RICHMOND SHIRE IRRIGATION
DEVELOPMENT OPPORTUNITY

PROSPECTUS FOR IRRIGATED AGRICULTURE.

FOREWORD

MOUNT ISA TO TOWNSVILLE ECONOMIC ZONE (MITEZ) IS THE REGIONAL DEVELOPMENT GROUP RESPONSIBLE FOR THE SEVEN SHIRES BETWEEN MOUNT ISA AND TOWNSVILLE, WHICH INCLUDES RICHMOND SHIRE IN NORTH WEST QUEENSLAND.

By supporting projects that demonstrate potential sustainable development and economic opportunity for its member shires MITEZ commissions studies designed to explore project feasibility and attract interest from potential funding partners and investors.

One such project that has been "on the books" with MITEZ for some 15 years is the irrigation and cropping potential for the mid-west shires along the Flinders River, Queensland's longest river. More specifically, a concept for diverting small percentages of water from the Flinders River to an off-stream storage at O'Connell Creek, with a possible 42,000 hectares of adjacent land in the Richmond Shire available for irrigation.

This prospectus brings together information from previous work and a number of studies carried out by Richmond Shire, designed to promote the potential for an off-stream storage concept, as well to highlight other possible options for irrigation and cropping in Richmond Shire. These proposals would work within the guidelines of the current and future Resource Operations Plans.

MITEZ believes this prospectus will be a valuable source of background information for investors, sharefarmers and potential irrigators who are looking for a new area of potential opportunities.

This document by no means has all the information required for a specific investor, but is the result of extensive work designed to assist investors to generally appreciate the irrigation potential on the mighty Flinders River and invites you to consider the prospects the mid-west shires have to offer.

David Glasson
MITEZ Chair

TABLE OF **CONTENTS**

EXECUTIVE SUMMARY

LANDHOLDERS AND COMMUNITY LEADERS IN THE RICHMOND SHIRE HAVE LONG HELD A BELIEF IN THE POTENTIAL FOR THE DEVELOPMENT OF IRRIGATED AGRICULTURE ON BLACK, CRACKING CLAY SOILS IN THE MITCHELL GRASS AND FLINDERS GRASS DOWNS ADJACENT TO THE FLINDERS RIVER, WHICH, AT A LENGTH OF 1004 KM FROM SOURCE TO SEA THROUGH NORTH QUEENSLAND AND TO THE GULF OF CARPENTARIA, IS ONE OF AUSTRALIA'S LONGEST RIVERS.

River dams, off-stream storages, and on-farm ring tanks, and non-artesian aquifers have been considered in various water-harvesting options for profitable use of both the water and land resources in the region. Small-scale irrigated cropping in Richmond has been successful, providing a useful pilot for potential crop types and market niches.

Richmond Shire, well serviced with road, rail and air transport, has a stable population, a higher than average proportion of younger workers in the 25 – 44 years of age bracket, a $36.2 million per annum economy based predominately on cattle and beef, and pursues a development strategy to reverse population decline, increasing the appeal and liveability of the district, and to promote investment potential in tourism and agricultural industries. Irrigated agriculture is an important prospect for future economic diversification.

Climate is semi-arid, hot humid summers, an annual average of 142 days above 35o C, high evaporation and dry, mild, winters. Highly seasonal average rainfall is 477 mm. The cropping season extends from early summer to the end of autumn. The modelled climate-change outlook is for a slight rainfall increase, increased temperatures and evaporation.

Gently undulating plains and downs of cracking clay soils 180 to 200 metres above sea level, underlain by Lower Cretaceous shales, mudstones, and limestones deposited 140 - 100 million years ago in shallow marine environments, now present a possible 41,000 ha of land suitable for irrigation between Richmond and Maxwelton.

Summer storms, water harvest during wet season river flows, and cropping from summer through to mid year gives Richmond a six month irrigation season, from December through to May, a strategy minimising evaporative losses and maximising water use efficiency.

Richmond investment interest has centred on the development of an off-stream surface storage infrastructure at O'Connell Creek, 25 km west of Richmond. There is also interest in a wider mosaic of irrigated cropping with individual on-farm storages, collectively forming a Flinders River agricultural precinct.

This prospectus collates available information and analysis conducted to date for investor scrutiny of opportunities for food and fibre production in North Queensland, addressing Australia's agricultural future.

INTRODUCTION

RICHMOND, AND THE OBJECTIVE OF THE PROSPECTUS.

NORTH-WEST QUEENSLAND'S RICHMOND SHIRE HAS VAST TRACTS OF LAND IN THE ROLLING DOWNS COUNTRY SUITED TO AGRICULTURAL DEVELOPMENT, WITH THE OPPORTUNITY TO MATCH AFFORDABLE LAND WITH WATER FOR IRRIGATION FROM THE FLINDERS RIVER.

With an average annual river flow in excess of 500,000 ML at Richmond, there is the potential for significant quantities of water to be available for irrigation development. This would offer welcome economic diversification for the region.

River dams, off-stream storages, and on-farm ring tanks, and non-artesian aquifers have been considered in various water-harvesting options for profitable use of both the water and land resources. Small-scale irrigated cropping has been successful.

Marked progress will only be achieved with a more determined development of infrastructure to harvest, store, and distribute water for irrigation, and to manage environmental and downstream needs.

This prospectus is a timely collation of data listing the potential, opportunities, and benefits for irrigated agriculture in the region, bringing together over a decade of preliminary assessment work. Existing gaps in knowledge, and issues for further research, can now be considered.

Further information can be obtained by contacting the Richmond Shire Council, Richmond, Queensland, and Mount Isa Townsville Economic Zone Inc in Mount Isa, Queensland.

BACKGROUND

IDENTIFY POTENTIAL IN THE FLINDERS RIVER WATER RESOURCE.

The Flinders River, with an average annual total flow of 3,800,000 ML of which a total of 80,000 ML is identified under current Queensland water resource planning for allocation for future development, is a regionally significant water resource that has attracted interest in irrigation and value-added farming for many years.

Flowing from the western side of the Great Divide to the Gulf of Carpentaria some 500 km to the northwest, the 18,900 km^2 of upstream catchment produces an annual average flow at Richmond in excess of 500,000 ML (median 270,000 ML). River flow is generated by wet season rainfall from November to March.

The Richmond Shire development agenda is to work with the Queensland Government's Gulf (Draft) Resource Operations Plan, to utilise those water resources adjacent to good quality agricultural land and to achieve economic and social growth in an economy underpinned by livestock grazing and beef production. Irrigated agriculture is seen as a key to diversifying the regional economy and achieving economic growth.

Initial assessments of agricultural development in the 1950's included the CSIRO Land Research Series – *General Report on Lands of the Leichhardt-Gilbert Area*. More recently, the Queensland Government targeted investigations through the Water Infrastructure Taskforce with assessments such as *Water Infrastructure Taskforce's Final Report to The Minister for Natural Resources, 1997*, and *An assessment of agricultural potential of soils in the Gulf region, North Queensland 1999*, in the process identifying 11 key areas with land systems and soils with potential for irrigated agricultural development.

In Richmond and along the Flinders River, sites have been examined for potential for a dam and water reservoir adjacent to land with soil types suited to irrigation. Early river flow data and landform mapping suggested potential for an off-stream storage in the vast natural land depression formed in the O'Connell Creek basin west of Richmond. This has been favoured as a practical solution to harvesting water for the district. Its feasibility, and the development of a centralised, contiguous, area of land for irrigation, was reported in the *Pre-Feasibility Report – Flinders River Off-stream Storage Scheme, Richmond, by Maunsell McIntyre (1999)* for the Queensland Department of Natural Resources. This was updated in the 2009 AECOM Australia Pty Ltd report, *Flinders River Off-Stream Storage, Pre-feasibility Scheme, Richmond Shire Council*.

Landscape and soil type for the prospective irrigation area was surveyed by the Queensland Department of Natural Resources and Mines in 1998, and subsequently in 2003 by Land Resource Assessment and Management Pty Ltd, reporting to the Richmond Shire on the *Potential for Irrigated Agriculture between Richmond and Maxwelton, North Queensland*. This assessment of soil type, suitability for irrigated farming, and likely land-based environmental impacts with irrigated farming, identified 41,650 ha of suitable soils on predominantly Mitchell and Flinders grass downs country in relative proximity to Richmond.

A moratorium on new water releases has been in place since 6th June 2003, when planning was announced for the Queensland Gulf water resources.

The Queensland Minister for Natural Resources and Water released the *Water Resource (Gulf) Plan* in November 2007. *The Gulf (Draft) Resource Operations Plan* was released in October 2008, with provision for a reserve of 80,000 ML per annum to be available for allocation to facilitate economic development and enterprise diversification along the Flinders River.

With land availability and impending water availability, there is considerable interest in the feasibility of both a larger off-stream storage, and a precinct system comprised of a number of smaller volume on-farm storages, with the likelihood that a composite regional irrigation infrastructure will be favoured, giving a critical mass for investment in an irrigation farming mosaic.

RICHMOND AT A **GLANCE**

INVESTMENT ATTRACTIVENESS.

RICHMOND SHIRE, CENTRALLY LOCATED IN QUEENSLAND'S NORTH-WEST, IS BOUNDED BY THE NEIGHBOURING SHIRES FLINDERS, MCKINLAY, WINTON, AND CROYDON.

Richmond is located on the Flinders Highway, almost halfway between Townsville and Mount Isa and is surrounded by rich black soil on open downs country of Mitchell and Flinders grasses with mineral-rich woodlands to the north. The region was first explored in the 1860's, and early settlement led to Richmond forming a significant part of the Queensland pastoral industry. Richmond provides essential services for residents and surrounding properties. The town has residential, rural-residential, and industrial land available.

Richmond Shire has a stable population of about 1,000 residents, 700 in town, a higher than average proportion of younger workers in the 25 – 44 years of age bracket, and an economy heavily dependent on agricultural production with a gross value of $36.2 million per annum (90% derived from cattle and beef, and 7% from sheep and wool). Energy supply is 66kV from the National Electricity Grid, via Townsville/Charters Towers.

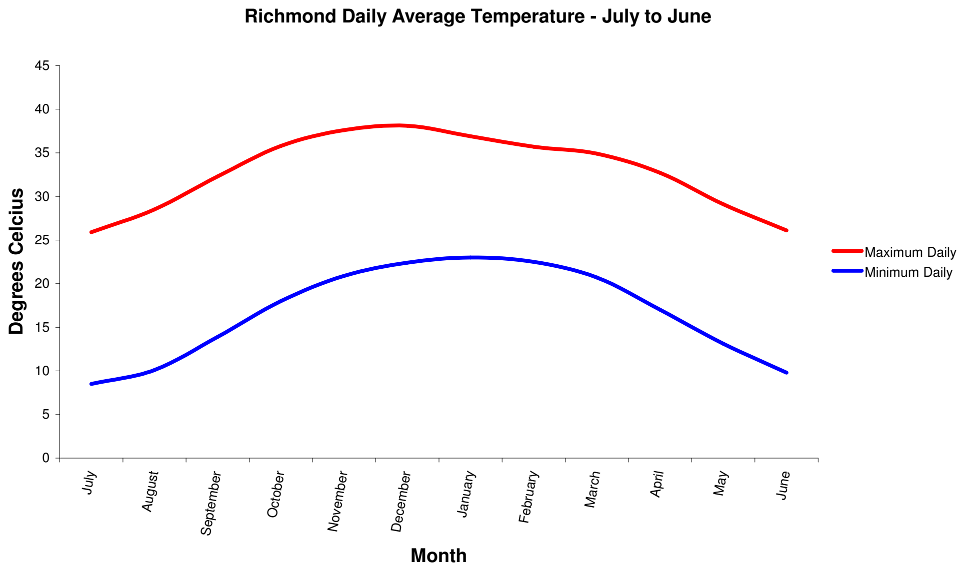
Social infrastructure includes health, housing, high-school education, public safety and transport, thrice- weekly air service, and with substantial capacity to absorb an increase in population. Dry season tourism (April-October) brings an increase into the region's economy, with the famous Kronosaurus Korner fossil museum featuring marine palaeontology, the recreational Lake Fred Tritton, annual race meetings, and the nationally renowned Richmond Field Days as notable local features.

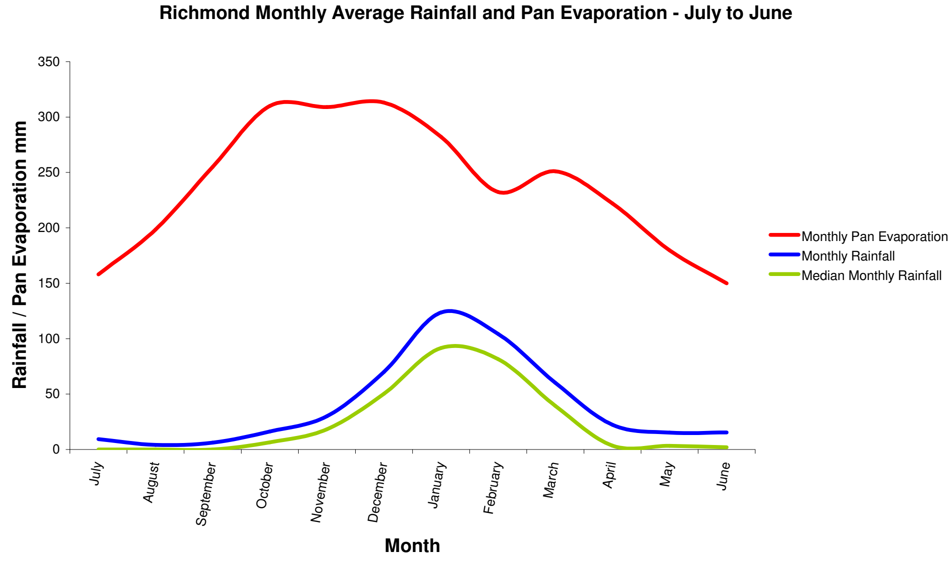
Like all neighbouring shires, Richmond pursues a strategy to arrest and reverse population decline, increasing the appeal and liveability of the district, and opening up investment potential in tourism and agricultural industries. Irrigated agriculture is an important prospect for future economic diversification. With low unemployment, Richmond is an attractive centre for workforce migration, boosting local capacity and increasing essential skills.

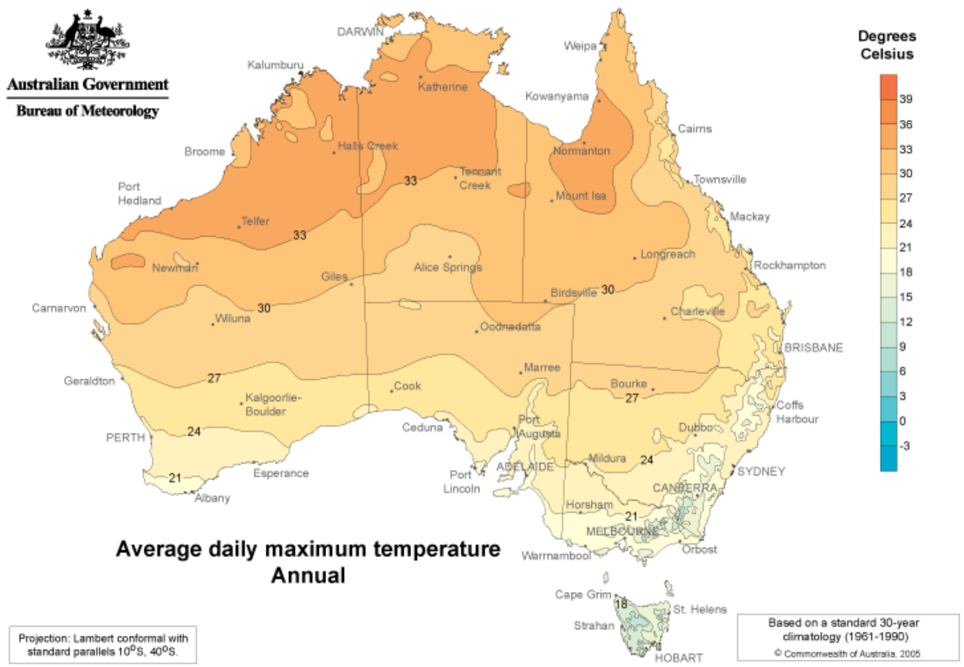
Richmond is most readily accessible to export links through the port of Townsville, 500 km to the east, and the ports of Karumba and Darwin also accessible by sealed roads (650 km and 2,000 km, respectively); Brisbane lies 1400 km to the southeast. A number of shipping lines offer freight services from Townsville to Japan, China, and South-East Asia, and direct services to Papua New Guinea.

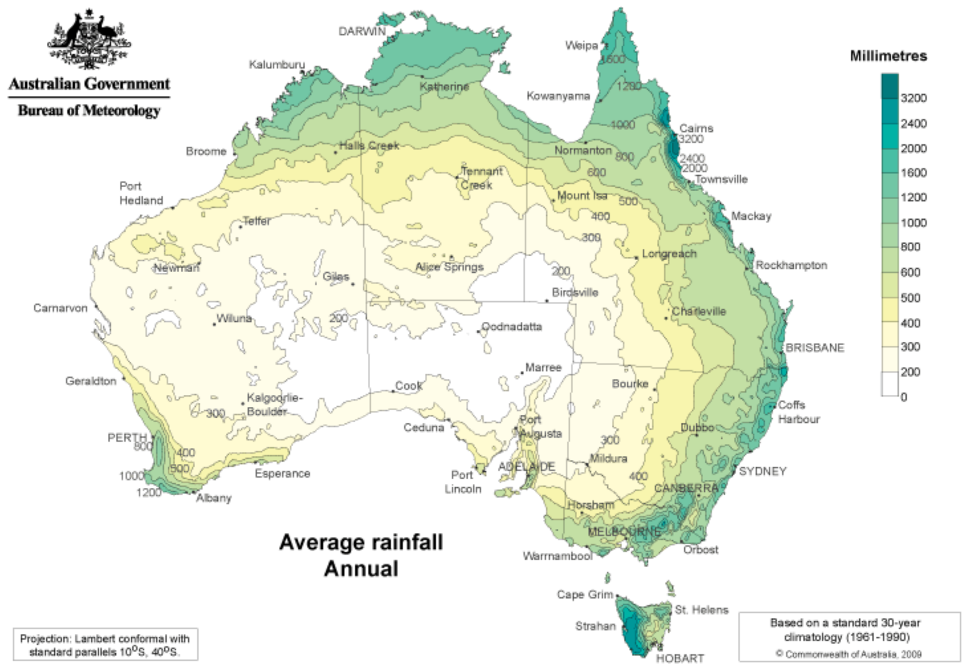
Natural resource, and agriculture research and development, is well supported at three levels. The Australian Government, through CSIRO, has provided substantial geological, soils, and ecosystem studies of the region. The Queensland Department of Employment, Economic Development, and Innovation (formerly Primary Industries and Fisheries), and the Department of Environment and Resource Management have expert knowledge of the soil, water resources, grazing industry management, and plant and animal biosecurity. Private consultancy networks deliver a high-level capacity for on-the-ground agronomic, economic, and market analysis services from regional centres in Charters Towers, Townsville, and Emerald.




Richmond Daily Average Temperature - July to June
Degrees Celcius
45
40
35
30
25
20
15
10
5
0
July
August
September
October
November
December
January
February
March
April
May
June
Month
Maximum Daily
Minimum Daily


Richmond Monthly Average Rainfall and Pan Evaporation - July to June
Rainfall / Pan Evaporation mm
350
300
250
200
150
100
50
0
July
August
September
October
November
December
January
February
March
April
May
June
Month
Monthly Pan Evaporation
Monthly Rainfall
Median Monthly Rainfall


Australian Government
Bureau of Meteorology
Degrees Celsius
39
36
33
30
27
24
21
18
15
12
9
6
3
0
-3
Average daily maximum temperature
Annual
Projection: Lambert conformal with standard parallels 10°S, 40°S.
Based on a standard 30-year climatology (1961-1990)
© Commonwealth of Australia, 2005
DARWIN
Kalumburu
Katherine
Weipa
Kowanyama
Cairns
Broome
Halls Creek
Normanton
Townsville
Port Hedland
Tennant Creek
Mount Isa
Mackay
Telfer
Longreach
Newman
Giles
Alice Springs
Rockhampton
Carnarvon
Wiluna
Birdsville
Charleville
Oodnadatta
BRISBANE
Marree
Geraldton
Cook
Bourke
Kalgoorlie-Boulder
Coffs Harbour
Ceduna
Port Augusta
Dubbo
PERTH
Esperance
Port Lincoln
ADELAIDE
Mildura
SYDNEY
Albany
CANBERRA
Horsham
MELBOURNE
Warrnambool
Orbost
Cape Grim
St. Helens
Strahan
HOBART


Australian Government
Bureau of Meteorology
Millimetres
3200
2400
2000
1600
1200
1000
800
600
500
400
300
200
0
Average rainfall
Annual
Projection: Lambert conformal with standard parallels 10°S, 40°S.
Based on a standard 30-year climatology (1961-1990)
© Commonwealth of Australia, 2009
DARWIN
Kalumburu
Katherine
Weipa
Kowanyama
Cairns
Broome
Halls Creek
Normanton
Townsville
Port Hedland
Tennant Creek
Mount Isa
Mackay
Telfer
Longreach
Newman
Giles
Alice Springs
Rockhampton
Carnarvon
Wiluna
Birdsville
Charleville
Oodnadatta
BRISBANE
Marree
Geraldton
Cook
Bourke
Kalgoorlie-Boulder
Coffs Harbour
Ceduna
Port Augusta
Dubbo
PERTH
Esperance
Port Lincoln
ADELAIDE
Mildura
SYDNEY
Albany
CANBERRA
Horsham
MELBOURNE
Warrnambool
Orbost
Cape Grim
St. Helens
Strahan
HOBART

CLIMATE

LIVING IN NORTH-WEST QUEENSLAND.

THE NORTH-WEST QUEENSLAND REGION HAS A SEMI-ARID CLIMATE WITH HOT HUMID SUMMERS AND DRY MILD WINTERS ALTHOUGH WITH THE RISK OF OCCASIONAL LIGHT FROSTS.

Summer temperatures are high, with an average of 142 days per year with a maximum above 35° C. Evaporation rates are high, peaking at 10 mm/day. Winters are cool, with a July average minimum temperature of 8.5° C; frosts may occur with 0.3 days per year recording a minimum temperature of 0°C.

Rainfall is highly seasonal. Annual average is 477 mm, ranging from 243 mm (10% decile) to 750 mm (90% decile). The majority of rain falls during the summer 'wet' season (November–March), either as heavy thunderstorms or rain depressions associated with north-western monsoons, or decaying cyclones.

In physiological terms of day-degrees and hours of sunlight/cloud-free days, the climate is well suited to agricultural production. Given the high temperatures and pan evaporation rates in spring and early summer, the cropping season logically extends from early summer storms, through late summer, to the end of autumn.

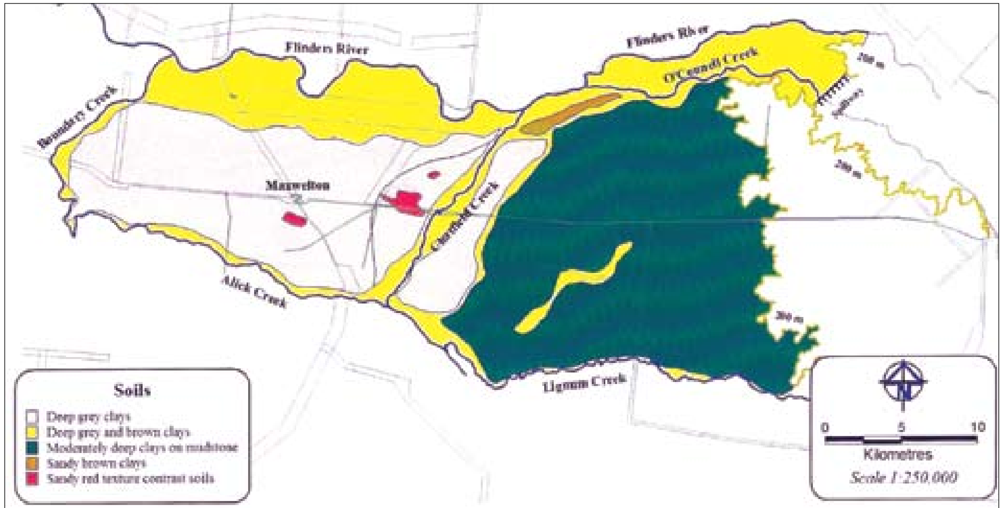
The climate-change modelled projections for Richmond through to 2030 suggest a rainfall outlook ranging from a slight decrease to a slight increase, and with temperatures and evaporation increased. The *CSIRO North Australian Sustainable Yields Report (2009)* predicts a 'possible increase' in flow conditions for the Flinders River in the climate-change outlook to 2030. Effectively, the climate is likely to remain stable, relatively unchanged for the next 20 years.

LAND & SOIL TYPE

IDENTIFIED POTENTIAL IN THE RICHMOND SHIRE.

The downs of the Richmond Shire are broad belts of flat to gently undulating plains, lying between 180 to 200 metres elevation above sea-level, and underlain by shales, mudstones, and limestones deposited in shallow marine environments in the Great Artesian Basin during the Lower Cretaceous period, some 140 - 100 million years ago. The rocks were uplifted towards the end of the Upper Cretaceous Period (about 65 million years ago), gently warped, and have been exposed to weathering and soil formation to form extensive areas of cracking clay soils.

The prospective irrigation area, reaching approximately 60 kilometres west from Richmond, and adjacent to and south of the Flinders River, is comprised of Julia, Balbirini, and Georgina landscape systems. The area is almost devoid of vegetation standing above the Mitchell grass *(Astrebla spp.)* and Flinders grass *(Iseilema spp.)* sward except for the ubiquitous woody weed, prickly acacia *(Acacia nilotica)*, which forms sporadic, dense thickets.



Source: Shields, PG (2003). Potential for irrigated agriculture between Richmond and Maxwelton, North Queensland. Land Resource Assessment and Management Pty Ltd; an unpublished soil consultant's report for the Richmond Shire Council.

The Julia land system (29,800 ha in close proximity to Richmond) consists of gently undulating plains with long even slopes between 0% and 3%. The treeless plains contain moderately deep clay soils that have developed on the Allaru Mudstone.

The Julia land system merges down-slope into the Balbirini land system (23,380 ha in close proximity to Richmond), level alluvial plains formed by deposition of sediments during prior flooding, with slopes less than 0.5%, and traversed by few shallow drainage lines. Soils are deep clays overlying unconsolidated sediments, including buried sand layers.

The Georgina land system (21,428 ha in close proximity to Richmond) consists of the active floodplain of the Flinders River and is associated with numerous braided stream channels separated by level alluvial flats and higher, gently sloping levees; it is inundated by fast-moving water in major flood events. Soils are deep clays on the flats and levee footslopes with deep sandy clays and sandy clay loams on the levees. Open eucalypt woodland vegetation is heavier than on open downs country.

The majority of prospective irrigation soils are cracking clays of the Julia and Balbirini land systems. They have self-mulching surface soils, uniform light-medium to medium clay texture through the profile, typically 1.5 to 3 metres deep, overlie mudstone, and develop deep vertical cracks when dry.

Previous soil survey work has provided very little soil chemical analytical data. The clay soils are all moderately to strongly alkaline at the surface and in the upper subsoil, with pH declining slightly in the lower subsoil and becoming mildly to moderately alkaline in the weathered bedrock.

Limited soil profile chemical analysis shows increasing salinity and electrical conductivity at depth in the moderately deep clays. As in all irrigation projects, soil salinity and groundwater levels will require careful management to ensure that irrigation practices do not contribute to a developing salinity problem.

Irrigation best-management practices would necessarily ensure optimal water delivery and scheduling, matching water availability to crop plant needs, and minimising ground water accession. Best-management practice would entail groundwater monitoring to warn of perched water tables and the potential for rising salinity.

Current land assessments maintain that the area under contention for irrigation development is not subject to acid sulphate soil issues that are more commonly found in near-coastal soils.

Under suitable management, a total of 41,650 ha of land within the proposed irrigable area would be available for irrigated cropping. Full development of this available land would require between 250,000 and 416,500 ML of water delivered to farms every year. There is clearly much more suitable land available for irrigated cropping than there is water currently available. Investment will target development of smaller areas with the likelihood that irrigation will be based on mosaics of the highest quality land, better suited to irrigated cropping.

SOIL	LAND SYSTEM	SOIL CLASSIFICATION	BRIEF DESCRIPTION	AREA	
				HA	%
Moderately deep clays on mudstone	Julia	Self-mulching Grey and Brown Vertosols	Grey and brown cracking clays with thin self mulching surface; overlying weathered mudstone at 0.75 – 1.25 m; moderately to strongly alkaline at the surface and upper subsoil, declining in lower subsoil, becoming mildly to moderately alkaline at depth; highly saline at depth; ESP range low to high	29,800	39.9
Deep grey clays	Balbirini	Self-mulching, Grey Vertosols	Dark grey cracking clays with a thin self mulching surface overlying buried clay and sandy layers below 1.0 m; mildly to strongly alkaline at the surface, increasing to slightly to strongly alkaline in the subsoil but lessening to become slightly alkaline in the buried layers below; saline at depth; ESP range low to high, high at depth	23,020	30.9
Sandy red texture contrast soils	Balbirini	Red Chromosols	Thick grey to brown sandy loam abruptly overlying red sandy light clay subsoil at 0.7 to 0.9 m; neutral pH in surface layer, subsurface and subsoil slightly acid to neutral in buried layers	360	0.5
Deep grey and brown clays	Georgina	Self-mulching, Grey and Brown Vertosols	Grey and brown cracking clays with a thin, weak self-mulching surface; overlooking buried clay and sandy layers below 1.0 m, scalds are common; moderately to strongly alkaline throughout the profile and the buried layers; salinity medium to high at depth; ESP range low to high, high at depth	20,980	28.1
Sandy brown clays	Georgina	Brown Dermasols	Brown sandy clays with a very thin surface crust; overlying buried layers below 0.7 m; slightly acid to neutral at surface, neutral in subsoil and buried layers	440	0.6
TOTAL				**74,600**	**100**

PRINCIPAL SOILS WITHIN THE POTENTIAL RICHMOND – RICHMOND/MAXWELTON PROPOSED IRRIGATION AREA SURVEYED BY SHIELDS (2003)

Source: adapted from Shields, PG (2003). Potential for irrigated agriculture between Richmond and Maxwelton, North Queensland.; an unpublished report for the Richmond Shire Council. Chemical range data based on 3 to 6 samples only.

PROPOSED IRRIGATION SEASON

STRATEGY FOR IRRIGATED CROPPING IN SUMMER.

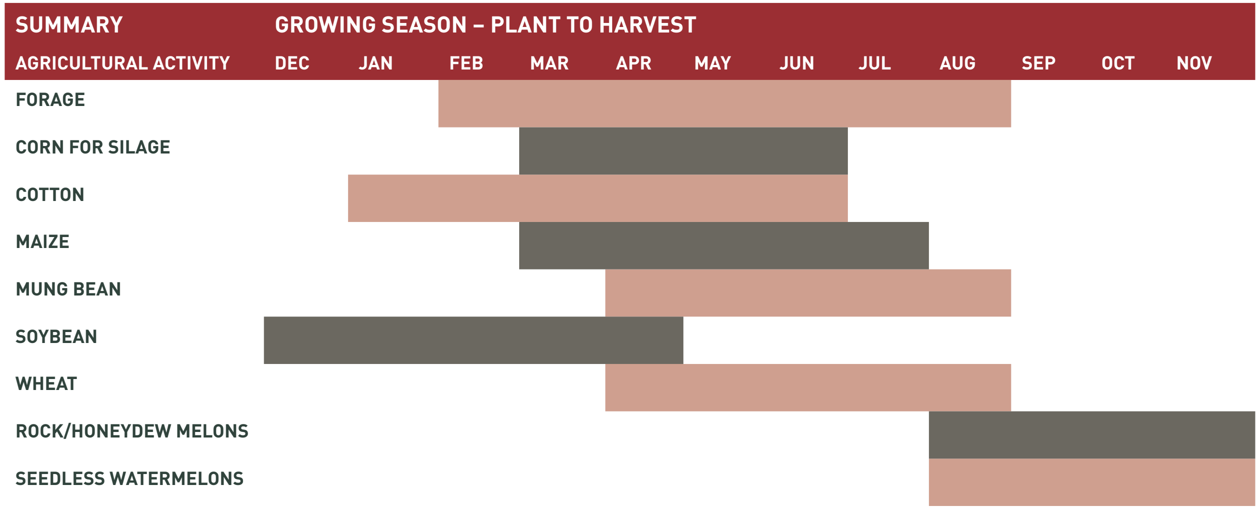
SUMMER STORMS, WATER HARVEST AND CAPTURE DURING WET SEASON RIVER FLOWS, AND CROPPING FROM SUMMER THROUGH TO MID-YEAR GIVES RICHMOND A SIX MONTH WINDOW FOR AN IRRIGATION SEASON, FROM DECEMBER THROUGH TO MAY.

Daytime temperature and daily evapotranspiration rate is decreasing, and plant daily water requirement is slightly reduced compared with peak summer and dry season conditions.

Such a strategy for the bulk of irrigated cropping in summer and autumn avoids attempting to carry surface storage water through to the end of year dry season where higher evaporation losses are incurred. Reducing overall evaporation losses improves the water-use efficiency for the irrigation scheme. The water storage may dry out during summer without detriment to cropping or infrastructure, although it could preclude pre-season watering.

AMPLE LAND

WHAT CROPS?



Source: local grower experience. Indicative cropping season profile for Richmond for irrigated forage, broadacre, and horticulture fresh market products. The bars indicate the period from planting to harvest.

The gross regional product for Richmond currently depends heavily on grazing for beef and, to lesser extent, wool. Private investment in water harvesting and storage infrastructure has targeted irrigated hay, forage and silage production for cattle fattening. Irrigated cropping has produced profitable crops of cotton and maize and test-market quantities of fresh-market melons. Valuable local experience provides a sound benchmark for the summer/autumn cropping season and for crop water requirements.

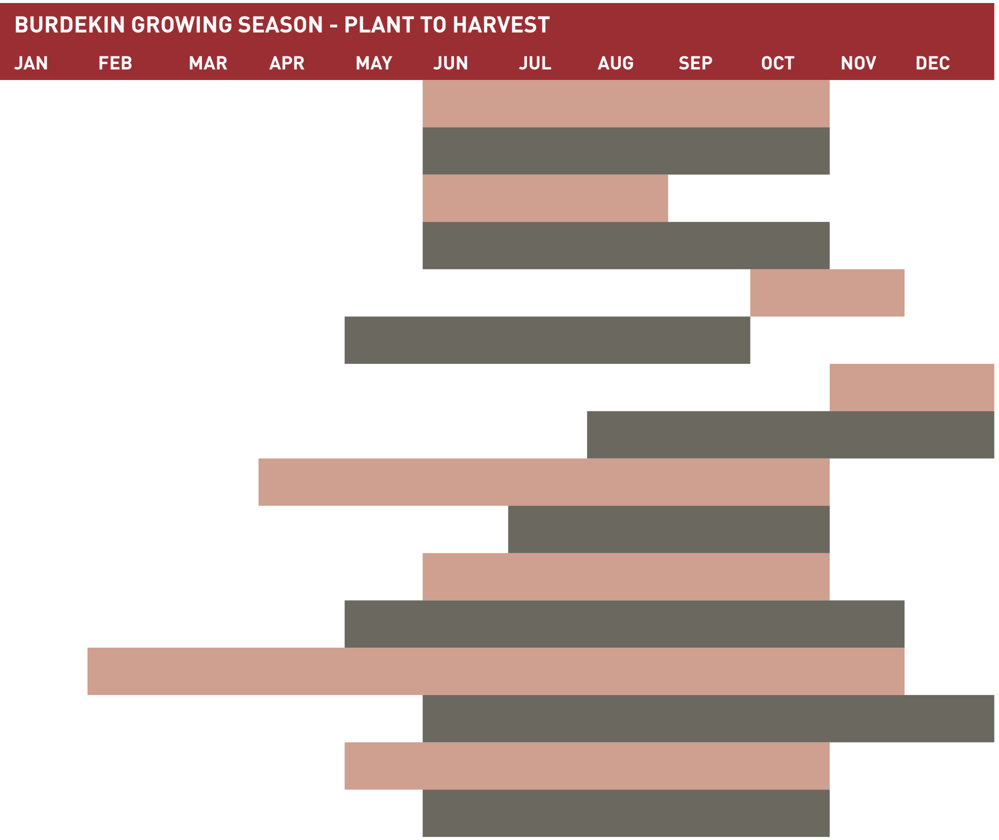
The prospect for irrigated agriculture in Richmond is for a lower climate-change risk than that for southern Australia. In any case, there is unlikely to be any significant impacts from climatic change over the Richmond area for at least the next 30 years. The region's high temperatures and incident solar radiation translate into favourable day-degree scenarios for crop production in the irrigated growing season. Low humidity and cool temperatures during autumn and winter have proven to reduce pest pressure and lessen insecticide dependence.

For fresh-market cropping, the focus for a competitive irrigated product should be on a counter-season or early season production to capture market advantages. Successful horticultural industries have been established under irrigation within the semi-arid tropics at Kununurra in Western Australia and at Emerald in Queensland. Vegetables are grown elsewhere in Queensland on irrigated cracking clays on the Darling Downs.

Recent trends in the cattle industry make hay production from sown pastures for local use in feedlots and attractive option. The UN and FAO have identified beef products as a significant area for growth over the next 50 years, particularly in South East Asia, driven by both population growth and rising income levels. This will continue as a key market driver for northern Australian beef products. Furthermore, predictions for the beef market suggest significant constraints in production growth in the medium term, pushing up real prices. This may mean opportunities for further intensification with feedlots, irrigated fodder, and opportunities for processing and moving beyond live cattle exports.

SUMMARY

AGRICULTURAL ACTIVITY	AREA (HA)	Volume Sold	Gross Revenue ($)
BEAN (FRESH)	800 TONNES	9,611	$12,456,000
CAPSICUM	130 TONNES	3,744	$7,020,000
COTTON	760 TONNES	5,320	$2,282,280
EGGPLANT	100 TONNES	5,000	$10,000,000
GRAPE (TABLE)	50 TONNES	868	$2,500,000
PUMPKIN	700 TONNES	8,400	$5,628,000
MANGO	1,500 TONNES	22,050	$50,715,000
MAIZE	3,000 TONNES	22,500	$6,750,000
MUNG BEAN	400 TONNES	500	$430,500
NAVY BEAN	350 TONNES	525	$472,500
ROCK/HONEYDEW MELON	400 TONNES	17,857	$15,810,000
SOYBEAN	2,000 TONNES	5,000	$2,500,000
SWEET CORN	800 TONNES	11,111	$11,064,000
SUGAR	83,815 TONNES	8,225,065	$254,170,957
WATERMELON	340 TONNES	12,750	$10,200,000
ZUCCHINI	100 TONNES	1,600	$3,842,000



Agricultural production profile for the lower Burdekin region, North Queensland dry tropics. In 2007-08, more than 95,000 ha irrigated cropping in the North and South Burdekin Water Board Areas, and the Burdekin River Irrigation Area, were supplied from the Burdekin River dam. The range of commodities indicates potential market niches for further dry-tropics irrigation.

The profile for irrigated cropping and production in the Burdekin – Bowen dry tropics, an area of similar latitude to Richmond, illustrates a range of cropping possibilities and seasons. In the case of the Lower Burdekin, irrigation water supply is more reliable, available year round, and summer temperatures and evaporation are lower than in the north-western inland. While significant livestock production occurs, there is minimal reliance on irrigated forage, with the major focus on sugar cane and vegetables as the dominant crops.

Despite Burdekin irrigated agriculture enjoying year-round water supply and more seasonal flexibility, and being likely to achieve a higher critical mass for market access than neighbouring areas, the scope of irrigated crop production and market availability here suggests high-value crop product niches that can be considered for irrigated agriculture ventures in other dry-tropics areas.


JOHN DEERE
9660STS


6

RELEVANT PRODUCTS	RELATIVE COMPARATIVE ADVANTAGE INDEX	TREND IN EXPORT GROWTH RELATIVE TO WORLD TRADE
BULK COMMODITIES		
EDIBLE NUTS (FRESH/DRIED)	1,593	Relatively quick world trade growth and gains in Australia's market share.
DRIED CITRUS	145	
MANGO (FRESH/DRIED)	136	Slow world trade growth and losses in Australia's market share.
GRAIN SORGHUM	196	
MINIMALLY TRANSFORMED		
BOVINE CUTS (FROZEN)	2,595	Relatively quick world trade growth and gains in Australia's market share.
BOVINE OFFAL (FROZEN)	1,286	
MAIZE (CORN) FLOUR	124	
RICE AND RICE FLOUR	310 and 394	Slow world trade growth and losses in Australia's market share.
CANE MOLASSES	603	
BOVINE CARCASES (FROZEN)	107	
SUBSTANTIALLY TRANSFORMED		
BEAN (DRIED AND SHELLED)	523	Relatively quick world trade growth and gains in Australia's market share.
TOMATO JUICE	181	
POTATO (FROZEN)	203	Increases in Australia market share of a slowing or contracting market.
CITRUS-BASED JAMS	371	
OTHER FROZEN VEGETABLE (E.G. CAPSICUM)	108	Slow world trade growth and losses in Australia's market share.
FRUIT MIXES (PREPARED/PRESERVED)	287	
SINGLE FRUIT AND VEGETABLE JUICES	151	Growth in the world market, but slower growth in Australian exports (oppotunity to capture market share if costs can be lowered).

Potential comparative advantage analysis for agricultural exports from North Queensland Burdekin catchment region using Relevant Products Relative Comparative Advantage Index score, a proxy measure of international competitiveness based on key commodity import and export trends over time. Score of greater than 100 shows relative competitive advantage.

– Significant export growth opportunity with world trade increasing and Australia gaining market share.

– Limited export growth oppurtunities with world trade growth slowing and Australian market share decreasing, or Australian increasing market share in a slow or contracting market.

A further guide on potential market niches, and where North Queensland dry tropics might enjoy a comparative advantage, can be seen in the following analysis on commodity competitiveness for the Burdekin region. The derived comparative advantage score based on trends in the shift in world trade and Australia's share in that trade is significant, as in recent years Australia has been experiencing a decline in competitiveness across much of the agricultural export sector.

Commodities with a significant export growth opportunity under increasing world trade and Australia gaining market share are listed in the accompanying table as having strong trends for export growth; those thought to have limited export growth opportunities with world trade growth slowing and Australian share decreasing, or with Australia increasing market share in a slowing or contracting market, are listed as having 'weak export growth'.

Overall, market conditions are likely to be less of a constraint on future Australian agricultural exports than the need to increase productivity in the face of changing climatic conditions. Production system research, the ability to put technological and management advances into practice, and the ability to adjust farming enterprises to meet the challenges arising from the changing physical and market environments are all likely to be key elements in adaptation for sustainable cropping, very relevant to the Northern Australian dry tropics.

Source: Marsden Jacob and Associates analysis for Queensland Department of Environment and Resource Management, based on Short C., Chester, C. and Berry, C. (2006), Australian Food Industry Performance and Competitiveness. Reproduced with permission of Queensland Deparment of Environment and Resource Management.

WATER INFRASTRUCTURE REQUIREMENTS

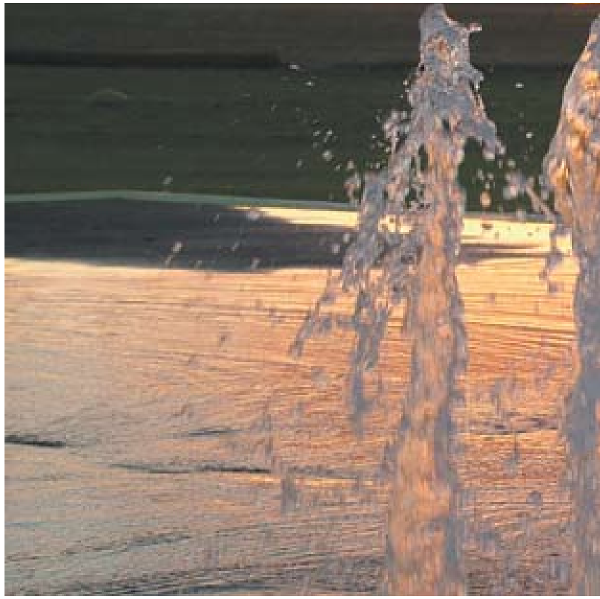
VISION FOR A CENTRALISED IRRIGATION SCHEME.

WATER SUPPLY, DEMAND MANAGEMENT, AND IMPACT MINIMIZATION FOR THE PROPOSED IRRIGATION SCHEME DEVELOPMENT WILL BE ADDRESSED IN ACCORDANCE WITH THE GULF (DRAFT) RESOURCE OPERATIONS PLAN.

Richmond's vision for a centralised irrigation scheme is centred on the appeal of a single, large, storage, and a known quantity of water available for allocation at the onset of the growing season to enable management of risk and to build market confidence. A central scheme will also bring a critical mass and confidence for irrigation investment. Adequate storage infrastructure is required to achieve this. Off-stream storage has been favoured as an option.

A natural basin on O'Connell Creek, a southern tributary of the Flinders River 25km west of the Richmond, assessed as potentially holding up to 190,000 ML has been suggested as suitable for off-stream storage. Such a scheme would require a diversion weir to be constructed on the Flinders River, with a regulated portion of river flow harvested for storage, together with a dam wall and spillway on O'Connell Creek returning excess water to the Flinders River, downstream of the diversion. A system of supply channels would be required to convey water by gravity to irrigation farmland.

The feasibility of such a scheme will be determined by the volume of water available for allocation, the geo-technical suitability of the area, and the construction method. Richmond Shire has commissioned investigations into the possible engineering requirements for such a scheme, Maunsell McIntyre 1999, and AECOM 2009. Queensland Department of Environment and Resource Management 2010 have also reviewed the engineering design and economic outlook.



Alternative options exist, with the possible parallel development of a series of on-farm ring tanks for surface off-stream storage on a smaller scale, with water lifted by pumping during peak river flows. The on-farm storage approach favours the concept of an irrigated agricultural precinct where cropping is located on smaller pockets of soil as a mosaic, a design anticipated to minimise the impact of irrigation on the environment. This approach has been considered by Richmond Shire and the neighbouring Flinders and McKinlay Shires.

Aquifer water, if available in sufficient supply, would overcome the higher evaporation losses from surface water storages. The current assessment puts the available aquifers in the Richmond Shire at too small a quantity to enable any significant water resource to be developed.

Aquifer depletion would risk impacting on stream replenishment flows, important for the hydrology of the year-round flow of northern rivers. Current policy requires that the seamless interconnection between aquifer and surface water flow be maintained.

WATER ALLOCATION PROCESS

DEALING WITH AVAILABLE AND UNALLOCATED WATER MENTIONED IN SECTION 28 OF THE QUEENSLAND WATER RESOURCE (GULF PLAN).

Under the *Water Resource (Gulf) Plan*, unallocated water reserves of 80,000 ML (General Reserve) and 20,000 ML (Strategic Reserve) are identified for the Flinders catchment.

The community will be advised via a series of information sessions of the process for the release of unallocated water once the Resource Operations Plan is finalised. This may involve expressions of interest.

Under the *Gulf (Draft) Resource Operations Plan* an application for unallocated water where the water is proposed to be used for irrigation must be accompanied by information that demonstrates the potential suitability of the land for irrigation with consideration of the following matters:

- availability of land without remnant vegetation
- occurrence of ecological assets/high value environmental features
- suitability of topography
- known cultural heritage sites
- soil attributes including salinity, sodicity and drainage concerns.

Applications will then be handled under a process for the release of the unallocated water from the reserves.

It should be noted that water will be available across the entire Flinders catchment, from Hughenden in the east to Cloncurry in the west through to the end of the system where it enters the Gulf approximately 500 km to the north.

ENVIRONMENTAL AND CULTURAL REQUIREMENTS

ENVIRONMENTAL AND OTHER REGULATORY LEGISLATION REQUIREMENTS.

For the development of the off-stream storage to proceed, proponents will address environmental and other regulatory legislation requirements in conjunction with the Richmond Shire. Any determination on these matters can only be made against a specific development proposal and will require assessment under the following legislation:

- Environmental river flows required in the *Gulf (Draft) Resource Operations Plan* (refer section 12)
- *Queensland Government Vegetation Management Act*
- *Australian Government Environmental Protection, Biodiversity and Conservation Act (2009)* requirements for threatened ecosystems
- Cultural heritage legislation.

The *Environmental Protection, Biodiversity and Conservation Act (1999)*, in the absence of State legislation, will be a significant guiding influence on how and what development can take place.

QUEENSLAND VEGETATION MANAGEMENT ACT 1999

Queensland's vegetation management framework regulates the clearing of native vegetation. It protects the State's biodiversity, and by conserving native vegetation, addresses land degradation problems such as salinity, soil degradation, erosion and declining water quality.

Grassland vegetation regional ecosystems (RE) are managed under regulations Schedule 4 (permit approval required) and Schedule 5 (no permit required) where land development will entail clearing of vegetation.

Vegetation in the Richmond/Maxwelton landscape falls predominately into the following categories:

Schedule 5 – least concern, permit not required

- RE 2.3.3 Mitchell Grass grassland on plains of cracking clays
- RE 4.9.1 grassland on cretaceous sediments
- RE 4.3.14 grassland on alluvium

There are some small areas, close to water courses, that would require assessment prior to development under the regulation

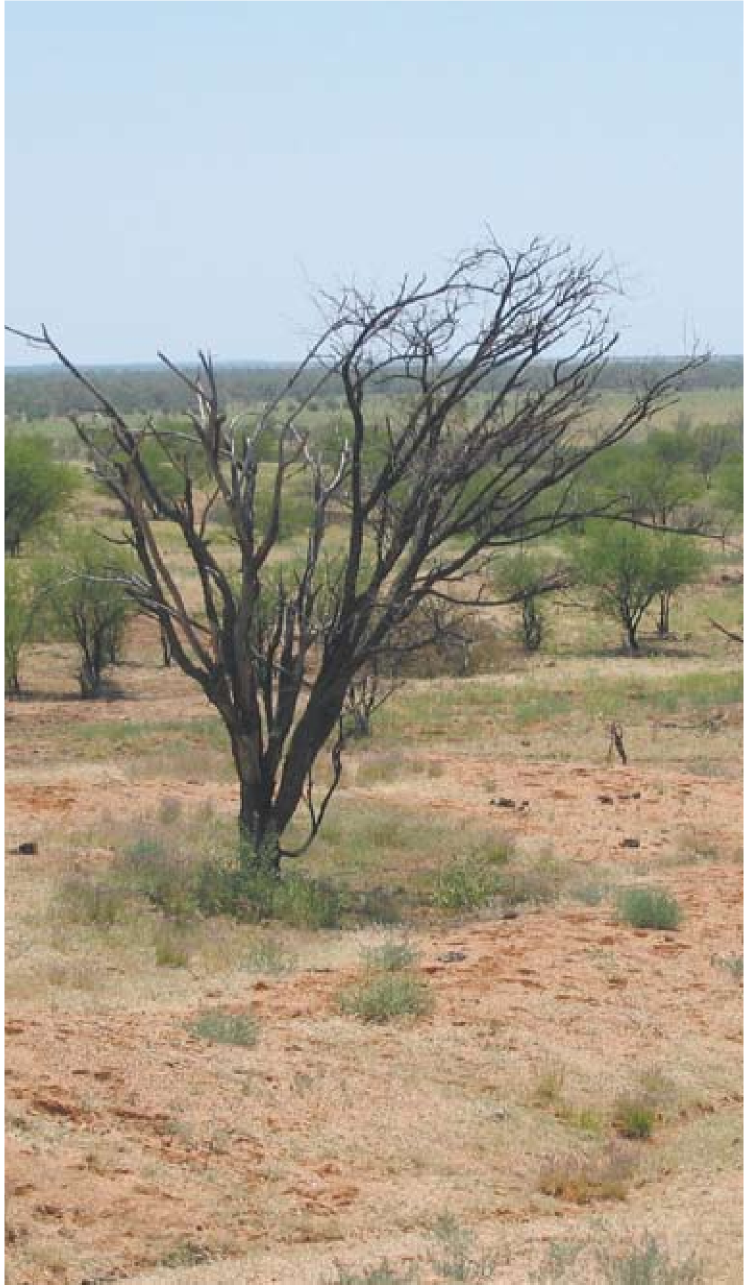
Schedule 4 – permit required before clearing:

- RE 4.9.7 grassland wooded with Acacia spp and Atalaya sp on cretaceous sediments

Any development proposal within this regional ecosystem would be subject to a code-based assessment by the relevant State authority to determine the level of development that can occur.

In all, this represents a likely low level of vegetation management issue for the proposed area of interest for irrigation development.

Details of the study area considered for Richmond Flinders River irrigation can be seen in the following 1:250,000 scale maps, showing the geographic location, surface relief, and land zone, soil, agricultural suitability, and regional ecosystem classification as determined under the Australian biophysical zoning conventions.

Richmond Shire Irrigation Development Opportunity

March 2010

Satellite Basemap

N

1:250,000 (A4)

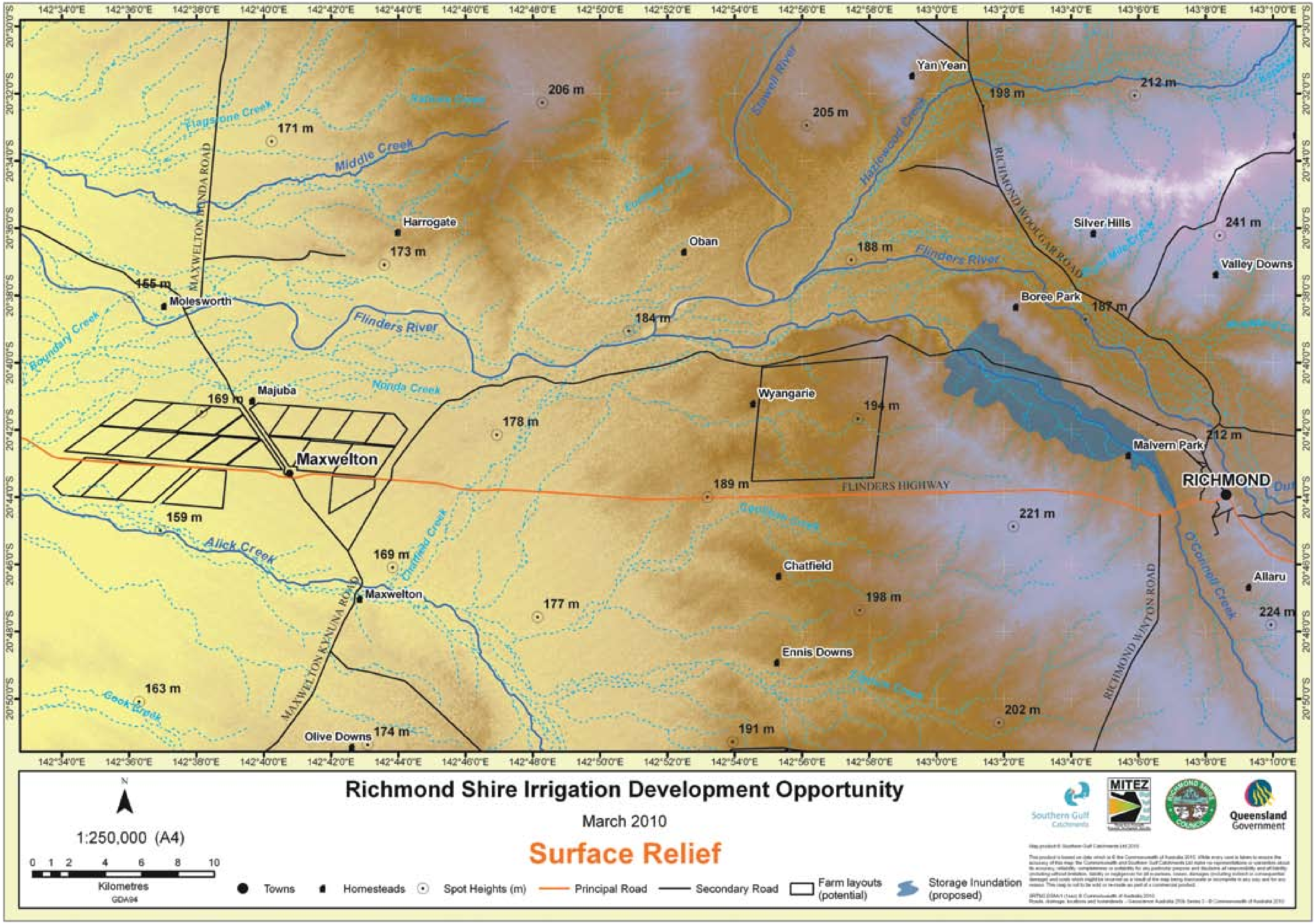
0 1 2 4 6 8 10

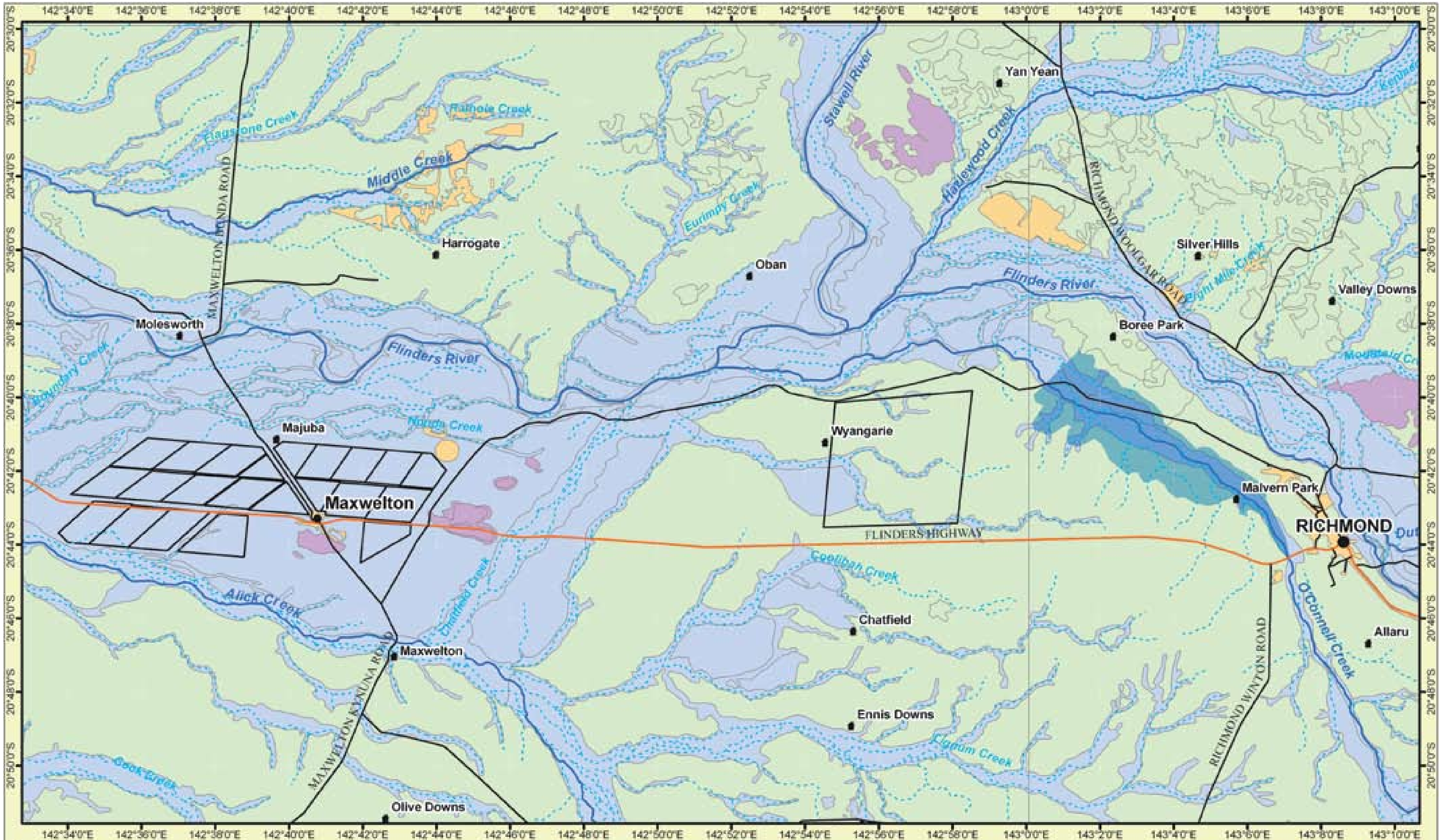
Kilometres

GDA94

Towns | Homesteads | Principal Road | Secondary Road | Farm layouts (potential) | DCDB | Storage Inundation (proposed)

Southern Gulf Catchments | MITEZ | Queensland Government


Richmond Shire Irrigation Development Opportunity
March 2010
Surface Relief
1:250,000 (A4)
0 1 2 4 6 8 10
Kilometres
GDA94
Towns
Homesteads
Spot Heights (m)
Principal Road
Secondary Road
Farm layouts (potential)
Storage Inundation (proposed)
Southern Gulf Catchments
MITEZ
Queensland Government
Maxwelton
RICHMOND
Yan Yean
Harrogate
Oban
Molesworth
Majuba
Wyangarie
Silver Hills
Valley Downs
Boree Park
Malvern Park
Chatfield
Ennis Downs
Allaru
Olive Downs
Flinders River
Middle Creek
Flagstone Creek
Alick Creek
Nonda Creek
Boundary Creek
Chatfield Creek
Gook Creek
Stawell River
Hazlewood Creek
O'Connell Creek
FLINDERS HIGHWAY
MAXWELTON JULIA ROAD
MAXWELTON KYNUNA ROAD
RICHMOND WOOLGAR ROAD
RICHMOND WINTON ROAD
206 m
171 m
205 m
198 m
212 m
241 m
173 m
188 m
155 m
184 m
187 m
169 m
178 m
194 m
212 m
189 m
159 m
221 m
169 m
198 m
177 m
224 m
163 m
202 m
191 m
174 m



Richmond Shire Irrigation Development Opportunity

March 2010

Landzones

N

1:250,000 (A4)

0 1 2 4 6 8 10

Kilometres

GDA94

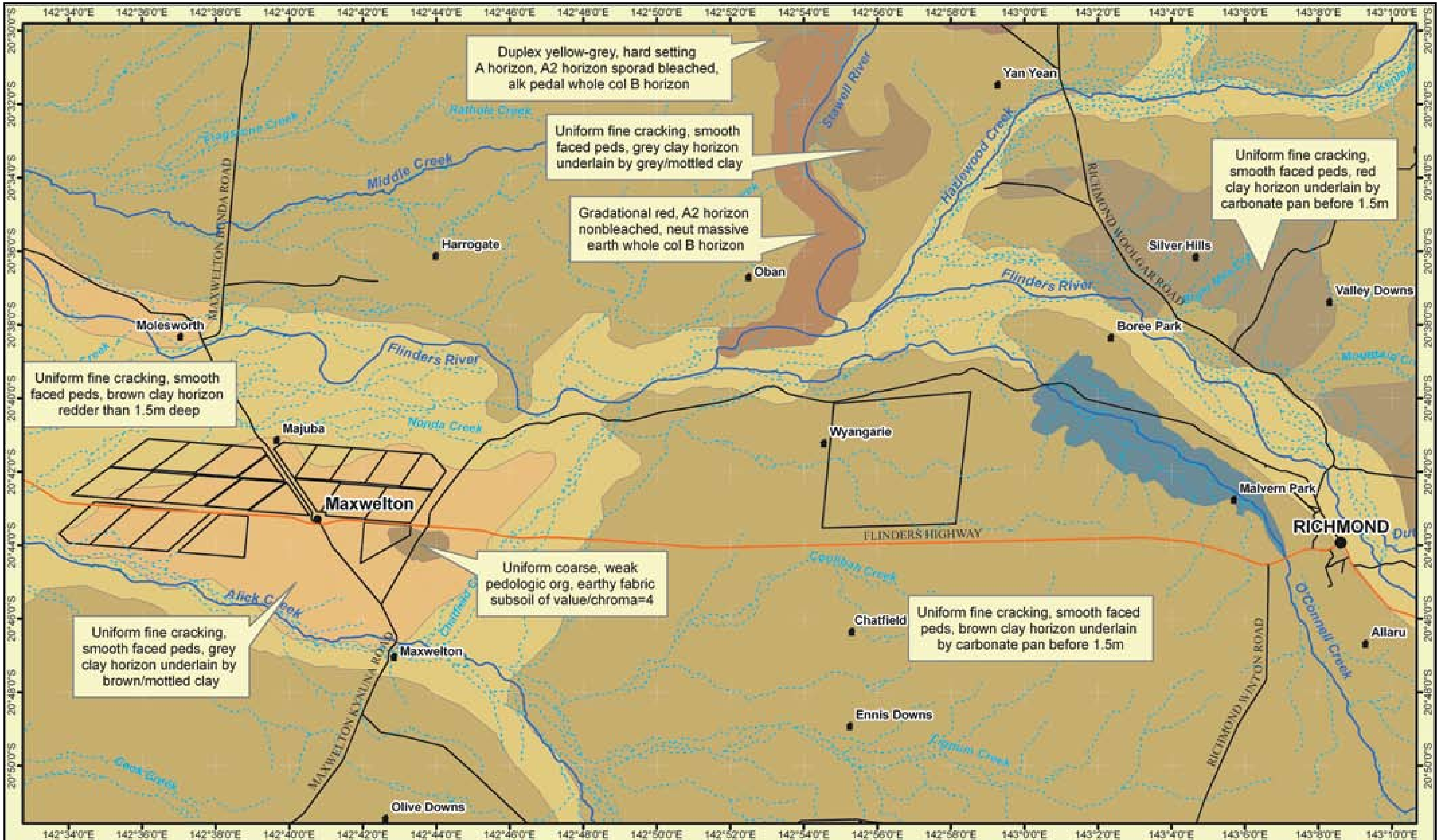
Legend	
Alluvium (river and creek flats)	Old loamy and sandy plains
Undulating country on fine grained sedimentary rocks	Nil
● Towns	Homesteads
Principal Road	Secondary Road
Farm layouts (potential)	Storage Inundation (proposed)

Southern Gulf Catchments

MITEZ

Richmond Shire Council

Queensland Government



Richmond Shire Irrigation Development Opportunity

March 2010

Soil Types

N

1:250,000 (A4)

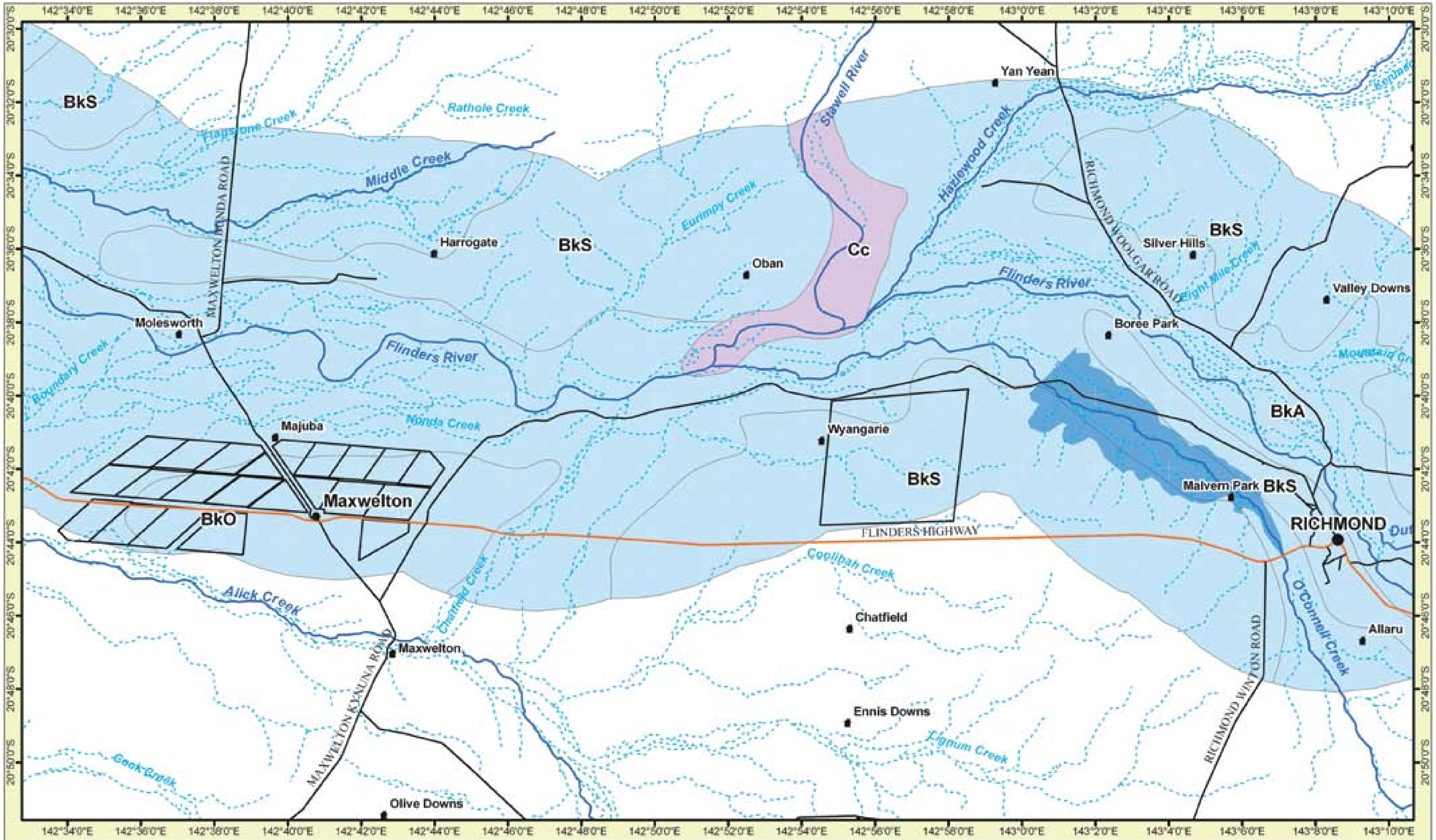
0 1 2 4 6 8 10

Kilometres

GDA94

Towns · Homesteads · Principal Road · Secondary Road · Farm layouts (potential) · Storage Inundation (proposed)

Southern Gulf Catchments · MITEZ · Richmond Shire Council · Queensland Government



N

1:250,000 (A4)

0 1 2 4 6 8 10

Kilometres

GDA94

Richmond Shire Irrigation Development Opportunity

March 2010

Agricultural Suitability

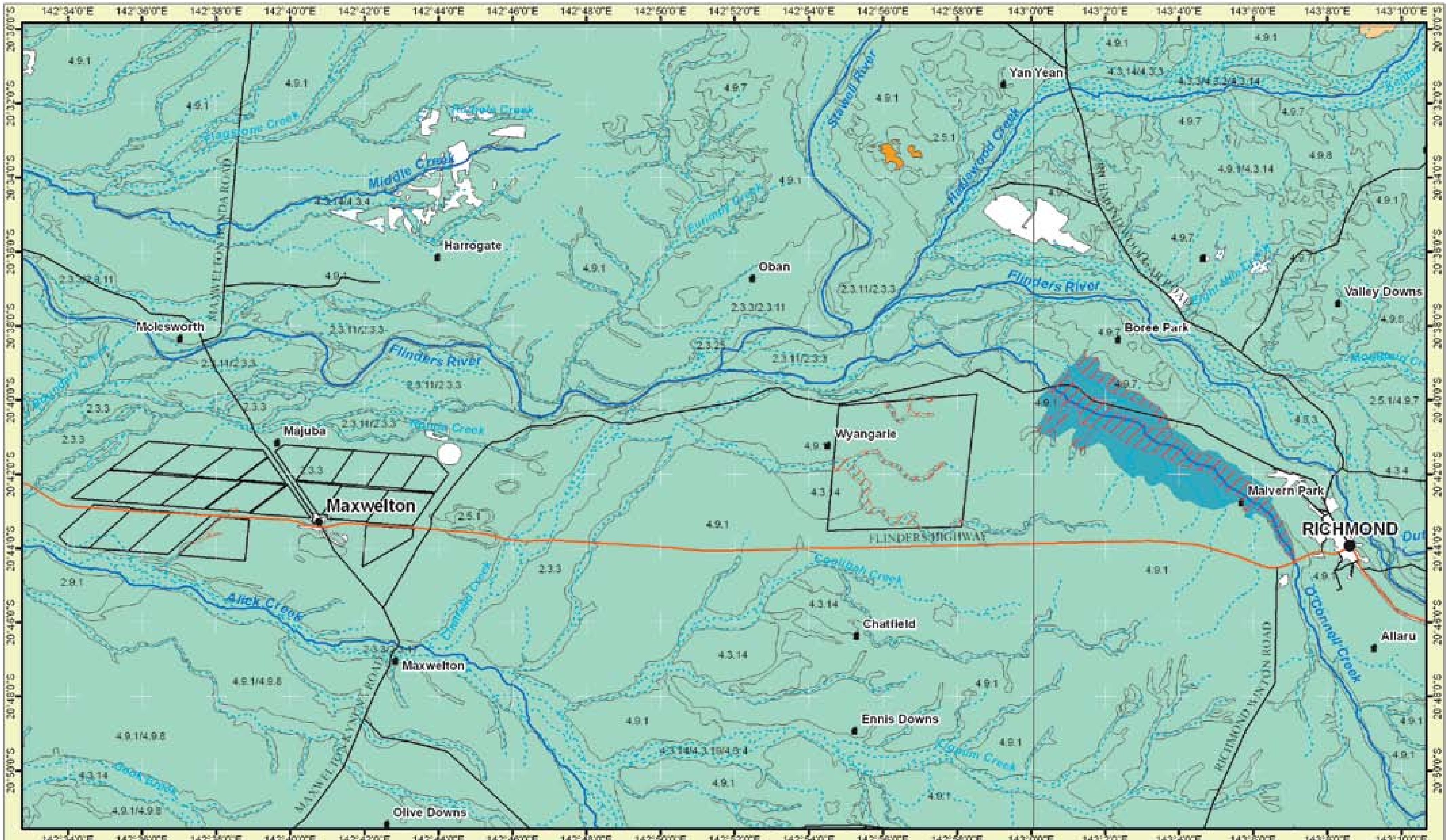
A1 A2 C

Towns Homesteads Principal Road Secondary Road Farm layouts (potential) Storage Inundation (proposed)

Southern Gulf Catchments

MITEZ

Queensland Government



Richmond Shire Irrigation Development Opportunity

March 2010

Regional Ecosystems

N

1:250,000 (A4)

0 1 2 4 6 8

Kilometres

GDA94

Non-remnant / regrowth | Not Of Concern | Of Concern - Sub-dominant | Of Concern - Dominant | Permit Required

Towns | Homesteads | Principal Road | Secondary Road | Farm layouts (potential) | Storage Inundation (proposed)

RICHMOND STATISTICS

APPENDIX

RICHMOND SHIRE SIZE: 26,602 km2 (about the size of Belgium)

LATITUDE: 20.7o South **LONGITUDE:** 143.1o East

ELEVATION: 211 m above sea level

SHIRE POPULATION: 1,151 people (700 permanent residents in the town of Richmond)

CLIMATE: temperature average minimum 15oC to average maximum 33oC

RAINFALL: average 477 ml per annum mainly as summer monsoon

DISTANCE FROM BRISBANE: 1,432 km north-west of Brisbane

DISTANCE FROM TOWNSVILLE: 500 km west south-west of Townsville

ELECTED REPRESENTATIVES: The Mayor and 4 Councillors

MAJOR INDUSTRY: agriculture and tourism

EMERGING INDUSTRY: mining

OTHER INDUSTRY: sandalwood, redclaw aquaculture (Cherax quadricarinatus), camel and goat meat exports

OPPORTUNITY FOR GROWTH: irrigated cropping and an increased farm service sector

ELECTRICITY SUPPLY: 66 kV from Townsville, as part of the national electricity grid

WATER RESOURCES: Great Artesian Basin and Flinders River

NATURAL RESOURCE MANAGEMENT: Southern Gulf Catchments

REFERENCE

- 'Gulf (Draft) Resource Operations Plan'. Queensland Government Department of Environment and Resource Management, Brisbane (2008).
- 'Flinders River Off-Stream Storage, Pre-feasibility Scheme', Richmond Shire Council, by AECOM Australia Pty Ltd (2009). Available from the Richmond Shire Council, Richmond, QLD.
- 'Potential for Irrigated Agriculture between Richmond and Maxwelton, North Queensland'. Land Resource Assessment and Management Pty Ltd (2003). Available from the Richmond Shire Council, Richmond, QLD.
- 'Richmond - O'Connell Creek Off-Stream Water Storage Facility', Richmond Shire (2008). Available from the Richmond Shire Council, Richmond, QLD.
- 'Grassland regional ecosystems and encroachment' Queensland Department of Environment and Resource Management – a fact sheet guide to the Queensland Vegetation Management Act 1999 and the interpretation of regional ecosystems.
- Photographs in the document are sourced from the Richmond Shire, C & B Tritton, and D.C. Pollock.

MITEZ

FURTHER INFORMATION:

RICHMOND SHIRE COUNCIL
50 Goldring Street Richmond, QLD
+61 (0)7 4741 3277

MOUNT ISA TOWNSVILLE ECONOMIC ZONE INC (MITEZ)
PO Box 1258, Mount Isa 4825
+61 (0)4 1771 9224
+61 (0)7 4743 3488

QUEENSLAND GOVERNMENT
DEPARTMENT EMPLOYMENT, ECONOMIC DEVELOPMENT, AND INNOVATION
75 Camooweal Street, Mount Isa, QLD
+61 (0)7 4747 2144