North Central RCS – Irrigated Land Theme Discussion Paper

Preamble – The North Central Regional Catchment Strategy (RCS) is the principle framework for land, water and biodiversity management in North Central Victoria. This discussion paper has been written to assist in the development of the North Central RCS. The discussion paper attempts to articulate our current understanding of particular issues or assets including setting priorities and will used to seek feedback and guide future direction setting in the RCS.

1. VISION:

Land and soils are managed within capability ensuring that agricultural productivity and environmental values are enhanced for future generations.

2. ASPIRATIONAL GOALS:

- A greater proportion of land in the catchment is matched with, and used, within its capability;
- Achieving sustainable land management by ensuring healthy soils, water and vegetation whilst increasing the net productivity generated from the land; and
- Ensure a culture of sustainable land management practices amongst both private and public land managers throughout the north central catchment.

3. ASSET DESCRIPTION

Land as an asset is taken to mean both the solid surface of the catchment, as well as, its underlying soils. Throughout the catchment, land provides the basis for sustaining complex environmental, social and economic activities. The catchment's soils contain a mixture of organic materials which have accumulated over a long period of time. Organic materials enable important biophysical processes to occur that are necessary for sustaining remnant native vegetation and agricultural activity. The unique topographic nature of the catchment has a significant influence on the hydrology of the region's waterways, groundwater and drainage systems.

Soil types throughout the lower catchment are diverse, ranging from red and yellow duplex soils; red friable earths; red and grey loams; pure grey, grey and red clays; grey sands and stony mottled duplex soils. The health and fertility of the catchment's soils are highly variable.

Land tenure is a legal term that defines rights of ownership relating to the use of land. The ownership of land can be seen as falling into two broad categories, "private" and "public". In terms of the lower area of the north central catchment, 90 per cent of the land is privately owned and managed in accordance with the desires and wishes of the landholder. The remaining 10 per cent of land is classified as public land and is managed and owned by the Crown in the interest of the broader community.

Land use in the lower catchment falls within three categories: irrigated agriculture, dryland agriculture and public land. Of the 714,000 ha in the Loddon Campaspe irrigation region, estimates indicate 505,000 ha of land is irrigated, dryland farming occurs on 140,000 ha of land and, public land owned by the Crown equals 79,000ha. Farming practices occurring in the region generally fall within four main categories. These being: dairying, cropping, livestock (beef and sheep), and horticulture. Dairying is by far the most dominant farm activity undertaken in the region

Lifestyle farming in the region is becoming more popular, particularly in areas close to major towns or high amenity areas such as near rivers or lakes.

4. GEOGRAPHIC AREA

The irrigation of land within the North Central catchment is largely based across the Loddon Campaspe Irrigation Region where the intensity of irrigation is greatest in the lower reaches and floodplains of the Campaspe and Loddon rivers.

The Loddon Campaspe Irrigation Region comprises the northern half of the North Central catchment and covers approximately 714,000 ha of land. The major townships in the region are Swan Hill, Kerang, Cohuna, Echuca, Rochester, Boort and Pyramid Hill. The northern boundary is the Murray River, just east of Echuca,

to Tyntynder in the north-west. From Tyntynder, the western boundary passes west of Boort and on to Serpentine in the south. From Serpentine the southern boundary crosses the Campaspe River near Rochester and again joins the Murray River east of Echuca.

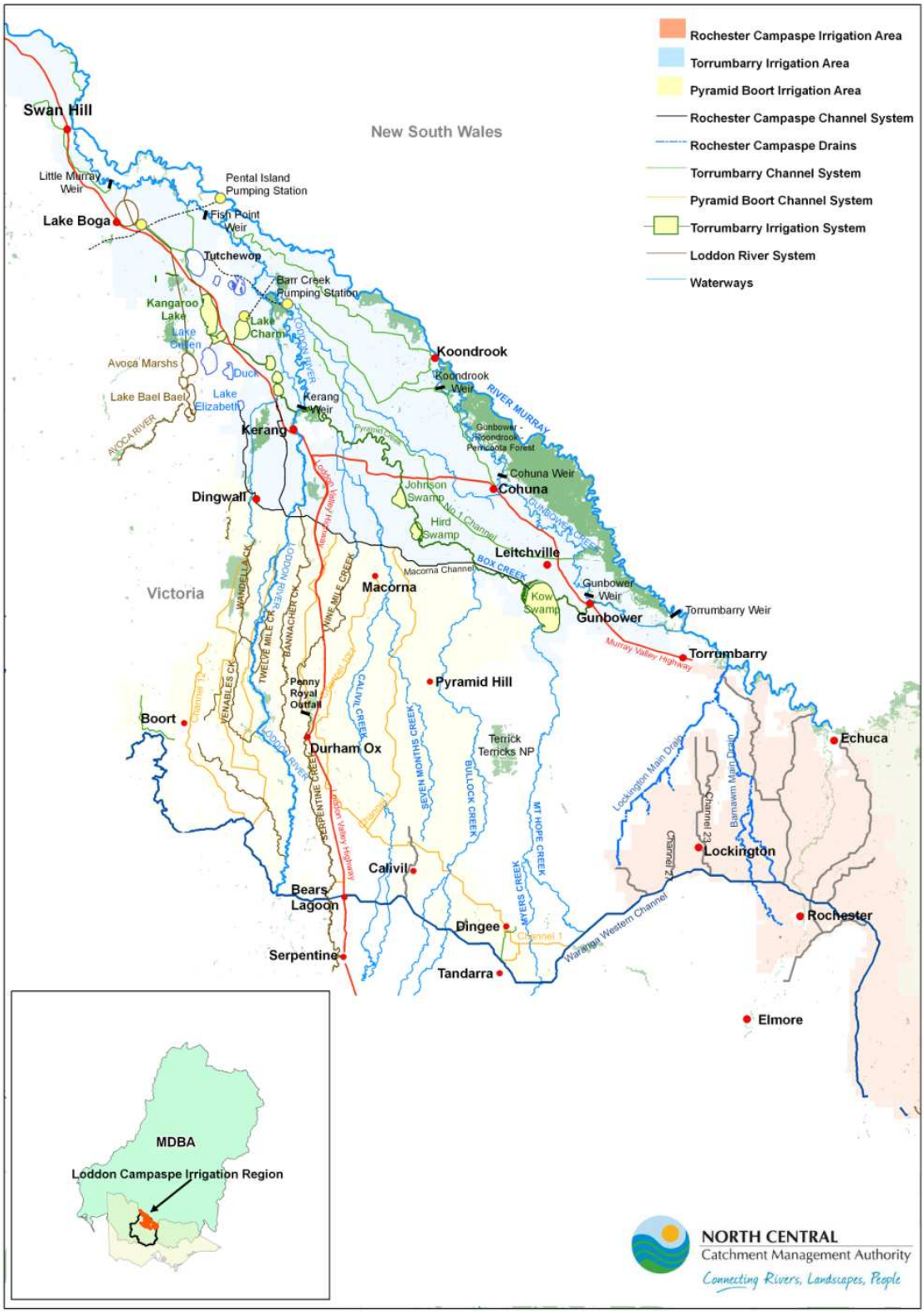

Figure 1: Geographic area of the Loddon Campaspe Irrigation Region.

5. RISKS TO IRRIGATED LAND

The primary threats to irrigated land are summarised as:

Threat	Risk
Increasing groundwater table levels	Hypersaline land discharging salt
Salinity impacts to agricultural productivity	Ongoing salinisation of productive land will reduce regional productivity and cause environmental impacts
Climate change resulting in well below or above average rainfall	Unviable farming will cause the abandonment of land
Increased flooding due to altered catchment hydrology	Prolonged inundation of land causing salinisation and waterlogging
Inappropriate drainage management	Increased waterlogging and salinisation of productive land will reduce regional productivity
Inappropriate land use change	Land use does not match land capability causing increased off site environmental impacts and reduced agricultural productivity. Increased prevalence of pest plants and animals across abandoned land.
Increasing areas of sodic soils	Waterlogging of productive land will reduce regional productivity and increase rate of wind and water erosion

A more detailed understanding of major threats to irrigated land is:

5.1 Climate variability

The ongoing uncertainty concerning climate variability presents a risk to irrigated land as less robust land use options are adopted, therefore rendering land susceptible to flood and drought impacts. More flexible and risk based approaches need to be adopted by farmers to deal with future uncertainty and provide strategies that are robust enough to cope with a range of possible climate change outcomes and variations. A drier climate into the future will probably reduce the amount of water available for irrigated agriculture. Potentially, farmers may abandon land causing a reduction in soil health and offsite impacts such as salinity and erosion. It is also possible for climate change to increase the frequency and severity of flood events. Poorly managed floodplain land could lead to increased waterlogging and salinisation. Such extreme climate events hasten the pace of change already taking place on the agricultural sector. The effects climate variability may have on irrigated land and agriculture can be quite complex and at this stage difficult to predict with any certainty.

5.2 Flood inundation

The inability to remove the headwaters of a flood and highly salt laden tail water erodes the productivity of the land, as well as, increases the amount of salt discharge into wetlands and waterways. Such an outcome threatens the area's natural assets. The establishment and ongoing maintenance of strategic regional and community surface water drainage networks is a key factor in overcoming the adverse impacts to land resulting from long periods of flood inundation.

5.3 Water logging

Inadequate on-farm drainage for irrigation water is a major cause of land salinisation which has flow on impacts that extend beyond the farm boundary. Water logging not only erodes farm productivity thus, reducing profitability, it can also cause damage to important environmental assets by decreasing water quality in rivers and wetlands as well as important public and private infrastructure. As excess water seeps into the soil profile, groundwater levels increase to threaten land in terms of reducing agricultural productivity and affecting important environmental features on the land.

5.4 Salinity impacts

For the irrigation community, salinity remains a threat to land and presents a significant challenge to landholder's ongoing productivity and, thus, their economic viability. The highly saline groundwater tables

underneath much of the irrigated catchment will ensure salinity remains an ever-present threat. The application of water to land increases groundwater tables and the mobilisation of salt throughout the catchment. It may be argued that the removal of irrigation will reduce the threat salinity posses to land. However, little is known about whether or not the removal of irrigation from areas where shallow groundwater tables exist will have a positive effect on the catchment's salt profile. It is quite probable for irrigation induced salinity to be replaced with dryland salinity as larger area of the lower catchment is transformed into dryland farms. In such areas, the issue of soil acidity may begin to emerge as a potential threat to land.

5.5 Soil sodicity

The productivity of sodic soils is extremely low. Sodic soils contain an excess of sodium. Sodium weakens the structure of clay soils resulting in particles of clay dispersing throughout the soil profile thus reducing its permeability and making land increasingly prone to waterlogging. Soil sodicity also increases the risk of secondary impacts occurring to natural assets and civic infrastructure within the Region.

5.6 Social Change

Sustainable land management practices which governments have encourage farmers to adopt during the previous decades are verging on a critical juncture. The pace of the structural change taking place within the irrigated region threatens the positive gains achieved over the previous decades in facilitating sustainable natural resource management. The median age of farmers has increased significantly across the region. This increase reflects the exodus of the younger generation from farming.

5.7 Invasive pest, plants and animals

Invasive pest, plants and animals present a significant threat to the sustainable management of irrigated land. This threat has increased as the structural adjustment taking place across the irrigated landscape intensifies. In some areas, previously irrigated land is no longer being actively managed to keep in check invasive pest, plants and animals. This presents a threat to the ongoing viability of neighbouring private and public land owners

5.8 Changing land use

The traditional pattern of land use is changing across the Loddon Campaspe Irrigation Region of northern Victoria. There is an increasing area of land within the region where water is no longer being intensively applied. As such, the irrigation delivery system is now being rationalised to improve efficiency. Outfall from a decade of drought and the recent flood events is likely to drive further changes to the established pattern of land use within the region. As the irrigation footprint reduces the area of land managed for dryland agriculture is likely to increase. The number of small scale hobby farms is expected to increase in areas within close proximity to larger towns. Such changes are likely to bring their own set of land management challenges.

6. POLICY CONTEXT

The management of land and soil across the Loddon Campaspe Irrigation Region is rapidly changing in response to recent droughts, floods and policy change. Climate variability has driven water reform to redress many of the environmental challenges of the past, including a reduction in the irrigated land footprint. Threats to land including salinity and use not matched to capability continue to be a focus of policy outcomes.

In 1988 the Victorian Government's *Salt Action: Joint Action* provided a framework for the development of salinity management plans in the region. In 2001, the Murray Darling Basin Commission released the *Basin Salinity Management Strategy* to provide accountability for salinity impacts to the River Murray.

In 2004, Victoria began to strategically reform water policy by releasing the *Our Water Our Future* initiative and so too influenced the management of irrigated land. The *Our Water Our Future* initiative encompassed the Northern Victoria Irrigation Renewal Project (NVIRP) to drive irrigation modernisation and rationalisation. The Northern Regional Sustainable Water Strategy was also released to guide sustainable water use by all users across northern Victoria.

In an effort to ensure the regional community could meet changing state and national policies, the scope and depth of planning to cover increasing land, water and environmental issues, the Loddon Campaspe Irrigation Region Land and Water Management Plan was developed in 2007 and updated in 2011.

In 2012, the Australian Government will seek to further drive water reform by finalising the Murray Darling Basin Plan.

Across regional irrigated landscapes, land use and soil health will continue to be heavily influenced by water reform outcomes. Policies relating to water reform will set the context and drive change due to the reliance of increased agricultural productivity on water.

7. COMMUNITY CONTEXT

A high value is placed on encouraging sustainable management of irrigated land by the community across the Loddon Campaspe Irrigation Region. For the most part, the Loddon Campaspe Irrigation Region community has a strong history of responding positively to the challenges which threaten the viability of irrigated land. There is a continued desire to balance the productive demands placed on irrigated land with the environmental and social values held by the boarder community. During the 1980s, the community worked together to tackle salinity which threatened their livelihood. Following the development of salinity plans, the community were involved in developing land and water management plans during the 1990s and 2000s. These community driven plans received government endorsement and continue to provide the basis for ongoing public investment in the region.

8. PRIORITY SETTING

A solid understanding of the region's assets, the threats, risks to these assets and, an awareness of the critical areas for targeted investment, is essential. Using detailed understanding of four biophysical characteristics for sustainably irrigating land, namely soil type, access to drainage, soils salinity and areas subject to inundation a map has been compiled to inform on-ground activities that will facilitate landscape change.

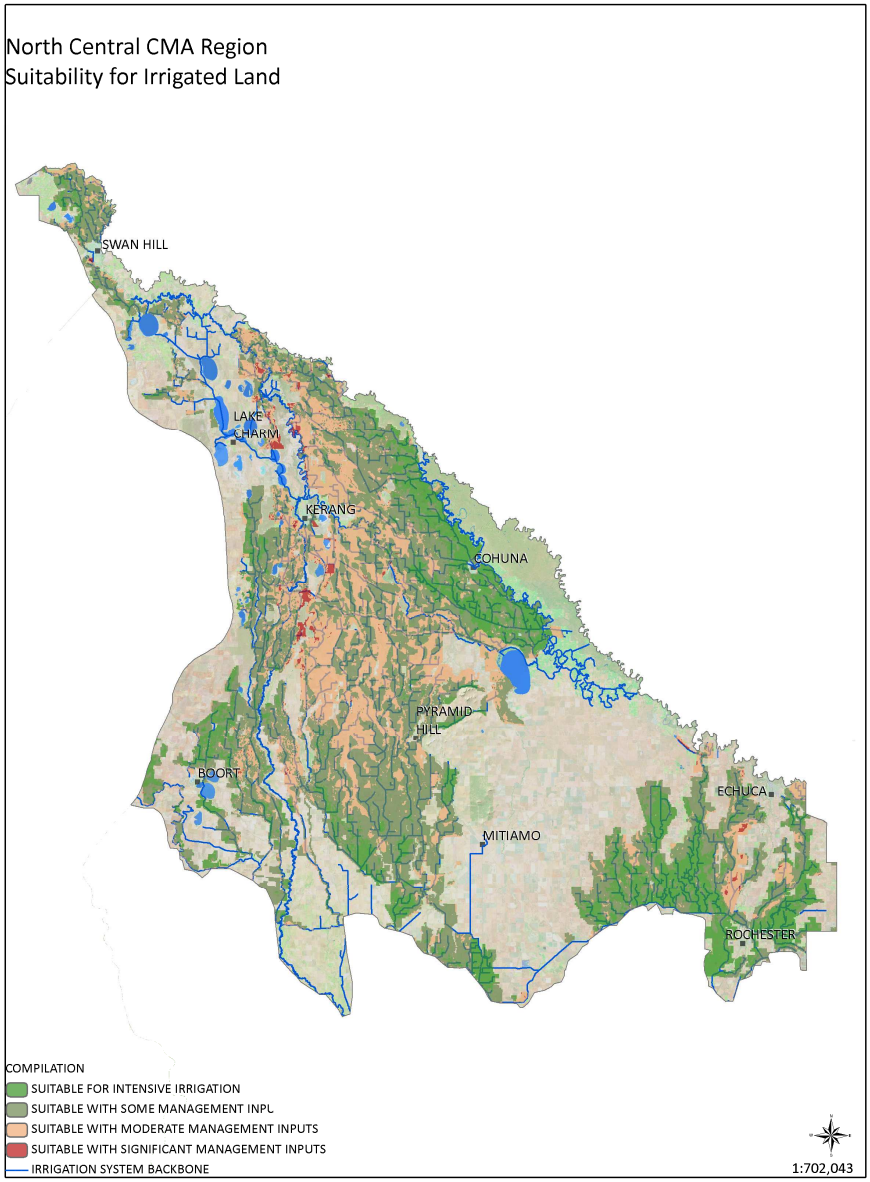

Figure 2: Suitability for irrigated agriculture in the Loddon Campaspe Irrigation Region

Figure 2 will assist in driving land and water management plan implementation, as well as irrigation system and on farm modernisation, across the Loddon Campaspe Irrigation region. The above map is an illustration of areas within the irrigation region where irrigation modernisation will deliver substantial economic, social and environmental benefits. The green areas on the above map provide an indication of where contemporary farming should be encouraged on land capable of sustaining irrigated agriculture. The soil types in these areas are more suitable for sustaining irrigation with minimal environmental impacts. The other areas on the above map illustrate where less intensive irrigation, dryland farming or land use to deliver biodiversity, amenity or carbon sequestration benefits.[1] Overall, the use of the pictorial representation can provide decision makers with a much clearer understanding of the tradeoffs that are required when developing landscape intervention priorities.

[1] For a more detailed discussion of the methodology behind the above map see Neville D. Crossman, Jeffrey D. Connor, Brett A. Bryan, David M. Summers and John Ginnivan's *Reconfiguring an Irrigation Landscape to Improve Provision of Ecosystem Services*, Socio-Economics and the Environment in Discussion, CSIRO Working Paper 2009-07, May 2009.

Irrigated land targets have been taken from the Loddon Campaspe Irrigation Region Land and Water Management Plan (Table 1).

Threat	Risk	Goal	Target
Inappropriate land use change	Land use does not match land capability causing increased off site environmental impacts and reduced agricultural productivity. Increased prevalence of pest plants and animals across abandoned land.	Implement on-farm works and measures to manage land resources wisely, improve water use efficiency and farm productivity.	By 2026, increase the area of land whole farm planned by 72,500ha.
Climate change resulting in well below or above average rainfall	Unviable farming will cause the abandonment of land		
Increasing groundwater table levels	Hypersaline land discharging salt	Land protected from salinity and waterlogging.	By 2026 reduce the area of land affected by water logging in the region by 150,000 ha (49,000 ha by improving access to drainage and 97,000 ha by implementing farm works and measures).
Inappropriate drainage management	Increased waterlogging and salinisation of productive land will reduce regional productivity		
Increased flooding due to altered catchment hydrology	Prolonged inundation of land causing salinisation and waterlogging		
Increasing areas of sodic soils	Waterlogging of productive land will reduce regional productivity and increase rate of wind and water erosion		
Salinity impacts to agricultural productivity	Ongoing salinisation of productive land will reduce regional productivity and cause environmental impacts	Land productivity increased while sustainably managing natural resources.	By 2026 increase in gross value of agriculture (GVOA) from the present net present value (NPV) of $370M to $510M.

Table 1: Irrigated Land Targets

9. KNOWLEDGE GAPS

Irrigated land management is being radically changed due to drought, recent flood events, government water policy and, the modernisation of the outdated irrigation infrastructure. Despite good intensions to account for any foreseen consequences, gaps in our knowledge still remain. As irrigated agriculture changes, the adjustment occurring to the biophysical elements throughout the landscape will continue to give rise to unexpected challenges. One of the critical gaps in our knowledge is how soil health will be affected once previously irrigated land is either less intensively irrigated or no longer irrigated. The current irrigation footprint will be reduced in size as water reform initiatives, such as the Murray Darling Basin Plan and NVIRP are implemented, and climate variation alters traditional farming practices. The change to land use will have an impact to soil health. Efforts must be undertaken to understand these threats and risks if the asset of irrigated land is to be healthy, productive and sustainable. As such, there will be an ongoing need to continually investigate and undertake research to enable knowledge gaps to be addressed.

Strategic planning requires good knowledge. To ensure the current knowledge is fit for purpose, to assist with strategic decision making and better target public investment, the development of an R&D strategy is required. The focus of such an R&D strategy should be on responding to the many challenges confronting the sustainable management of land as the region and its community transition to a future with less water to apply to the land.

10. DISCUSSION

As a physical resource, land with water provides the foundation for all environmental, social and economic activity throughout the region. The key challenge is to ensure the use and management of land is consistent with the land's capability and limitations. This understanding is vital to match appropriate land capability with land use, whilst protecting environment assets, resulting in sustainable management of the region's resources to benefit local communities.

Landholders will be encouraged to engage in profitable diverse agriculture but responsible land use practices, replacing high-input approaches with low-input natural systems. The primary drivers of land and water reform, irrigation modernisation initiatives and increasing agricultural productivity will continue to cause landscape change across irrigated land. The RCS must support local communities to manage and adapt to sustainable landscape change to ensure land use is matched to land capability.

11. RCS DIRECTION & RECOMMENDATIONS

Landholders within irrigation areas are adopting more flexible farming systems to manage risks associated with a variable climate, irrigation modernisation and rationalisation, water reform and food security. The North Central CMA in conjunction with regional partners will continue to support landholders to maintain sustainable land use by ensuring land use is consistent with the land's capability and limitations.

The implementation of the Loddon Campaspe Irrigation Region Land and Water Management Plan will be the primary mechanism to achieve sustainable land and soil management. There is a recognition that changes within irrigated agriculture will continue to be driven by water reform, irrigation modernisation and changing commodity demands.

The implementation of the Murray Darling Basin Plan will influence and shape irrigated agriculture and the management of land within the region. A key priority will be to ensure that the Basin Plan implementation is consistent with the Regional Land and Water Management Plan to ensure sustainable outcomes for the region.