statement, which identifies how each drainage or works solution, was determined.

Who can prepare development plans?

For regional drainage schemes, a Licensed Land Surveyor or Agricultural/Environmental/Civil Engineer, who has demonstrated experience in drainage and environmental assessment, shall prepare all development plans.

On farm works plan (Natural Resource Plan) may be prepared by the landholder. Refer to **Section 3**.

7.7 Design Response Statement

This statement is to be prepared in conjunction with appropriate design plans such as Natural Resource Plans (refer **Section 3**). These are required for all works other than those listed in Table 7.2 and shall contain:

- Description of proposed drainage system and works, including all infrastructure. Such information shall include all crossings, depression reshaping, landforming, tree planting and dams.
- Assessment why catchment management solutions and best land use practices cannot resolve drainage problems.
- Assessment of existing and surrounding drainage systems ie. Why are the proposed works required – why is the current drainage system not working (topography, no existing drainage system, inadequate drainage, soil conditions)
- Assessment of historical agricultural land uses practices in the vicinity of the site – dryland, irrigation, cropping, pasture – grazing – current impacts on environment from existing land uses
- Proposed agricultural land use and/or type of cropping to be carried out on site
- Proposed works – Natural Resource Plan

Where regional drainage schemes are considered the design response plan and statement shall address the following additional items:

- Design flows shall also be specified for regional schemes.
- Identification on a plan of the different stages of works to be completed.
- Evaluation of proposed drainage system(s) and works:-
  - Risk assessment – identify risks to public health, agricultural production and property and the possibility of liability to Responsible Authorities and the Goulburn Broken Catchment Management Authority.
  - Environmental Impact Assessment – assessment of the impacts that drainage plan may have on surrounding land, drains and watercourses, such as :-
- changing the water regimes and seasonality of a watercourse.
- groundwater levels and salinity, and estimated impacts on salt discharge.
- reducing the water quality of a stream.
- reducing vegetation values.
- calculation of proposed drainage discharges from the site shall be calculated.
- assessment shall be made to the current levels of water quality and pollution within adjacent watercourses and wetlands within the catchment and any expected changes as a result of new drainage works.
  - Identification of the proposed method of drainage (mole, tile, banks and channel) in response to the characteristics of the site and justification for such a method.
  - Proposed outfall location and identification of what areas downstream will be affected by the proposed discharge.
  - Types of nutrient and sediment controls and re-use facilities that are proposed.
  - Correspondence and approvals from the Goulburn Broken Catchment Management Authority, Goulburn-Murray Water and Department of Natural Resources and Environment

8 APPROVAL PROCESSES

How do I apply for approval and whom do I consult?

Firstly the applicant prepares a:

- Natural Resource Plan (see **Section 3**)
- Design Response Statement.

The proponent may make a 97N Application for certificate to the responsible authority (see **Section 6**) to confirm works requires no permit. The responsible authority will decide if any drainage work proposed requires a permit under the schedule to the Rural Zone and **Table 7.2.**

If permit is required it must be referred to the Goulburn Broken Catchment Management Authority. Proposals shall be referred to other authorities where proposal may impact on their assets or responsibilities, including:

CMA	Works in a flood overlay
CMA/NRE	Works affecting wetlands
G-MW	Surface / Groundwater
NRE	Removal of native vegetation
Parks Victoria	Works on Public Land
G-MW, VicRoads, V/Line	Works affecting agency assets
WA	Works affecting water supply catchments

Regional drainage schemes must be prepared in accordance with **Section 3** with direct consultation with the above Referral Authorities where appropriate including Aboriginal Affairs Victoria – where known sites of cultural heritage exist. Written consent of these referral authorities must be obtained. Once all approvals and consents have been obtained, applicants can then apply for a planning permit to Council, to undertake these works.

Consent from affected landholders and occupiers must be supplied for works requiring a planning permit. A statutory declaration shall be completed by the applicant identifying that a copy of the Natural Resource Plan and Design Statement was sent to the downstream landholder for on farm earthworks. For regional schemes all affected owners and occupiers shall be notified.

No consent from affected landowners – mediation meeting (proposals not in accordance with this document)

Should consent from an affected landowner not be obtained then Council shall then convene a meeting with the applicant, referral authorities and surrounding landowners. Notice under Section 52(1) of the Planning and Environment Act will be given to surrounding landowners at this meeting. The purpose of such a meeting is to explain the application to both Council and all surrounding landowners and identify other relevant issues, prior to the assessment of the application.

In accordance with Clause 59(2) of the Planning and Environment Act, a decision cannot be made on this application until 14 days have elapsed after the giving of notice.

Fees

The responsible authority reserves the right to charge an appropriate fee for mediation meetings and for consideration of the application.

APPENDIX 1: SELF ASSESSMENT GUIDELINES

REGIONAL DRYLAND DRAINAGE SCHEMES

Consent from NRE, CMA and other relevant government agencies Yes/No

LOCAL (ON FARM) DRAINAGE WORKS

Are works exempt, or permit not required as per TABLE 7.2 Yes/No

If not exempt the works will be assessed against the following standards: -

Does the proposed works comply with the following local standards

Local Standard 1 – Catchment Management Approach (Natural Resource Plan Prepared) Yes/No

Local Standard 2 – On Farm Environmental Buffers Yes/No

Local Standard 3 – On Farm Drain Location Yes/No

Local Standard 4 – On Farm Longitudinal Drain Slope Yes/No

Local Standard 5 – On Farm Drain Shape Yes/No

Local Standard 6 – On farm Drain Outfalls Yes/No

Local Standard 7 – On farm Water Quality and Retardation Yes/No

Local Standard 8 – Natural Storage and Wetlands Area Yes/No

Local Standard 9 – Fencing and Revegetation Yes/No

Local Standard 10 – Heritage and Cultural Sites Yes/No

Local Standard 11 – Community Support Yes/No

Does Design Response Statement justify the need for drainage works Yes/No

IF A NO ANSWER IS GIVEN TO ANY OF THE ABOVE CRITERIA, THE APPLICATION IS LIKELY TO BE REFUSED.