

## WHY PROPERTY PLAN?

Property planning allows the landholder to match the production systems on the property to its level of capability to assure future productivity and sustainability. When land is used beyond its capability it causes resource degradation and thereafter has reduced ability to support production, conversely if land is used below its potential the opportunity for greater production is being wasted. Property Planning allows the landholder to manage their resources and address environmental issues in a methodical and logical manner.

Property planning enables us to plan for not only the management of stock, irrigated and dryland crops and other farm enterprises such as ecotourism or olives but also for soils, paddocks, trees, wildlife, water supply and other resources that make up a property.

Property planning provides an opportunity to address and combat resource degradation. Even low levels of degradation can result in reduced production yields. In the example of soil degradation soil erosion, salinity, soil acidity, soil structure breakdown, loss of soil fertility, tree decline and weed invasion are conditions that reduce catchment condition, production and profitability.

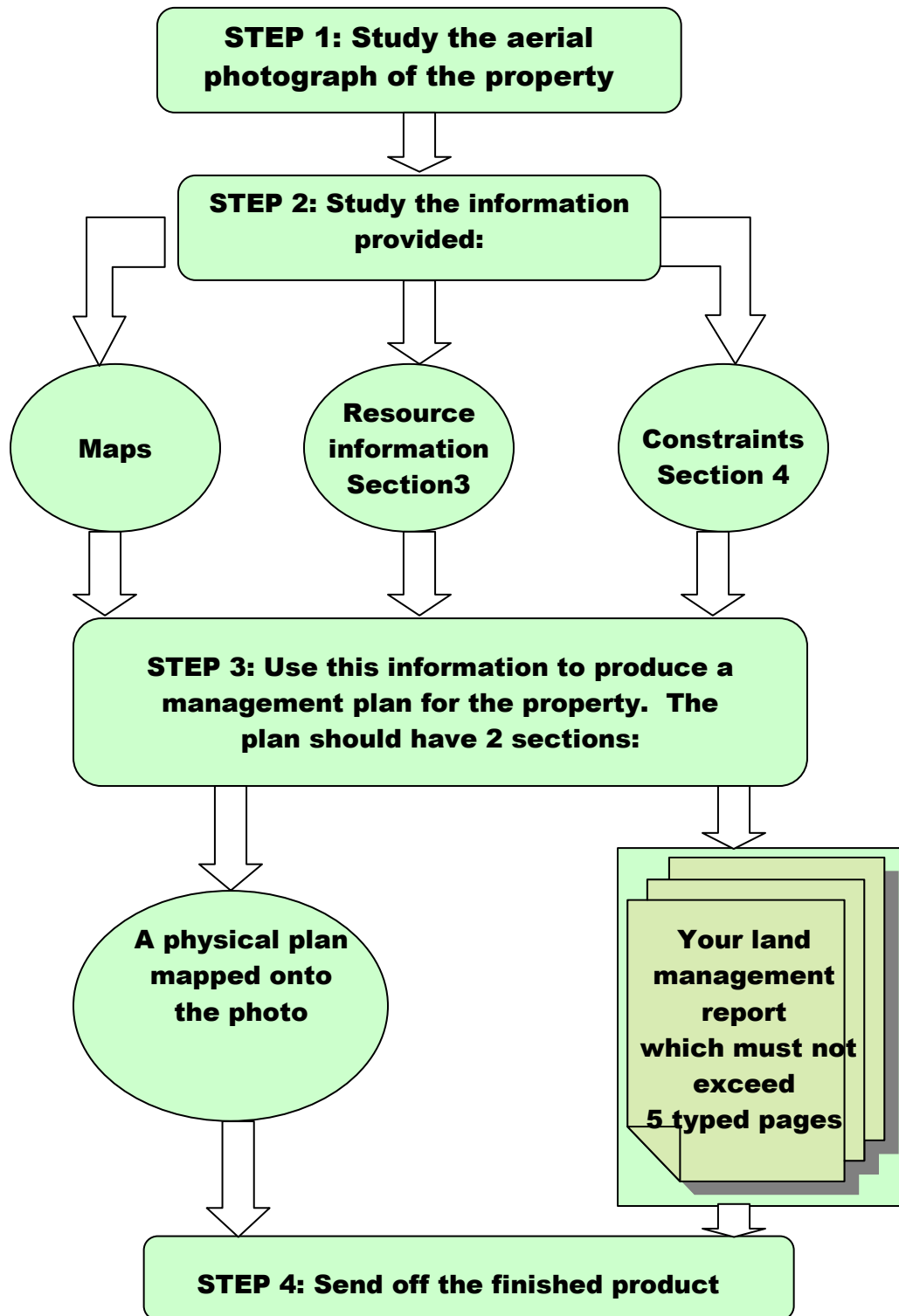
Property planning usually includes a close look at the financial situation of the property. Financial considerations will often be the deciding factors in determining what can be done, and this should be addressed at least in general terms. As the major aim is to produce a practical physical plan, profitability and funding sources should be considered and described in the final report in only broad terms.

The final property plan should:

- Convey a ‘vision’ for the property over the longer term.
- Take into account natural characteristics of the land, water and vegetation
- Minimise land and water degradation by the identification of existing and possible problem areas and adapting management
- Be responsive to social, legal and economic constraints
- Optimise profitability of enterprises
- Consider broader environmental and resource issues –for example what are surrounding landholders doing? Does the local Landcare group have a plan for the area? What is happening in the catchment?

## DEVELOPING YOUR PROPERTY PLAN

For the purposes of this competition, the scenario is that you are a team of Farm Advisory Consultants that have been contracted to plan a property for the owner. This exercise will take you through the steps involved in property planning. The following flow chart demonstrates the steps to be taken.



## RESOURCE INFORMATION - 'TRELAWNEY'

The following section outlines the information relevant to 'Trelawney' that you will need to take into account when undertaking your plan. It includes information on the history of 'Trelawney', the aims of the landholder, and a physical stock take of the property.

Conducting a physical stock take of the property is a key element in developing a property management plan. By examining a farm thoroughly you will see a complete picture of the current state of its resources, and how to best use these resources into the future. Some factors cannot easily be changed (eg climate and soils) while others can be changed (eg land use and fence lines).

Information in this section should be used in conjunction with the maps provided. Also included are key points you will have to consider when developing your plan.

## About the Property

### 1. History and Current Enterprise

‘Trelawney’ is a 751 hectare property in the Somerton district (between Tamworth and Gunnedah) currently agisting 287 cows and 150 calves. It was purchased by the Indigenous Land Corporation (ILC) in 1996 to be developed as a training facility for indigenous students to train as jackaroos.

Parts of ‘Trelawney’ have been cropped for over 100 years and for a number of years there were 3 large centre pivot irrigators for cropping. The property still bares the traces of the centre pivot irrigators which you can see the outlines of the irrigated areas on the Boundary Map.

Since the ILC purchased ‘Trelawney’ these centre pivot paddocks have been left to native pasture regeneration. Scalded areas and evidence of erosion are still present which is also obvious on the Boundary Map. The centre pivot irrigator is no longer in use and is not in working order.

A travelling irrigator is used to irrigate a paddock of lucerne and a cultivation paddock at the entrance to the property. The lucerne is used on farm for stock feed.

Stock are rotated around the property with cattle moved in mobs as defined by feed availability. Pests and weeds of various types are common across the property particularly along the Peel River frontage on the southern end.

In the 1950’s, dams, grassed waterways and contour banks were constructed on the property. There are some land degradation issues including gully erosion, sheet erosion and scalding on many parts of the property which need to be addressed. This can be seen on the Harzard Map.

‘Trelawney’ has a 192 ML groundwater (bore) licence and a 980 ML surface water licence (extracted from the Peel River when allocations are permissable and varies from year to year). Currently 80% of the surface water licence is permitted to be extracted. At the moment only a small amount of groundwater is used for irrigation of the lucerne and cultivation paddock. Stock water is pumped to a tank and troughs. Dams are also used for stock water. The water infrastructure for the stock enterprise requires improvement if the the owners want to run more stock.

There are some good access roads and tracks throughout the property as well as a homestead, training facility and sheds. There is a woolshed, sheep and cattle yards which are all in working order.

## 2. Landholder's Goals

While property plans may be based purely on the physical resources of a catchment, it is the landholder who will implement the plan. It is therefore desirable that any plan not only accounts for the physical factors within the catchment but also the aims of the landholder.

The goals of the owners on 'Trelawney' are to:

- Improve cattle grazing enterprise
- Start at least one other enterprise on 'Trelawney'
- Train young indigenous members of the community as jackaroos
- Review and improve water management
- Control erosion where required
- Improve fencing to a stock proof condition
- Improve and maintain an area of native vegetation for the indigenous flora and fauna species
- Improve the physical condition of the property

# STOCKTAKE OF RESOURCES

## 1. The Base Image and Measuring Area

You are provided with a series of satellite images on a CD or website to download and print to undertake your property mapping. These maps must be printed as an A3 size for the scale to be correct. The satellite image was taken in 2005. The north arrow is shown along with the property boundary and scale.

The scale of the photo is approximately 1:15 000. The following information in Table 1 can be used to calculate areas of paddocks or other areas on the property.

*Table 1: Area statistics*

'Trelawney' Total Area 751 ha
Scale - 1:15 000
1 cm : 150 m
1 cm square: 150 m x 150 m
1 cm square: 22,500 square metres
1 hectare = 10,000 metres square
So 1cm square = 2.25 hectares

A dot grid can also be used to calculate land areas (see Appendix III).

## 2. Contours and Drainage

Drainage lines which are indicated on the contour map using contour lines will influence the way that the property may be best managed.

The map shows contour lines, which represent areas of uniform elevation, with a constant interval in height between them. This means that where contours are spaced more closely together, the land surface is steeper, so may require conservative management to offset the potential erosion hazard.

### Key Considerations

- Drainage lines, watercourses and riparian vegetation should be retained and carefully managed. They are especially at risk of erosion if cultivated or overgrazed.
- Often these areas could benefit from revegetation and grazing management i.e. stock excluded and only crash grazed when required. Or they may already contain native vegetation that is important for biodiversity values on the property.

## 3. Current Infrastructure

*See Infrastructure map for more information.*

The infrastructure map shows the location of existing fences, gates, yards and sheds on 'Trelawney', which are important considerations when designing your management plan. While it is preferable to keep existing infrastructure to reduce the costs associated with implementing the new plan, these resources are more flexible. If the benefits of their removal or relocation are exceeded by the costs involved then consider implementation.

## 4. Land use

*See the Existing land use map for more details.*

Land use is marked on the land use map for ‘Trelawney’. Most of the property is used for grazing at the moment with native regeneration of pastures. Most of the pastures are of poor quality and could be improved. There are two paddocks at the entrance to the property which is used for irrigation of lucerne and other crops.

## 5. Water

Under the Water Reform legislation ‘Trelawney’ has a licence to extract up to 980 ML of water from the Peel River each year. Of this 5 ML is for stock and 3 ML for domestic purposes. This 8 ML is not tradable. Currently 80% of this licence can be extracted. These allocations vary from year to year depending on dam levels.

The water supply on ‘Trelawney’ consists of a number of dams and troughs across the property. With the addition of more paddocks and increased stock numbers this is an issue that will require some planning in the future.

### Key Considerations

- Although current infrastructure is useful to show, it should not be used to limit your management options. Some infrastructure (such as dams) are relatively permanent features, whereas fences and gates can be repositioned or constructed elsewhere if this best meets the management needs of the property.

## 6. Soils

*See Soils map for more information.*

Soil is the main resource upon which plant and animal production depends, so it is essential to understand the features that determine the ability of a soil to support such production, and to be resilient towards degradation. The soil map shows the extent of different soil landscapes on ‘Trelawney’, and further detail is provided below.

The names given below are not the names of the individual soil types but the names of the soil landscape which can comprise of a number of soil types. The use of soil landscapes as a mapping unit allows the combining of soil and topographic constraints (including physical features such as the high and low points of an area) into one unit so that the map can be viewed in terms of limitations for urban and rural development.

At the field day we will be identify, test and describe the soil type within the landscape at a particular point on the farm using soil pits. In addition, we will describe how these soils were formed and what advantages and limitations they may have.

### Wongo

This soil landscape is found along broad undulating low hills. It is characterised by open-woodland and grass mostly cleared for grazing and cropping. These soils are sedimentary made from sandstones, mudstones and conglomerate. Conglomerates are fragments of rocks or

pebbles cemented together by another mineral substance. These soils can be grazed or cropped but good groundcover should be maintained at all times due the limitations listed below.

The limitations of this soil landscape include:

- Localised gully erosion hazard
- Low to Moderate fertility
- Wind erosion hazard
- Highly erodible topsoils resulting in sheet and rill erosion
- Saline recharge and discharge areas

### **Oodnadatta**

This soil landscape is generally found along the gently inclined footslopes and drainage plains. The soil landscape is made up of woodland and open-woodland on land mostly cleared for agriculture.

This landscape is made of both colluvial and alluvial soils. Colluviul soils are formed by the mass movement of the soil parent material. Alluvial soils are formed by the deposition of soils along rivers and streams. These soils can be grazed or cropped using good grazing management and conservation farming practices to maintain good groundcover.

The limitations of the soil landscape include:

- High salinity recharge potential
- Localised salinity discharge zone
- Widespread sheet and wind erosion hazard
- Gully erosion hazard
- Water logging hazard
- Localised flood hazard
- Low to moderate fertility

### **Peel**

This landscape is a level plain to gently undulating plain with level and gently undulating slopes. The soils are alluvial soils which are formed by the deposition of soil parent material along rivers and streams. This soil landscape has been cleared for cropping, irrigation and grazing. These soils are highly fertile, deep self-mulching clays.

The limitations of the soil landscape include:

- Flood hazard
- Poor drainage
- Water logging
- Streambank erosion hazard
- 'Sheet erosion hazard

When describing a soil so we can identify it and determine its qualities we need to look at a number of the soils features:

- Soil Texture describes the relative proportions of sand (large particles), silt (small particles) and clay (tiny particles) in a soil. Texture indicates the ease with which a soil

can be worked and its capacity to hold water and nutrients. Texture also affects the ability of a soil to handle machinery traffic, and its susceptibility to erosion.

- Soil pH is a measure of the acidity and/or alkalinity of a soil. It is an important factor in determining the availability of nutrients and trace elements to plants. At low pH for example, nutrients such as phosphorus become deficient, while others such as aluminium become available in toxic amounts.
- Soil colour gives a good guide to the level of organic matter, the amount and state of iron in the soil, the degree of leaching and level of drainage. A red coloured soil is due to highly oxidised iron (similar to rust) and indicate good drainage and are usually found higher on ridges and upper slopes. Yellow, grey and mottled soils are indicators of less well drained soils and are usually found in lower areas and on drainage lines.
- Soil structure refers to the arrangement of soil particles, the strength of the bonding between them and the size and distribution of the pores throughout the soil. Structure plays an important role in determining the ability of a soil to absorb and to hold water and air. Also, the ease with which seedlings may emerge from and roots may penetrate the soil.
- The rate of water infiltration of soil affects the productivity of a property. The more rainfall that soaks into the ground means more water available for plant production. The rate of water infiltration also affects the amount of run-off (which may increase soil erosion) and recharge to groundwater.
- Soil salinity refers to the presence of salt in the soil. A high salt level is toxic to plants, and may cause poor pasture growth and reduced crop yield, and in extreme cases, bare patches of unproductive land.
- Soil fertility refers to the chemical, physical and biological fertility of a soil. Chemical soil fertility refers to soil pH, soil salinity and the ability of the soil to store and supply plant nutrients. Physical soil fertility refers to soil texture and structure. Biological soil fertility refers to the amount of organic matter and the ability of the soil to support biological activity.
- Soil health refers to the combination of the chemical, physical and biological fertility of a soil. A healthy soil can be defined as one that is productive and easy to manage under the intended land use. In addition, a healthy soil has biological, physical and chemical properties that promote the health of plants, animals and humans while also maintaining environmental quality.

## 7. Vegetation and Habitat Areas

*See Vegetation map for more information.*

Distribution of vegetation on the property can be observed on the aerial photo and vegetation map. Natural vegetation has been modified through clearing and a history of grazing and agriculture. Appendix IV contains a species list of weeds, trees, shrubs and grasses found on

‘Trelawney’, which may be relevant to your management planning particularly if you propose to revegetate areas of the property.

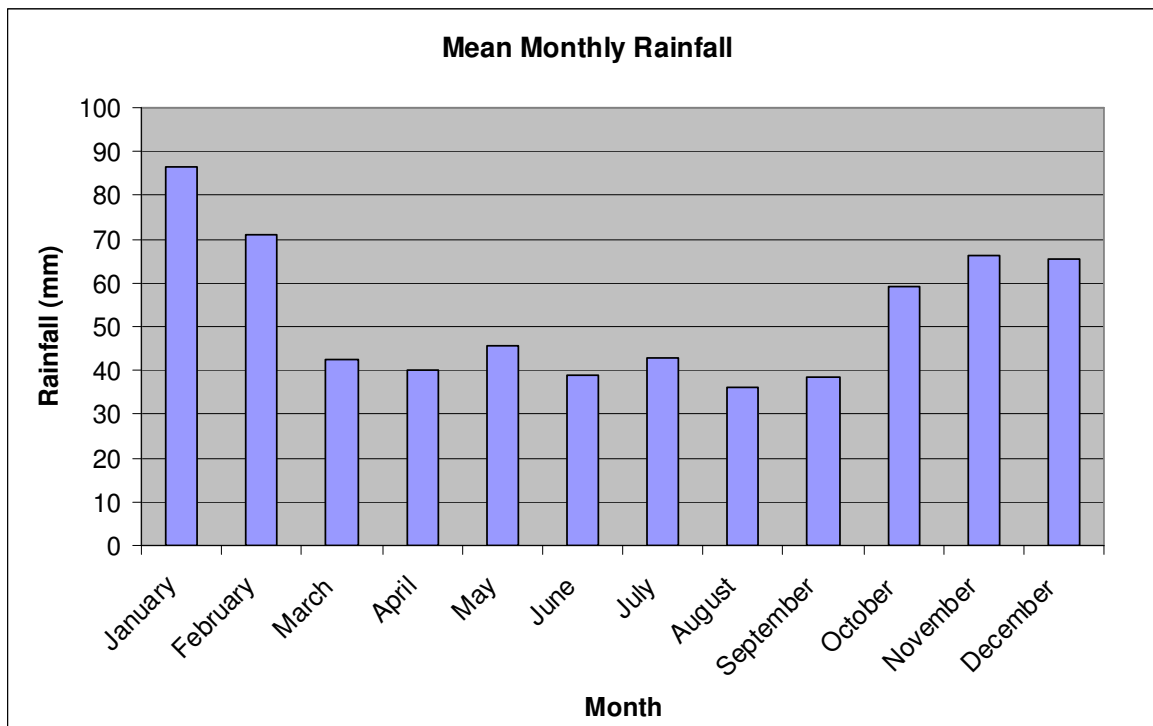
**Key Consideration:**

- Trees provide stock protection (shade and shelter), erosion control, seed source for regeneration, timber supplies (fire wood and fence posts), wildlife habitat, and farm beautification. The landholder views vegetation as a resource for their property
- Trees are deep rooted and can be used to help lower the water table and thus reduce the potential for salinity. They must, however, be placed in the correct position within the landscape to have this effect.
- In less developed country on this property, native vegetation regenerates easily when fenced from livestock. In more developed country, vegetation would have to be planted.

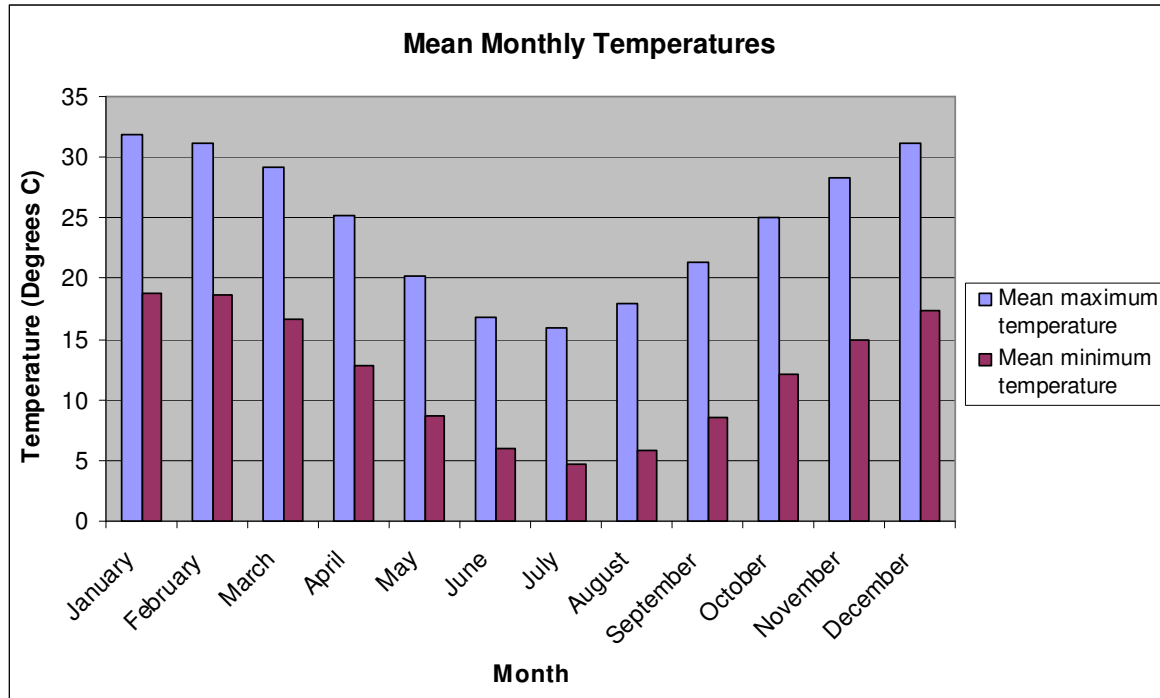
**8. Climate**

‘Trelawney’ is situated on the North West Slopes of NSW at an elevation of 300-360 meters. The property is situated in a summer rainfall zone but useful falls occur in winter and spring. The summers are hot but not extreme, the winter days are mild and nights can be cool and occasionally frosty. The average rainfall is 634mm.

Figure 1 demonstrates the average monthly rainfall over the year, and clearly shows the pattern of summer dominance.



As well as rainfall, temperature is another important determinant of plant growth and influences infiltration and evaporation dynamics. Figure 2 shows the mean monthly minimum and maximum temperatures for ‘Trelawney’.



The prevailing wind direction at ‘Trelawney’ is South Westerly in winter and North Westerly in the summer.

More climatic information is available at: [www.bom.gov.au/climate/averages/](http://www.bom.gov.au/climate/averages/)

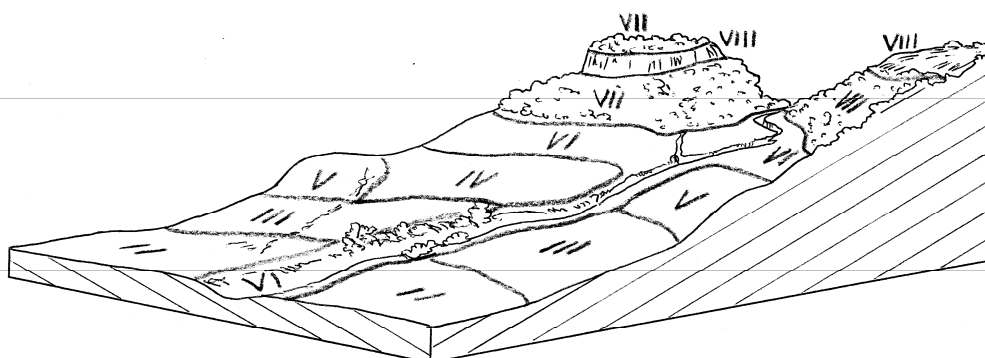
### Key Considerations

- Rainfall amount and seasonality determines the crop and pasture species that may be grown in an area and influences plant growth, erosion hazard, flooding hazard and groundwater levels.
- The amount of rainfall influences stream-flow to lower areas and groundwater levels through deep drainage.
- Temperature will affect plant growth and stock nutritional needs; management of the property needs to consider how the effect of temperature can be managed.
- Wind speed and direction influences water use by crops and pastures, and is an important consideration when determining sites for wind breaks or stock shelter areas

## 9. Land Capability Classes

*See Land use map for more information.*

Land capability describes the ability of land to sustain a type of land use without causing permanent damage. If land is used beyond its capability, the resource becomes degraded and therefore has a reduced ability to support further productivity. In NSW an eight-class system is commonly used to assess land capability. Features such as slope, soil type, and erosion risk are considered, and the most limiting factor determines the overall capability class for any land portion. The diagram below indicates typical land capability boundaries in a landscape.



The following table describes the eight class system that was used to classify land on ‘Trelawney’ (refer to land capability map), and indicates how each may be best managed to maintain its productivity and sustainability.

**Table 3: Land Capability classes**

Land class	Brief description
<b>I</b>	Best cropping soils in NSW – flat. Usually flat land that is highly fertile and is often cropped continuously. Examples include market gardening area.
<b>II</b>	Very good cropping land. Low slope with little erosion potential and good soil types. Techniques such as crop rotations and conservation farming will ensure long term sustainability of the farm environment.
<b>III</b>	Sloping cropping country that could wash and erode when ploughed. The land is also quite fertile cropping land but due to the length of slope, and perhaps the type of soil, erosion control earthworks such as contour banks should be used to control erosion. Conservation tillage techniques are recommended for Class III soils.
<b>IV</b>	Best grazing country but too fragile for regular crops - up to 2 crops in 10 years with direct drilling or minimum tillage (tined implements recommended). Keep pastures taller than 5 cm. The land may be undulating with main limitations being slope, rockiness, fertility of soil, and/or susceptibility to soil structure decline. Pasture improving, applying fertiliser and controlling grazing will maintain adequate groundcover.
<b>V</b>	As for class IV, but less capable because: <ul style="list-style-type: none"> <li>• some limitations are more significant, and/or</li> <li>• because of existing or potential erosion, and the degree of slope, may require erosion control earthworks (this is more so if the topsoil is to be exposed during cultivation).</li> </ul> Control of vermin, broadcasting of seed or aerial fertiliser application may also be necessary. There may be some waterlogging.
<b>VI</b>	Grazing land that must not be cultivated because of soils, slope, wind or water erosion hazard or rock. Requires good management such as controlled grazing or broadcast pasture improvement (often by air) for improved carrying capacity.
<b>VII</b>	Too fragile for grazing, keep trees for seed and honey. Land best left under green timber or undisturbed ground cover. The area could be a high recharge area.
<b>VIII</b>	Non farming scenic woodland or wetland - not capable of sustaining agriculture production eg. cliffs, lakes, swamps and quarries.

## Key Considerations

- Using the above information on Land Capability, consider what land use enterprise options and management are best suited to the different areas of the property.
- Current land use may exceed the land's capability. Are you going to maintain what is there or consider new enterprises or management strategies?

# MANAGING THE RESOURCES

## 1. Specific Land Use Issues

*See Landuse Hazard Map for more information*

Existing problems within the property will influence the final plan. What remedial action will be required? What enterprises and management strategies are most suited to these areas? Some of the landuse hazards within the competition property are mapped in the Land use hazards map, others and their implications are further described in Table 4, think about where these are relevant.

**Table 4: Land Use Hazards that exist within 'Trelawney'**

Land Use Issues	Points to be aware of when developing management options
Shallow soils	Soils in many areas of the property are shallow and have a high rock content. Shallow soils have: <ul style="list-style-type: none"> <li>• Low water holding capacity, which results in lower production potential.</li> <li>• Poor infiltration, so increased run-off leads to poor plant establishment and susceptibility to erosion.</li> <li>• Low fertility that results in reduced plant vigour therefore reducing plant production.</li> </ul>
Sheet and gully erosion	Areas of shallow soil, high slope, and erodible soils and those areas where groundcover is less than 70% are susceptible to sheet erosion. Natural drainage lines where water concentrates, or where water is directed off contour banks are susceptible to gully erosion Soil Erosion causes <ul style="list-style-type: none"> <li>• Loss of top soil = loss of production potential.</li> <li>• downstream siltation</li> <li>• water quality problems and degradation of the riparian zone</li> </ul> Constructed waterways also require special attention and management as these areas often have significant amounts of water flowing through them during a rain period and can erode if groundcover is not kept at a high level.
Salinity	Salt scalds are present on 'Trelawney' which is marked on the Landuse Hazard Map. Areas of bare ground are present and also salt tolerant plants growing in other areas. Vegetation must be carefully managed in these areas susceptible to prevent more area becoming scalded leading to loss of agricultural production and increased erosion. Carefully analysing piezometer data can give clues to the source of salinity and groundwater flow which will aid in developing management recommendations.
Tree decline	Several areas of the property have a relatively low tree cover % because of past clearing, loss of trees due to dieback, grazing, and competition from pastures. Tree decline can reduce agricultural production through loss of shade and shelter, as well contributing to other forms of land degradation such as erosion, salinity and waterlogging.

Land Use Issues	Points to be aware of when developing management options
Loss of perennial pasture	Reduced ground cover leading to bare areas and erosion, particularly during periods of low rainfall. Poor nutritional value of pasture species leads to low stock production.
Water quality	Current erosion along watercourses means waterways in the catchment experience high levels of turbidity (muddy water).
Weeds	Environmental weeds are those which are not listed as noxious but do pose serious environmental threats to biodiversity of the catchment.

## 2. Rainfall Use Efficiency

When rain falls, there are four paths it may take – runoff, deep drainage, transpiration or evaporation (see Table 4 below). There are a number of factors relating to the physical landscape and to management that influence what happens to rain that falls on the property.

Property management plans should aim to make the most of the rainfall that falls, that is, increase the rainfall use efficiency, reducing water losses to runoff, deep drainage and evaporation

**Table 4: Rainfall can go to the following places when it falls;**

Component	Description	% of total rainfall
Runoff	The amount of rainfall that runs off is determined by slope, groundcover, soil structure and depth to any impermeable layers in the soil profile. The steeper the slope, the easier it is for water to run. Low groundcover also makes it easier for water to run. Soils with poor structure have low infiltration rates and run water more easily. Shallow soils, even if they have good structure, fill with water and the balance runs off.	Low 4%, common 10%, high 15%+
Deep Drainage	Deep drainage is a function of soil texture and agronomy. Water is held in the soil by surface tension, capillary pressure and electromagnetic attraction. The maximum amount of water that can be held is called field capacity. Once the amount of water held in the soil exceeds field capacity, the surplus drains through the soil. If it passes beyond the plant root zone, it becomes deep drainage. Soils with coarse texture have less capacity to retain water and drain more easily. Agronomic systems that rely on stored soil water also encourage deep drainage (e.g. long fallow cropping systems).	average 2-4% high 6-8%
Evaporation/ Inefficiency	Loss from bare earth, ineffective transpiration or losses due to soil nutrient status.	Low 15%, High 60%+
Transpiration	Amount of rainfall actually required to grow grass fed to animals, crops and to form litter layer on soil surface	Balance

## 3. Legal Obligations

Many legal constraints affect the final property plan. Table 5 briefly outlines the legal constraints and their implications for the property. In addition to those listed below it may be prudent to address the Pesticides Act, the Rivers and Foreshores Act, the Environmental

Planning and Assessment Act and the Occupational Health and Safety Acts, all of which can be found at [www.legislation.nsw.gov.au](http://www.legislation.nsw.gov.au). More information can be found at relevant websites (Given in Section 6).

Table 5: Legal constraints within the Competition Property

Issue	Legal constrain
Native Vegetation Clearing	<i>Native Vegetation Act 2003</i> Clearing of native vegetation (except under routine agricultural management activities and other exemptions (OH+S)) must be approved through the vegetation management Act. Property Vegetation planning is a process that can be used to manage vegetation over a period of 15 years or more.
Threatened species	<i>Threatened Species Conservation Act 1997</i> (See Department of Environment and Conservation web page). Endangered ecological communities such as white box or yellow box are protected by this Act. An application to clear must be approved by National Parks. <i>Federal Environment Protection Biodiversity Conservation Act</i>
Protected land	<i>Soil Conservation Act 1938</i> This applies to stream banks (no native vegetation removal within 20 metres of stream bank). Also applies to lands that are steep, <i>greater than 33 %/ 18 degrees</i> Existing native vegetation must be retained and allowed to regenerate. This includes grasses as well as shrubs and trees.
Noxious weeds	<i>Noxious Weeds Act 1993</i>
Bushfire Management	<i>Rural Fires Act 1997</i> , all clearing is to be carried out in accordance with this Act.
Local Government Planning Zones	Rural Zone - Generally encourages rural pursuits within this zone, and incompatible development should be controlled
Water – farm dams	<i>Water Management Act 2000</i> Under the Water Reform legislation up to 10% of the water that falls on the property may be harvested (stored in a dam) and used for any purpose before a licence must be obtained. This is called the harvestable right. This guarantees a basic level of access to a water supply for the rural community. For more information go to <a href="http://www.dlwc.nsw.gov.au/care/water/wr/pdfs/Farm_dams_assessment_guide.pdf">http://www.dlwc.nsw.gov.au/care/water/wr/pdfs/Farm_dams_assessment_guide.pdf</a>
Water –Surface Water extraction licence	<i>Water Management Act 2000</i> Under the Water Reform legislation ‘Trelawney’ has a licence to extract up to 980 ML of water from the Peel River each year. Of this 5 ML is for stock and 3 ML for domestic purposes. This 8 ML is not tradable. Currently 80% this licence can be extracted. These allocations vary from year to year depending on dam levels.
Water – Groundwater licence	<i>Water Management Act 2000</i> Under the Water Reform legislation ‘Trelawney’ also has a licence to extract up to 192 ML of groundwater.