Department of Science, Information Technology and Innovation

# Land use Summary 1999–2013

for the Border Rivers and Moonie catchments

Queensland Government

**Prepared by**

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Report updated in July 2016 to correct figures reporting the net land use changes, p. 14.

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**Acknowledgements**

We wish to acknowledge the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) who coordinate the Australian Collaborative Land Use and Management Program (ACLUMP).

The QLUMP team includes staff from DSITI and four business centres of the Department of Natural Resource and Mines (DNRM) South Region. The input from the regions has been extremely valuable in respect of their mapping skills, local knowledge and capacity to engage regional experts in compiling updated land use mapping data.

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# Introduction

The Queensland Land use Mapping Program (QLUMP) is a joint initiative of the Department of Science, Information Technology and Innovation (DSITI) and the Department of Natural Resources and Mines (DNRM). QLUMP is part of the Australian Collaborative Land Use and Management Program (ACLUMP) coordinated by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). ACLUMP promotes nationally consistent land use information.

Land use and land management practices have a profound impact on Queensland's natural resources, agricultural production and the environment. The availability of consistent and reliable spatial information regarding land use is critical for sustainable natural resource management by Australian, Queensland and local governments, Natural Resource Management (NRM) regional groups, industry groups, community groups and land managers.

QLUMP has updated land use mapping in the Border Rivers and Moonie catchments to 2013, forming part of the Queensland Murray-Darling Committee NRM region. This report presents and summarises land use mapping including:

- revised 1999 and 2006 land use datasets including improvements and corrections to the originals
- 2013 land use dataset
- land use change dataset from 1999–2006, 2006–2013 and 1999–2013
- summary statistics derived from the above spatial datasets
- results of the accuracy assessment of the 2013 land use dataset.

# Methodology

Mapping is performed in accordance with ACLUMP guidelines. The methodology is accurate, reliable, cost-effective, and makes best use of available databases, satellite imagery and aerial photography. QLUMP maps each catchment with the most recent suitable imagery available.

The Australian Land Use and Management (ALUM) classification (Figure 1, page 5) shows five primary classes, identified in order of increasing levels of intervention or potential impact of land use; water is included separately as a sixth primary class. Within the primary classes is a three-level hierarchical structure. Primary, secondary and tertiary levels broadly describe the potential degree of modification or impact of land use on the landscape. The secondary level in the three-level hierarchical structure is the minimum attribution level for land use mapping in Queensland.

Primary and secondary levels relate to land use (i.e. the principal use of the land in terms of the objectives of the land manager). The tertiary level includes data on commodities or infrastructure. For example, crops such as cereals or infrastructure such as urban residential. Where possible, class attribution is performed to the tertiary level. For instance, QLUMP consistently maps land use classes *sugar* and *cotton* (dryland and irrigated) to tertiary level.

The mapping scale is 1:50,000 with a minimum mapping unit of two hectares and a width of 50 metres for linear features.

The 1999 (or later where available) baseline land use dataset formed the basis for the 2013 land use dataset. The 1999 and 2006 land use maps were revised and improved in addition to

compiling an updated land use map for 2013. This was achieved primarily by interpretation of SPOT5 satellite imagery, high-resolution orthophotography, scanned aerial photography and inclusion of expert local knowledge. An ESRI ArcSDE geodatabase replication environment was used to overlay land use datasets on imagery and digitised or modified areas previously omitted or incorrectly mapped in 1999 and 2006 and mapped areas of actual land use change for 2013. Land use change maps were then derived (at the secondary level of the ALUM classification) for the periods 1999–2006, 2006–2013 and 1999–2013.

Some land uses are difficult to differentiate using satellite imagery and existing databases, for example, dryland and irrigated agriculture. Therefore, local expert knowledge provided by state government regional staff, natural resource management groups, shires, agricultural industries and landholders was an important component of the mapping methodology. Field survey was also undertaken to verify areas of uncertainty.

The land use mapping methods used by QLUMP are described in full in the ABARES handbook: Guidelines for land use mapping in Australia: principles, procedures & definitions – Edition 4.

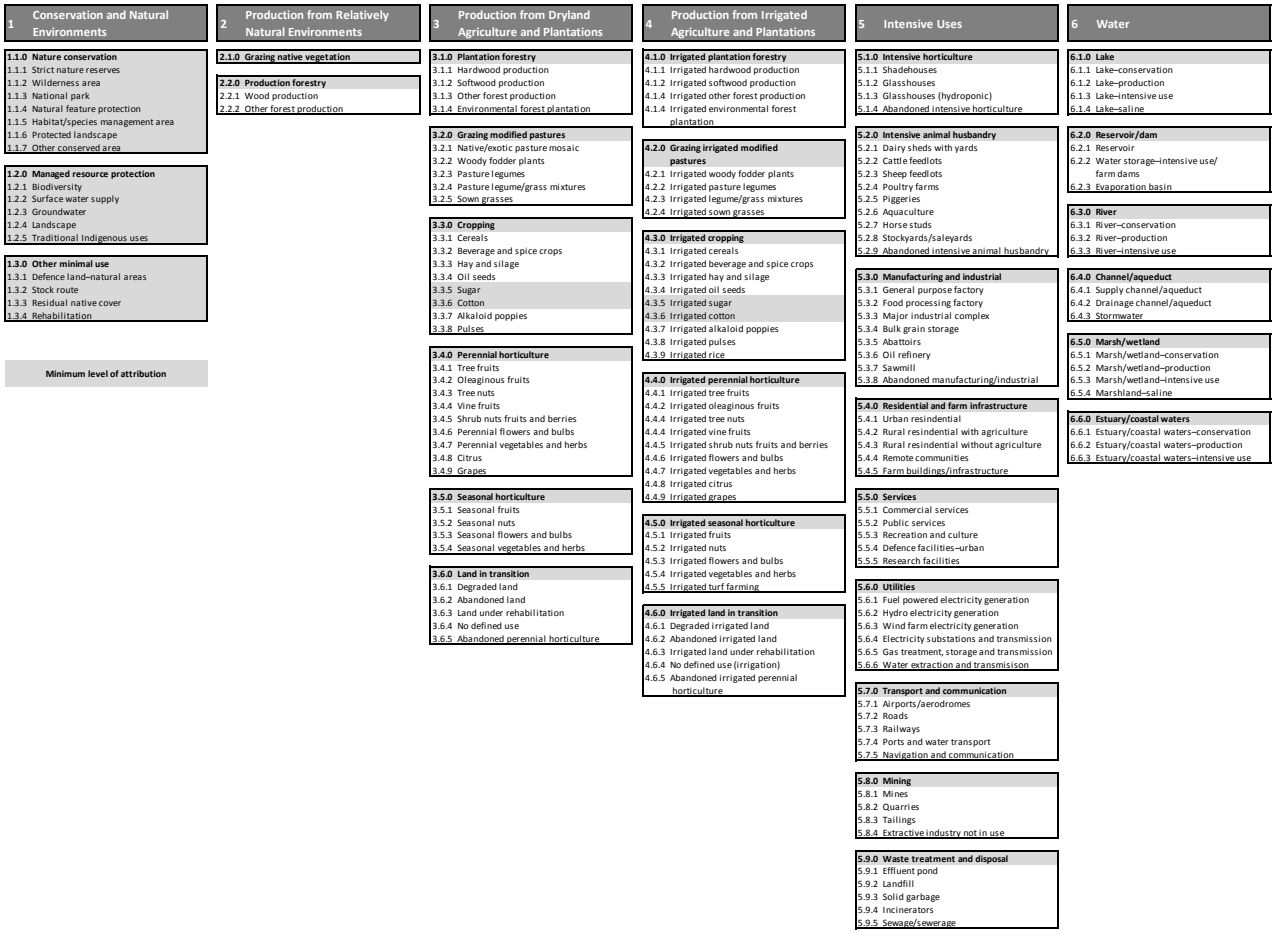


**Figure 1: Australian Land Use and Management (ALUM) classification, Version 7**

## Data Limitations

Land use features that are linear, such as roads and railways, are not mappable at a scale of 1:50,000 with a specified minimum mapping width of 50 metres. As a result, the area estimates of these **linear features** represent only a small proportion of the actual area within this land use type in Queensland. This is of relevance to the following land use classes:

- *transport and communication*
- *utilities*
- *rivers*

Similarly, land uses that fall under the QLUMP minimum mapping area of two hectares are not explicitly mapped but aggregated into the surrounding land use class. This will have the effect of over-estimating the area of some land use classes. For example, *cropping* and *grazing native vegetation,* where tracks and farm infrastructure, road reserves, drainage lines, cleared and uncleared land adjacent to rivers, and land immediately adjacent to, or between, cropped paddocks are included.

Livestock grazing occurs on a range of pasture types including native and exotic as well as mixtures of both. Identifying and separating these pasture types using imagery, aerial photography and field observation is difficult and unreliable. Therefore, the ALUM classification secondary land use classes of *grazing modified pastures* and *grazing irrigated modified pastures* have not been mapped explicitly from the *grazing native vegetation* class. These two classes have been mapped with the benefit of field verification to identify, for example, dairy pastures and fodder crops. Areas of pasture which appeared to be harvested for fodder or grazed off were mapped as *cropping*. This may contribute to an over-estimation of cropping in the region. The appearance of these can be highly variable therefore classification may not be consistent.

The distinction between (dryland) *cropping* and *irrigated cropping* was not always evident and it is likely there is some misclassification in these classes. QLUMP undertook field surveys and together with local knowledge confirmed areas of irrigation as much as possible. An areas proximity to water sources (watercourse or dam) as well as water entitlement (irrigation licences) information was also used. In addition, areas mapped as *irrigated cropping* are potentially only irrigated on a supplementary basis and may not have actually been irrigated in 1999, 2006 or 2013.

The *rural residential* land use class is a source of possible thematic error. Properties on the fringes of suburban settlements, hobby farms and subdivisions in isolated localities with comparatively small lot sizes were mapped to this class. The use of Queensland Valuation System (QVAS) was helpful in mapping this class, based on whether or not the land owner was classified as a primary producer. Residential features greater than 0.2 hectares and less than 16 hectares were mapped as rural residential. This class may be misclassified with *grazing native vegetation* and *other minimal use*, especially on larger properties.

A combination of the Queensland Herbarium's wetlands and regional ecosystem datasets provided the basis for mapping *marsh/wetlands*, *lakes*, *rivers* and *reservoir/dams*. The ephemeral nature of many of these water features can lead to confusion as they may be present in one image and either absent or different in subsequent or previous dated imagery. As a result, there may be errors, omissions and disagreement in the mapping of features such as farm dams, reservoirs, lakes, wetlands and other water features. Many water features, whilst exceeding the minimum mappable area requirements, do not meet the criteria for linear or uniform features.

The 1999, 2006 and 2013 land use datasets are a snapshot of what was interpreted as the primary land use in these years**.** However, effort was given to distinguishing between an actual land use change and a rotation. For example, an area that is usually cropped, but is not used for that particular purpose in the year of interest, was still mapped as *cropping* in the 2013 dataset even though no crop was present in that year. This was not considered an actual land use change, but rather a rotation, as the primary land use for that paddock would still be *cropping*.

# Products

## 1999, 2006 and 2013 land use datasets

Land use datasets for the Border Rivers and Moonie catchments are presented at the secondary level of the ALUM classification (Figure 1 page 5) in:

- 1999 land use dataset — Figure 2 (page 8),
- 2006 land use dataset — Figure 3 (page 10)
- 2013 land use dataset — Figure 4 (page 12)

Summary statistics for each are presented in:

- 1999 land use — Table 1 (page 9)
- 2006 land use — Table 2 (page 11)
- 2013 land use — Table 3 (page 13)

All statistics presenting the area of land use classes are reported in hectares (ha).

Table 3 (page 13) shows that *grazing native vegetation* (64%) and *cropping* (21%) were the major land use classes for 2013 in the Border Rivers and Moonie catchments.

Analysis of the overall (net) land use change relative to the updated land use mapping for 1999–2006 shows a reduction of 7% or 197,167ha for the primary class of *production from relatively natural environments*. This contraction occurred entirely within the secondary land use class of *grazing native vegetation.* For 2006–2013 the primary class of *production from relatively natural environments* showed a further slight decrease of 0.4% or 11,964ha.

The *conservation and natural environments* primary land use class showed slight growth in both era's—1% or 984ha in 1999–2006 and 4% or 2,711ha in 2006–2013. At the secondary level the *managed resource protection* land use class increased by 32% or 1,262ha for 1999–2006 and again by 43% or 2,983ha for 2006–2013.

The primary land use class of *production from dryland agriculture and plantations* increased by 22% or 174,773ha for 1999–2006 and again by 1% or 6,814ha for 2006–2013. Similarly, the *production from irrigated agriculture and plantations* primary land use class increased by 17% or 16,098ha for 1999–2006 and again by 2% or 1,839ha for 2006–2013.

The primary class of *water* increased by 19% or 4,967ha for 1999–2006. The increase was entirely from the secondary land use class of *reservoir/dam*.

Analysis of the specific land use changes from one secondary class to another for 1999–2006 and 2006–2013 is presented in the section on page 15. Analysis of the land use change for 1999–2013 has been included as Appendix A, on page 23.

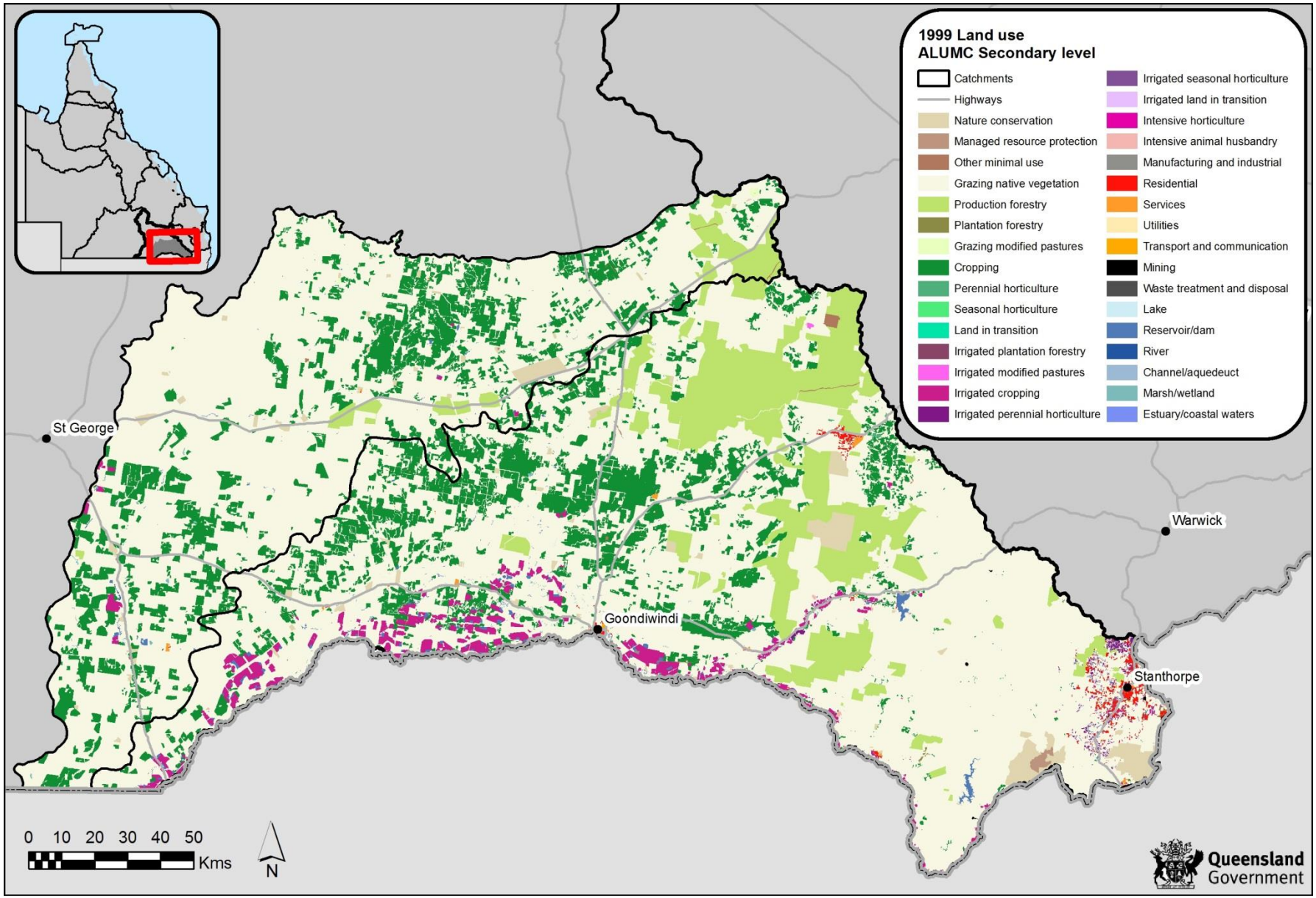


**Figure 2: 1999 land use map for the Border Rivers and Moonie catchments**

**Table 1: Summary statistics of land use in 1999 in the Border Rivers and Moonie catchments**

| Land use code | Land use class | Area (ha) | Area % |
|---|---|---|---|
| 1 | Conservation and natural environments | 71,542 | 1.86 |
| 1.1 | Nature conservation | 64,645 | 1.68 |
| 1.2 | Managed resource protection | 2,676 | 0.07 |
| 1.3 | Other minimal use | 4,222 | 0.11 |
| 2 | Production from relatively natural environments | 3,041,536 | 79.03 |
| 2.1 | Grazing native vegetation[1] | 2,666,986 | 69.30 |
| 2.2 | Production forestry | 374,550 | 9.73 |
| 3 | Production from dryland agriculture and plantations | 615,901 | 16.00 |
| 3.1 | Plantation forestry | 495 | 0.01 |
| 3.2 | Grazing modified pastures[2] | 849 | 0.02 |
| 3.3 | Cropping | 613,872 | 15.95 |
| 3.3.6 | Cropping – cotton[3] | 743 | 0.02 |
| 3.4 | Perennial horticulture | 670 | 0.02 |
| 3.5 | Seasonal horticulture | 16 | <0.01 |
| 4 | Production from irrigated agriculture and plantations | 78,711 | 2.05 |
| 4.2 | Irrigated grazing modified pastures[2] | 256 | 0.01 |
| 4.3 | Irrigated cropping | 71,036 | 1.85 |
| 4.3.6 | Irrigated cropping – cotton[3] | 43,821 | 1.14 |
| 4.4 | Irrigated perennial horticulture | 5,418 | 0.14 |
| 4.5 | Irrigated seasonal horticulture | 2,001 | 0.05 |
| 5 | Intensive uses | 20,103 | 0.52 |
| 5.2 | Intensive animal husbandry | 755 | 0.02 |
| 5.3 | Manufacturing and industrial | 560 | 0.01 |
| 5.4 | Residential and farm infrastructure | 13,993 | 0.36 |
| 5.5 | Services | 3,158 | 0.08 |
| 5.6 | Utilities | 22 | <0.01 |
| 5.7 | Transport and communication | 702 | 0.02 |
| 5.8 | Mining | 784 | 0.02 |
| 5.9 | Waste treatment and disposal | 130 | <0.01 |
| 6 | Water | 20,673 | 0.54 |
| 6.1 | Lake | 229 | 0.01 |
| 6.2 | Reservoir/dam | 15,841 | 0.41 |
| 6.3 | River | 2,321 | 0.06 |
| 6.4 | Channel/aqueduct | 21 | <0.01 |
| 6.5 | Marsh/wetland | 2,262 | 0.06 |
| | **Grand Total** | **3,848,466** | **100.00** |

[1]*grazing native vegetation* includes all pastures (modified and unmodified). No distinction is made in respect of tree cover.

[2]*grazing modified pastures and irrigated grazing modified pastures* are not mapped explicitly. In this case the areas mapped are generally dairy pastures.

[3]the area of c*ropping – cotton* and *irrigated cropping – cotton* are a subset of the total area of *cropping* and *irrigated cropping* respectively.

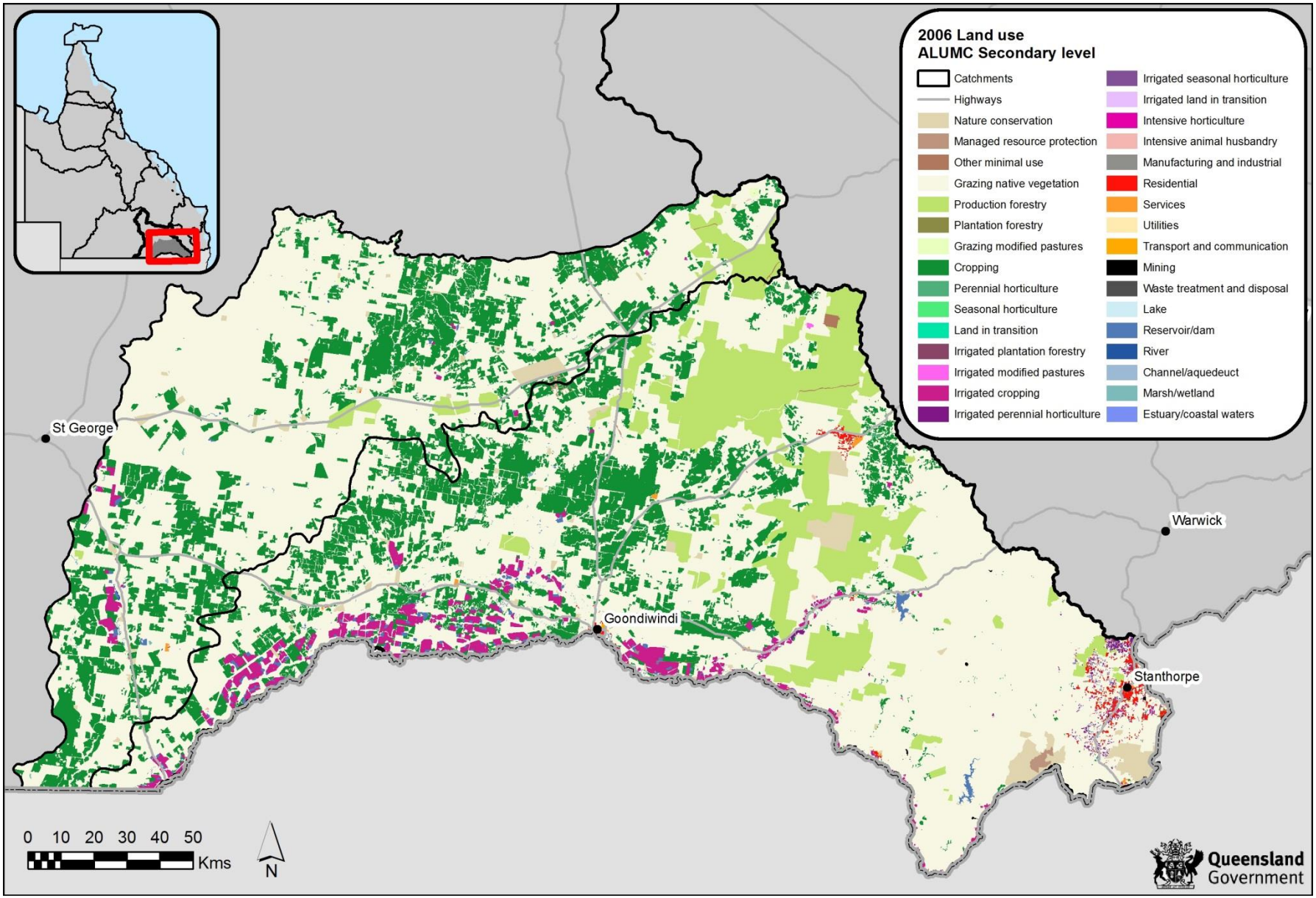


**Figure 3: 2006 land use map for the Border Rivers and Moonie catchments**

**Table 2: Summary statistics of land use in 2006 in the Border Rivers and Moonie catchments**

| Land use code | Land use class | Area (ha) | Area % |
|---|---|---|---|
| 1 | Conservation and natural environments | 72,526 | 1.88 |
| 1.1 | Nature conservation | 64,653 | 1.68 |
| 1.2 | Managed resource protection | 3,938 | 0.10 |
| 1.3 | Other minimal use | 3,935 | 0.10 |
| 2 | Production from relatively natural environments | 2,844,369 | 73.91 |
| 2.1 | Grazing native vegetation[1] | 2,469,819 | 64.18 |
| 2.2 | Production forestry | 374,550 | 9.73 |
| 3 | Production from dryland agriculture and plantations | 790,674 | 20.55 |
| 3.1 | Plantation forestry | 246 | 0.01 |
| 3.2 | Grazing modified pastures[2] | 849 | 0.02 |
| 3.3 | Cropping | 788,867 | 20.50 |
| 3.4 | Perennial horticulture | 696 | 0.02 |
| 3.5 | Seasonal horticulture | 16 | <0.01 |
| 4 | Production from irrigated agriculture and plantations | 94,809 | 2.46 |
| 4.2 | Irrigated grazing modified pastures[2] | 256 | 0.01 |
| 4.3 | Irrigated cropping | 86,945 | 2.26 |
| 4.3.6 | Irrigated cropping – cotton[3] | 49,974 | 1.30 |
| 4.4 | Irrigated perennial horticulture | 5,538 | 0.14 |
| 4.5 | Irrigated seasonal horticulture | 2,069 | 0.05 |
| 5 | Intensive uses | 20,448 | 0.53 |
| 5.1 | Intensive horticulture | 10 | <0.01 |
| 5.2 | Intensive animal husbandry | 876 | 0.02 |
| 5.3 | Manufacturing and industrial | 560 | 0.01 |
| 5.4 | Residential and farm infrastructure | 14,021 | 0.36 |
| 5.5 | Services | 3,176 | 0.08 |
| 5.6 | Utilities | 22 | <0.01 |
| 5.7 | Transport and communication | 704 | 0.02 |
| 5.8 | Mining | 926 | 0.02 |
| 5.9 | Waste treatment and disposal | 154 | <0.01 |
| 6 | Water | 25,640 | 0.67 |
| 6.1 | Lake | 229 | 0.01 |
| 6.2 | Reservoir/dam | 20,808 | 0.54 |
| 6.3 | River | 2,321 | 0.06 |
| 6.4 | Channel/aqueduct | 21 | <0.01 |
| 6.5 | Marsh/wetland | 2,262 | 0.06 |
| | **Grand Total** | **3,848,466** | **100.00** |

[1]*grazing native vegetation* includes all pastures (modified and unmodified). No distinction is made in respect of tree cover.

[2]*grazing modified pastures* and *irrigated grazing modified pastures* are not mapped explicitly. In this case the areas mapped are generally dairy pastures.

[3]the area of c*ropping – cotton* and *irrigated cropping – cotton* are a subset of the total area of *cropping* and *irrigated cropping* respectively.

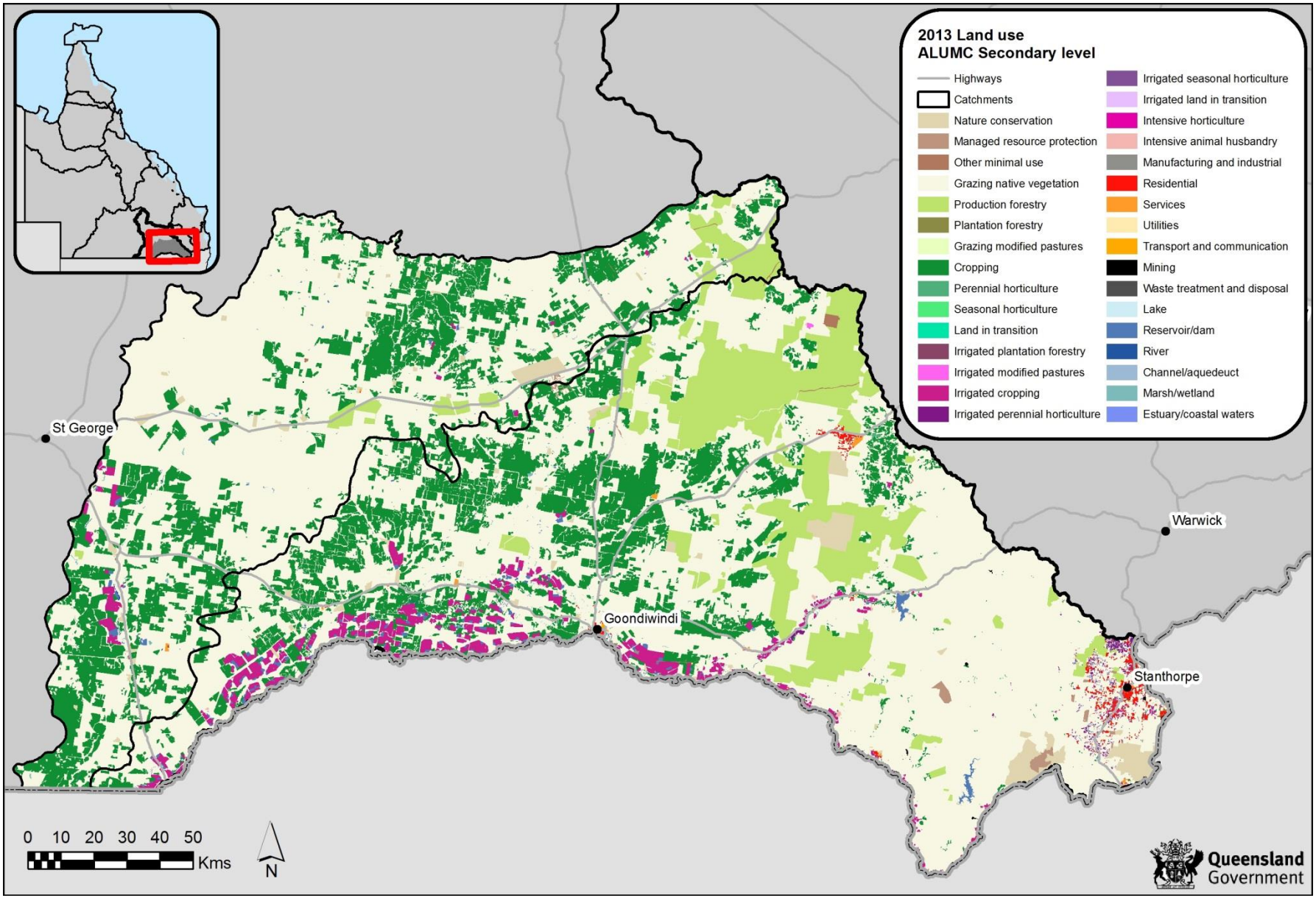


**Figure 4: 2013 land use map for the Border Rivers and Moonie catchments**

**Table 3: Summary statistics of land use in 2013 in the Border Rivers and Moonie catchments**

| Land use code | Land use class | Area (ha) | Area % |
|---|---|---|---|
| 1 | Conservation and natural environments | 75,237 | 1.95 |
| 1.1 | Nature conservation | 64,645 | 1.68 |
| 1.2 | Managed resource protection | 6,921 | 0.18 |
| 1.3 | Other minimal use | 3,671 | 0.10 |
| 2 | Production from relatively natural environments | 2,832,405 | 73.60 |
| 2.1 | Grazing native vegetation[1] | 2,458,324 | 63.88 |
| 2.2 | Production forestry | 374,082 | 9.72 |
| 3 | Production from dryland agriculture and plantations | 797,488 | 20.72 |
| 3.1 | Plantation forestry | 246 | 0.01 |
| 3.2 | Grazing modified pastures[2] | 127 | <0.01 |
| 3.3 | Cropping | 796,233 | 20.69 |
| 3.4 | Perennial horticulture | 850 | 0.02 |
| 3.5 | Seasonal horticulture | 16 | <0.01 |
| 3.6 | Land in transition | 26 | <0.01 |
| 4 | Production from irrigated agriculture and plantations | 96,648 | 2.51 |
| 4.2 | Irrigated grazing modified pastures[2] | 256 | 0.01 |
| 4.3 | Irrigated cropping | 88,750 | 2.31 |
| 4.3.6 | Irrigated cropping – cotton[3] | 50,241 | 1.31 |
| 4.4 | Irrigated perennial horticulture | 5,548 | 0.14 |
| 4.5 | Irrigated seasonal horticulture | 2,093 | 0.05 |
| 5 | Intensive uses | 20,707 | 0.54 |
| 5.1 | Intensive horticulture | 12 | <0.01 |
| 5.2 | Intensive animal husbandry | 938 | 0.02 |
| 5.3 | Manufacturing and industrial | 588 | 0.02 |
| 5.4 | Residential and farm infrastructure | 14,114 | 0.37 |
| 5.5 | Services | 3,176 | 0.08 |
| 5.6 | Utilities | 22 | <0.01 |
| 5.7 | Transport and communication | 704 | 0.02 |
| 5.8 | Mining | 995 | 0.03 |
| 5.9 | Waste treatment and disposal | 159 | <0.01 |
| 6 | Water | 25,981 | 0.68 |
| 6.1 | Lake | 229 | 0.01 |
| 6.2 | Reservoir/dam | 21,149 | 0.55 |
| 6.3 | River | 2,321 | 0.06 |
| 6.4 | Channel/aqueduct | 21 | <0.01 |
| 6.5 | Marsh/wetland | 2,262 | 0.06 |
| | **Grand Total** | **3,848,466** | **100.00** |

[1]*grazing native vegetation* includes all pastures (modified and unmodified). No distinction is made in respect of tree cover.

[2]*grazing modified pastures* and *irrigated grazing modified pastures* are not mapped explicitly. In this case the areas mapped are generally dairy pastures.

[3]the area of c*ropping – cotton* and *irrigated cropping – cotton* are a subset of the total area of *cropping* and *irrigated cropping* respectively.

### Overall land use change by primary land use class

Figure 5 presents the overall (net) changes in land use within the Border Rivers and Moonie catchments by primary land use class. The graph shows the net reduction or gain for 1999–2006 and 2006–2013. Note that the first bar for each primary land use class is the 1999–2006, whilst the second is the 2006–2013 and each series sums to zero.

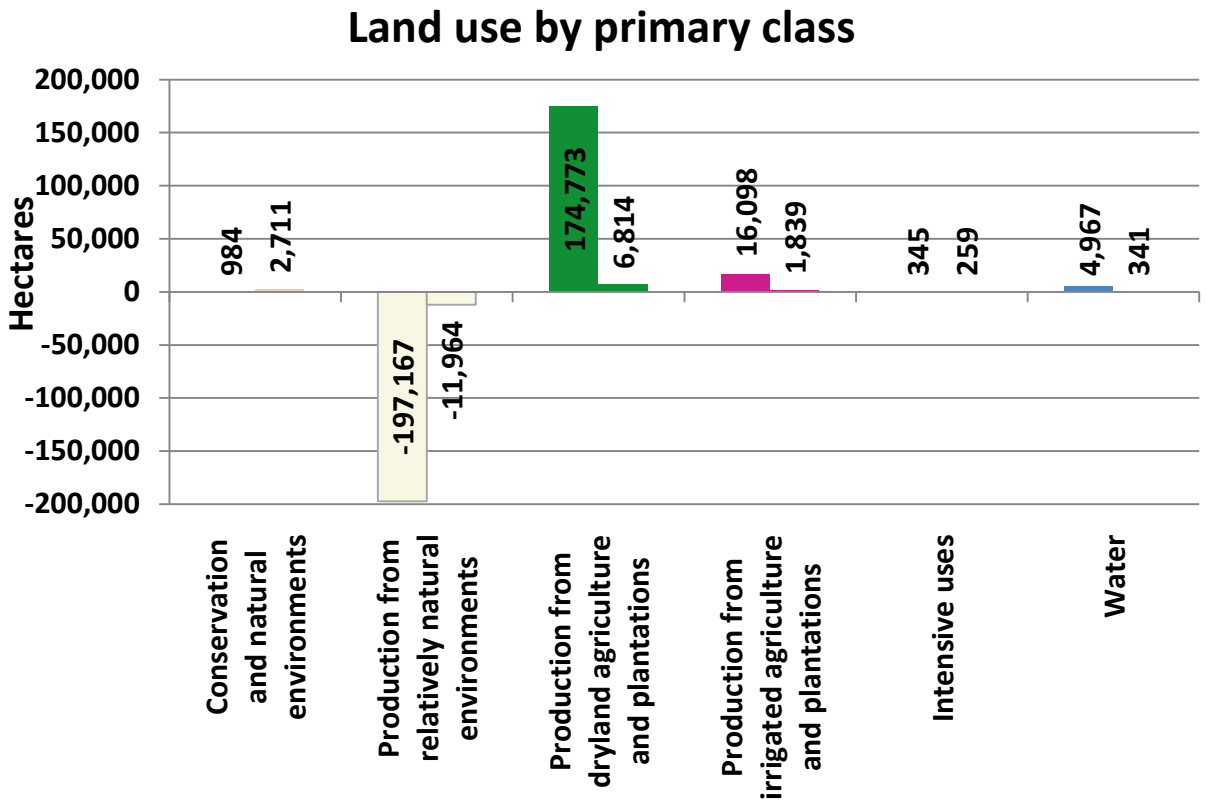


**Figure 5: Net land use change by primary class (1999–2006 and 2006–2013) in the Border Rivers and Moonie catchments**

The *production from relatively natural environments* primary land use class has shown an overall decline in each epoch—with a large reduction of 197,167ha in 1999–2006 (which equates to a 6% decline) in the Border Rivers and Moonie catchments. The *production from dryland agriculture and plantations* primary land use class gained 174,773ha in the 1999–2006 epoch (28% gain).

The land use changes at the primary level for the 2006–2013 epoch were relatively minor.

## Land use change datasets (1999–2006, 2006–2013 and 1999–2013)

Figures 7, 9 and 11 (pages 18, 21 and 25) show the land use change datasets for the Border Rivers and Moonie catchments. The data has been presented relative to the **change in intensity** of the land use at the secondary level of the ALUM classification.

For example, change from 2.1.0 (*grazing native vegetation*) to 2.2.0 (*production forestry*) is an increase in land use intensity, whilst change from 2.1.0 (*grazing native vegetation*) to 1.1.0 (*nature conservation*) is a decrease. This is highlighted in the ALUM classification (Figure 1, page 5). Moving down and from left to right through the classification, the level of intervention or potential impact of land use increases.

Land use change mapping products have been compiled for three epochs (1999, 2006 and 2013). At the secondary level of the ALUM classification, the total area of land use change is:

- 1999–2006: 226,014ha (6% of the catchments). Of this 213,154ha (94% of the total change) is mapped as an increase in land use intensity, whilst 12,861ha (6%) is a decrease.
- 2006–2013: 181,741ha (5% of the catchments). Of this 94,444ha (52% of the total change) is mapped as an increase in land use intensity, whilst 87,297ha (48%) is a decrease.
- 1999–2013: 361,831ha (9% of the catchments). Of this 284,484ha (79% of the total change) is mapped as an increase in land use intensity, whilst 77,348ha (21%) is a decrease.

The land use change totals between the two eras (1999–2006 and 2006–2013) will not add up to match those compiled for the 1999–2013 era. This is because land use change mapping only accounts for land use at a specific moment in time; some change will result from rotation, whilst some may be the result of more than one change event. For example, an area mapped as *grazing native vegetation* in 1999 may have been mapped as *land in transition* in 2006 before finally becoming *residential* in 2013. These changes would be reflected in each of the land use change mapping products as change from *grazing native vegetation* to *land in transition* in the 1999–2006, and change from *land in transition* to *residential* in 2006–2013, and lastly change from *grazing native vegetation* to *residential* in 1999–2013.

Summary statistics presenting the land use change at the secondary level for 1999–2006 and 2006–2013 are shown in Tables 4 and 5 (pages 16 and 19). The change from 1999–2013 is presented in Appendix A (page 23).

The land use changes within the Border Rivers and Moonie catchments were predominantly within the grazing and cropping land use classes—and are two-way. Gains are often offset in part by reductions and vice versa. The pie charts presented in Figures 6 and 8, (pages 17 and 20) illustrate the major fluxes within each of these land use classes, for each change era.

### 1999–2006 Land use change

The 1999–2006 land use change shows that the change from *grazing native vegetation* to *cropping* accounted for 189,552ha or 84% of all the total change mapped, followed by 10,776ha (5%) of *grazing native vegetation* changing to *cropping* (Table 4).

**Table 4: Summary statistics for land use change at secondary level for 1999–2006 in the Border Rivers and Moonie catchments (showing only the land use changes > 10ha)**

| Land use code 1999 | Land use class 1999 | Land use code 2006 | Land use class 2006 | Area (ha) | Area Change (%) | Total change (%) |
|---|---|---|---|---|---|---|
| 2.1.0 | Grazing native vegetation | 3.3.0 | Cropping | 189,552 | 4.93 | 83.87 |
| 3.3.0 | Cropping | 2.1.0 | Grazing native vegetation | 10,776 | 0.28 | 4.77 |
| 2.1.0 | Grazing native vegetation | 4.3.0 | Irrigated cropping | 8,404 | 0.22 | 3.72 |
| 2.1.0 | Grazing native vegetation | 4.3.6 | Irrigated cropping – Cotton | 4,753 | 0.12 | 2.10 |
| 2.1.0 | Grazing native vegetation | 6.2.0 | Reservoir/dam | 3,752 | 0.10 | 1.66 |
| 3.3.0 | Cropping | 4.3.0 | Irrigated cropping | 2,630 | 0.07 | 1.16 |
| 2.1.0 | Grazing native vegetation | 1.2.0 | Managed resource protection | 1,218 | 0.03 | 0.54 |
| 3.3.0 | Cropping | 4.3.6 | Irrigated cropping – Cotton | 841 | 0.02 | 0.37 |
| 3.3.6 | Cropping – Cotton | 4.3.6 | Irrigated cropping – Cotton | 743 | 0.02 | 0.33 |
| 4.3.0 | Irrigated cropping | 6.2.0 | Reservoir/dam | 647 | 0.02 | 0.29 |
| 4.3.0 | Irrigated cropping | 2.1.0 | Grazing native vegetation | 357 | 0.01 | 0.16 |
| 3.3.0 | Cropping | 6.2.0 | Reservoir/dam | 352 | 0.01 | 0.16 |
| 3.1.0 | Plantation forestry | 3.3.0 | Cropping | 249 | 0.01 | 0.11 |
| 4.3.0 | Irrigated cropping | 3.3.0 | Cropping | 243 | 0.01 | 0.11 |
| 1.3.0 | Other minimal use | 3.3.0 | Cropping | 236 | 0.01 | 0.10 |
| 4.3.6 | Irrigated cropping – Cotton | 6.2.0 | Reservoir/dam | 201 | 0.01 | 0.09 |
| 2.1.0 | Grazing native vegetation | 5.8.0 | Mining | 142 | <0.01 | 0.06 |
| 2.1.0 | Grazing native vegetation | 4.4.0 | Irrigated perennial horticulture | 124 | <0.01 | 0.05 |
| 2.1.0 | Grazing native vegetation | 5.2.0 | Intensive animal husbandry | 120 | <0.01 | 0.05 |
| 2.1.0 | Grazing native vegetation | 1.3.0 | Other minimal use | 108 | <0.01 | 0.05 |
| 4.3.0 | Irrigated cropping | 4.3.6 | Irrigated cropping – Cotton | 86 | <0.01 | 0.04 |
| 2.1.0 | Grazing native vegetation | 4.5.0 | Irrigated seasonal horticulture | 67 | <0.01 | 0.03 |
| 1.3.0 | Other minimal use | 4.3.0 | Irrigated cropping | 62 | <0.01 | 0.03 |
| 4.3.6 | Irrigated cropping – Cotton | 2.1.0 | Grazing native vegetation | 48 | <0.01 | 0.02 |
| 1.3.0 | Other minimal use | 6.2.0 | Reservoir/dam | 44 | <0.01 | 0.02 |
| 2.1.0 | Grazing native vegetation | 5.4.0 | Residential | 42 | <0.01 | 0.02 |
| 4.3.6 | Irrigated cropping – Cotton | 3.3.0 | Cropping | 31 | <0.01 | 0.01 |
| 6.2.0 | Reservoir/dam | 3.3.0 | Cropping | 28 | <0.01 | 0.01 |
| 1.3.0 | Other minimal use | 1.2.0 | Managed resource protection | 26 | <0.01 | 0.01 |
| 2.1.0 | Grazing native vegetation | 3.4.0 | Perennial horticulture | 26 | <0.01 | 0.01 |
| 2.1.0 | Grazing native vegetation | 5.9.0 | Waste treatment and disposal | 24 | <0.01 | 0.01 |
| 5.4.0 | Residential | 1.2.0 | Managed resource protection | 17 | <0.01 | 0.01 |
| 2.1.0 | Grazing native vegetation | 5.5.0 | Services | 17 | <0.01 | 0.01 |
| 4.4.0 | Irrigated perennial horticulture | 5.1.0 | Intensive horticulture | 10 | <0.01 | <0.01 |
| **Total** | | | | **226,014** | **5.87** | **100** |

Analysis of the 1999–2006 land use change within the *grazing native vegetation* and *cropping* land use classes is presented in Figure 6.

Figure 6–a shows that the largest proportion of land use change from *grazing native vegetation* was to *cropping* (189,552ha or 91% of the total change from *grazing native vegetation*), followed by 8,404ha (4%) and 4,753ha (2%) changing to *irrigated cropping* and *irrigated cropping – cotton* respectively. Interestingly 3,752ha (2%) changed to *reservoir/dam.*

A total of 10,776ha or 74% of the total change from *cropping* went to *grazing native vegetation*, while 2,630ha (18%) changed to *irrigated cropping* and a further 841ha (6%) changed to *irrigated cropping – cotton.* (Figure 6–b)

The majority of land use change to *grazing native vegetation* was from *cropping*—10,776ha (96%) followed by 357ha (3%) from *irrigated cropping.* (Figure 6–c)

Almost all the land use change to *cropping* came from *grazing native vegetation*—189,552ha. (Figure 6–d)

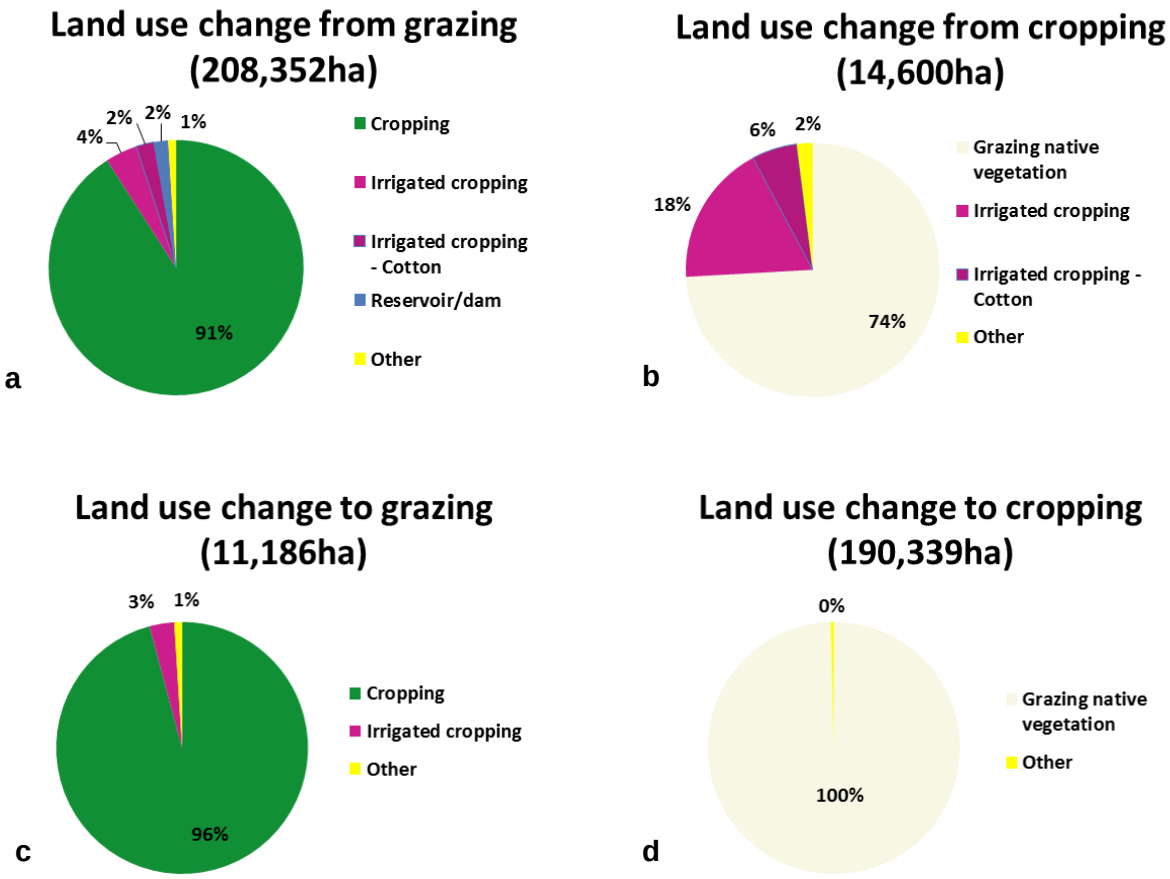


**Figure 6: Charts (a–d) of 1999–2006 land use change within the grazing native vegetation and cropping land use classes**

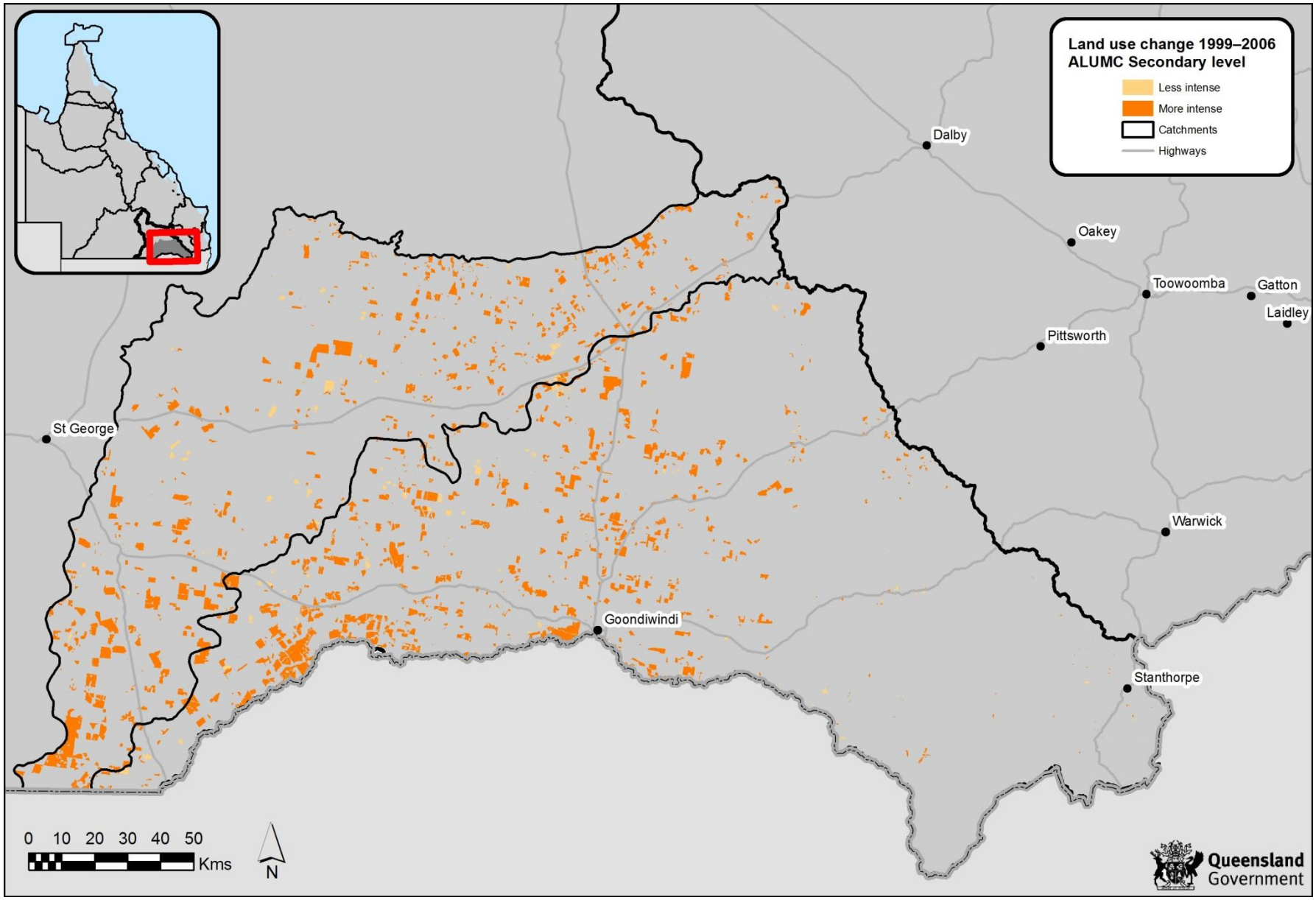


**Figure 7: 1999–2006 land use change map at secondary level for the Border Rivers and Moonie catchments**

### 2006–2013 Land use change

For 2006–2013, the largest land use change was observed from *grazing native vegetation* to *cropping* of 89,670ha or 49% of the total change mapped. This reduction of *cropping* was offset almost entirely by the change from *cropping* (81,422ha or 45%) to *grazing native vegetation* (Table 5).

**Table 5: Summary statistics for land use change at secondary level for 2006–2013 in the Border Rivers and Moonie catchments (showing only the land use changes > 10ha)**

| Land use code 2006 | Land use class 2006 | Land use code 2013 | Land use class 2013 | Area (ha) | Area Change (%) | Total change (%) |
|---|---|---|---|---|---|---|
| 2.1.0 | Grazing native vegetation | 3.3.0 | Cropping | 89,670 | 2.33 | 49.34 |
| 3.3.0 | Cropping | 2.1.0 | Grazing native vegetation | 81,422 | 2.12 | 44.80 |
| 2.1.0 | Grazing native vegetation | 1.2.0 | Managed resource protection | 2,969 | 0.08 | 1.63 |
| 3.3.0 | Cropping | 4.3.0 | Irrigated cropping | 1,150 | 0.03 | 0.63 |
| 2.1.0 | Grazing native vegetation | 4.3.0 | Irrigated cropping | 1,110 | 0.03 | 0.61 |
| 3.2.0 | Grazing modified pastures | 2.1.0 | Grazing native vegetation | 767 | 0.02 | 0.42 |
| 4.3.6 | Irrigated cropping – cotton | 2.1.0 | Grazing native vegetation | 689 | 0.02 | 0.38 |
| 2.1.0 | Grazing native vegetation | 4.3.6 | Irrigated cropping – cotton | 571 | 0.01 | 0.31 |
| 2.2.0 | Production forestry | 2.1.0 | Grazing native vegetation | 462 | 0.01 | 0.25 |
| 2.1.0 | Grazing native vegetation | 6.2.0 | Reservoir/dam | 407 | 0.01 | 0.22 |
| 4.3.0 | Irrigated cropping | 3.3.0 | Cropping | 393 | 0.01 | 0.22 |
| 3.3.0 | Cropping | 4.3.6 | Irrigated cropping – cotton | 352 | 0.01 | 0.19 |
| 4.3.0 | Irrigated cropping | 2.1.0 | Grazing native vegetation | 274 | 0.01 | 0.15 |
| 1.3.0 | Other minimal use | 3.3.0 | Cropping | 177 | <0.01 | 0.10 |
| 4.3.0 | Irrigated cropping | 4.3.6 | Irrigated cropping – cotton | 163 | <0.01 | 0.09 |
| 2.1.0 | Grazing native vegetation | 3.4.0 | Perennial horticulture | 146 | <0.01 | 0.08 |
| 4.3.6 | Irrigated cropping – cotton | 6.2.0 | Reservoir/dam | 112 | <0.01 | 0.06 |
| 6.2.0 | Reservoir/dam | 4.3.0 | Irrigated cropping | 109 | <0.01 | 0.06 |
| 1.3.0 | Other minimal use | 2.1.0 | Grazing native vegetation | 108 | <0.01 | 0.06 |
| 2.1.0 | Grazing native vegetation | 5.4.0 | Residential | 100 | <0.01 | 0.05 |
| 6.2.0 | Reservoir/dam | 3.3.0 | Cropping | 99 | <0.01 | 0.05 |
| 2.1.0 | Grazing native vegetation | 5.8.0 | Mining | 71 | <0.01 | 0.04 |
| 2.1.0 | Grazing native vegetation | 5.2.0 | Intensive animal husbandry | 56 | <0.01 | 0.03 |
| 2.1.0 | Grazing native vegetation | 4.4.0 | Irrigated perennial horticulture | 50 | <0.01 | 0.03 |
| 2.1.0 | Grazing native vegetation | 2.1.0 | Grazing modified pastures | 36 | <0.01 | 0.02 |
| 4.4.0 | Irrigated perennial horticulture | 2.1.0 | Grazing native vegetation | 28 | <0.01 | 0.02 |
| 2.1.0 | Grazing native vegetation | 4.5.0 | Irrigated seasonal horticulture | 28 | <0.01 | 0.02 |
| 2.1.0 | Grazing native vegetation | 3.6.0 | Land in transition | 26 | <0.01 | 0.01 |
| 3.3.0 | Cropping | 1.3.0 | Other minimal use | 21 | <0.01 | 0.01 |
| 4.3.6 | Irrigated cropping – cotton | 3.3.0 | Cropping | 19 | <0.01 | 0.01 |
| 3.3.0 | Cropping | 5.3.0 | Manufacturing and Industrial | 18 | <0.01 | 0.01 |
| 3.3.0 | Cropping | 6.2.0 | Reservoir/dam | 17 | <0.01 | 0.01 |
| 3.3.0 | Cropping | 3.2.0 | Grazing modified pastures | 16 | <0.01 | 0.01 |
| 5.4.0 | Residential | 1.2.0 | Managed resource protection | 15 | <0.01 | 0.01 |
| **Total** | | | | **181,741** | **4.72** | **100** |

Figure 8 presents an analysis of the 2006–2013 land use change within the *grazing native vegetation* and *cropping* land use classes.

Figure 8–a shows the largest land use change was from *grazing native vegetation* to *cropping* (89,670ha or 94% of the total change from *grazing native vegetation*), followed by 2,969ha (or 3%) changing to *managed resource protection*.

The majority of this change was offset by 81,422ha (97%) of change from *cropping* to *grazing native vegetation*. For 2006–2012 this resulted in a net gain in *cropping* of 7,356ha. (Figure 6–c)

A total of 81,422ha or 98% of the total change from *cropping* went to *grazing native vegetation*. (Figure 6–b)

Almost all (99%) of the land use change to *cropping* came from *grazing native vegetation*— 89,670ha. (Figure 6–d)

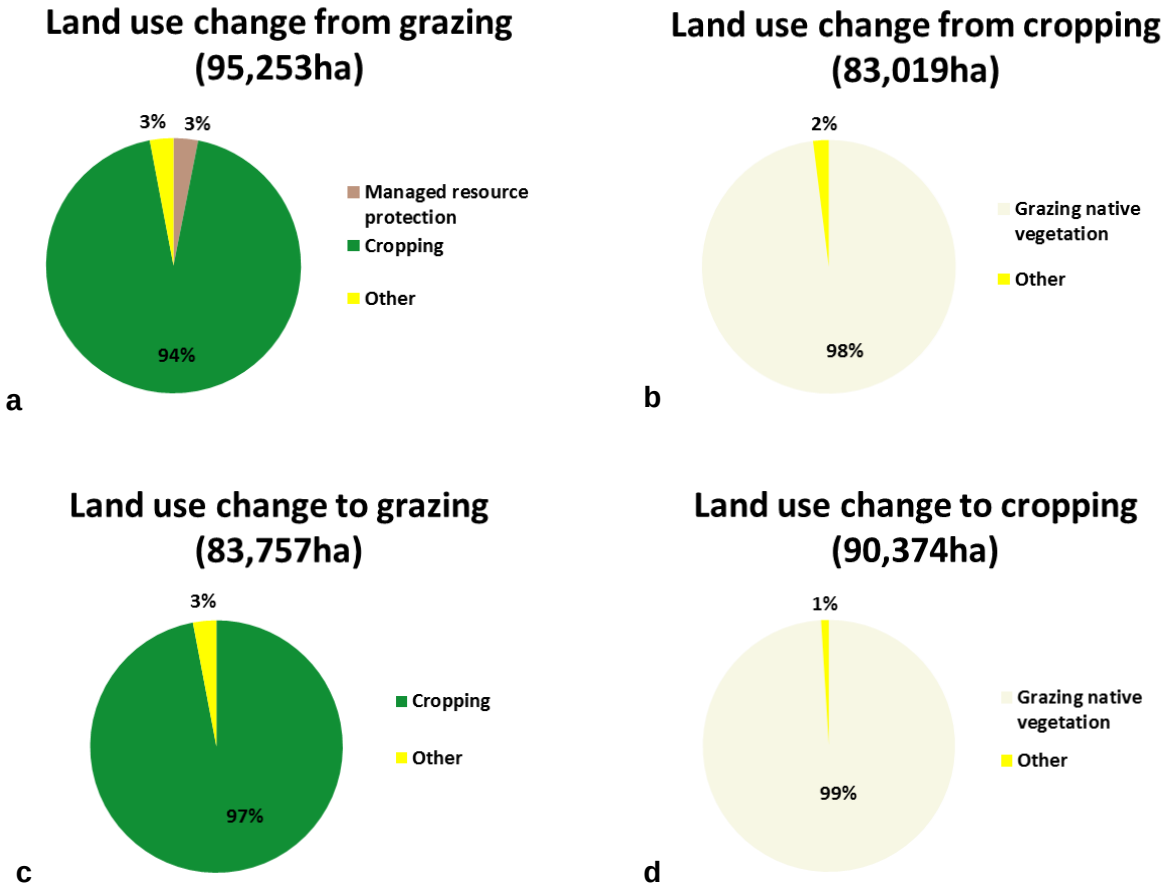


**Figure 8: Charts (a–d) of 2006–2013 land use change within the grazing native vegetation and cropping land use classes**

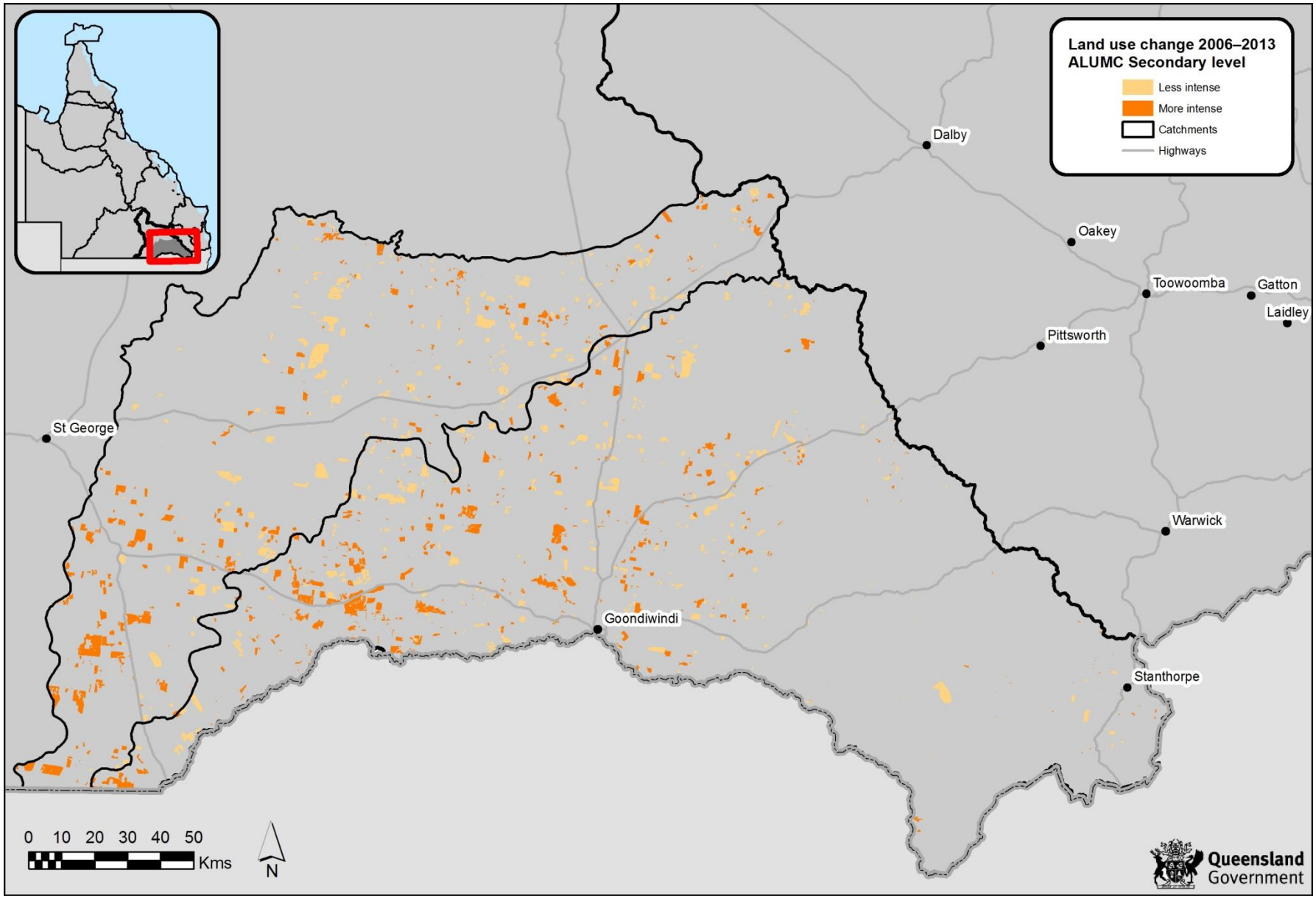


**Figure 9: 2006–2013 land use change map at secondary level for the Border Rivers and Moonie catchments**

# Data format and availability

## Download land use datasets

Use the Queensland Spatial Catalogue QSpatial to access land use data sets. Search for **"land use mapping"** in the search term field, after restricting your search to **“cadastral and land planning”** in the categories field. Metadata is also available from QSpatial.

The dataset comprises an ESRI vector geodatabase at a nominal scale of 1:50,000. Within this are six feature classes: 1999 improved land use, 2006 improved land use, 2013 updated land use, 1999–2006 land use change layer, 2006–2013 land use change layer and 1999–2013 land use change layer. The feature classes are polygon datasets with attributes describing land use. Land use is classified according to the Australian Land Use and Management Classification (ALUMC) Version 7, May 2010. Note: a representation showing land use at secondary level is available when working within a geodatabase.

Digital Data is supplied with a licence and by using the data you confirm that you have read the licence conditions included with the data and that you agree to be bound by its terms.



## Request a land use map

It is possible to request a land use map from the QLUMP website based upon a specific location (Lot on Plan, Street address or Central latitude/longitude coordinates) in Queensland. The land use maps are emailed in portable document format (PDF).The maps present the most recent land use information available at the secondary level of the Australian Land Use and Management (ALUM) Classification.

## View land use on the Queensland Globe

View the most recent Queensland land use information on the Queensland Globe. Use this application to browse spatial data in Queensland, including land use and up-to-date satellite imagery.

Land use is available for viewing within the Planning and Cadastre category globe.

# Appendix A 1999–2013 Land use Change

For 1999–2013, the largest land use changes were observed from *grazing native vegetation* to *cropping* of 257,142ha (71% of all the total change mapped) and *cropping* to *grazing native vegetation* (70,213ha or 19%). A further 9,426ha (3%) of *grazing native vegetation* changed to *irrigated cropping*. Collectively, for 1999–2013 all the land use change to *cropping* accounts for 258,549ha or 71% of the total, and the land use change to *irrigated cropping* accounts for 13,202ha or 4% of the total. Some of this increase in cropping area has been offset in part by a reduction of *cropping* in other areas of the catchment, with 70,213ha (19%) changing to *grazing native vegetation*.

**Table 6: Summary statistics for land use change at secondary level for 1999–2013 in the Border Rivers and Moonie catchments (showing only the land use changes > 40ha)**

| Land use code 1999 | Land use class 1999 | Land use code 2013 | Land use class 2013 | Area (ha) | Area Change (%) | Total change (%) |
|---|---|---|---|---|---|---|
| 2.1.0 | Grazing native vegetation | 3.3.0 | Cropping | 257,142 | 6.68 | 71.07 |
| 3.3.0 | Cropping | 2.1.0 | Grazing native vegetation | 70,213 | 1.82 | 19.40 |
| 2.1.0 | Grazing native vegetation | 4.3.0 | Irrigated cropping | 9,426 | 0.24 | 2.61 |
| 2.1.0 | Grazing native vegetation | 4.3.6 | Irrigated cropping – cotton | 4,913 | 0.13 | 1.36 |
| 2.1.0 | Grazing native vegetation | 1.2.0 | Managed resource protection | 4,187 | 0.11 | 1.16 |
| 2.1.0 | Grazing native vegetation | 6.2.0 | Reservoir/dam | 4,115 | 0.11 | 1.14 |
| 3.3.0 | Cropping | 4.3.0 | Irrigated cropping | 3,603 | 0.09 | 1.00 |
| 3.3.0 | Cropping | 4.3.6 | Irrigated cropping – cotton | 1,194 | 0.03 | 0.33 |
| 3.2.0 | Grazing modified pastures | 2.1.0 | Grazing native vegetation | 767 | 0.02 | 0.21 |
| 3.3.6 | Cropping – cotton | 4.3.6 | Irrigated cropping – cotton | 743 | 0.02 | 0.21 |
| 4.3.0 | Irrigated cropping | 3.3.0 | Cropping | 653 | 0.02 | 0.18 |
| 4.3.0 | Irrigated cropping | 6.2.0 | Reservoir/dam | 650 | 0.02 | 0.18 |
| 4.3.0 | Irrigated cropping | 2.1.0 | Grazing native vegetation | 512 | 0.01 | 0.14 |
| 2.2.0 | Production forestry | 2.1.0 | Grazing native vegetation | 462 | 0.01 | 0.13 |
| 1.3.0 | Other minimal use | 3.3.0 | Cropping | 404 | 0.01 | 0.11 |
| 3.3.0 | Cropping | 6.2.0 | Reservoir/dam | 366 | 0.01 | 0.10 |
| 4.3.6 | Irrigated cropping – cotton | 6.2.0 | Reservoir/dam | 266 | 0.01 | 0.07 |
| 3.1.0 | Plantation forestry | 3.3.0 | Cropping | 249 | 0.01 | 0.07 |
| 2.1.0 | Grazing native vegetation | 5.8.0 | Mining | 209 | 0.01 | 0.06 |
| 4.3.6 | Irrigated cropping – cotton | 2.1.0 | Grazing native vegetation | 209 | 0.01 | 0.06 |
| 2.1.0 | Grazing native vegetation | 5.2.0 | Intensive animal husbandry | 177 | <0.01 | 0.05 |
| 2.1.0 | Grazing native vegetation | 3.4.0 | Perennial horticulture | 172 | <0.01 | 0.05 |
| 2.1.0 | Grazing native vegetation | 4.4.0 | Irrigated perennial horticulture | 169 | <0.01 | 0.05 |
| 2.1.0 | Grazing native vegetation | 5.4.0 | Residential | 142 | <0.01 | 0.04 |
| 6.2.0 | Reservoir/dam | 4.3.0 | Irrigated cropping | 106 | <0.01 | 0.03 |
| 2.1.0 | Grazing native vegetation | 4.5.0 | Irrigated seasonal horticulture | 95 | <0.01 | 0.03 |
| 4.3.0 | Irrigated cropping | 4.3.6 | Irrigated cropping – cotton | 86 | <0.01 | 0.02 |
| 1.3.0 | Other minimal use | 4.3.0 | Irrigated cropping | 66 | <0.01 | 0.02 |
| 4.3.6 | Irrigated cropping – cotton | 3.3.0 | Cropping | 50 | <0.01 | 0.01 |
| 1.3.0 | Other minimal use | 6.2.0 | Reservoir/dam | 48 | <0.01 | 0.01 |
| **Total** | | | | **361,831** | **9.40** | **100** |

Figure 10 presents an analysis of the 1999–2013 land use change within the *grazing native vegetation* and *cropping* land use classes.

The largest proportion of land use change was from *grazing native vegetation* to *cropping* (257,142ha or 92% of the total change from *grazing native vegetation*), followed by 9,426ha (or 3%) changing to *irrigated cropping*. (Figure 10–a)

Figure 10–b shows that the land use change from *cropping* was largely to *grazing native vegetation*—70,213ha or 94%.

Part of the reduction in *grazing native vegetation* was offset by 70,213ha or 97% of the total change from *cropping* changing to *grazing native vegetation* (Figure 10–c)

Almost all (99%) of the land use change to *cropping* came from *grazing native vegetation*—257,142ha. (Figure 10–d)

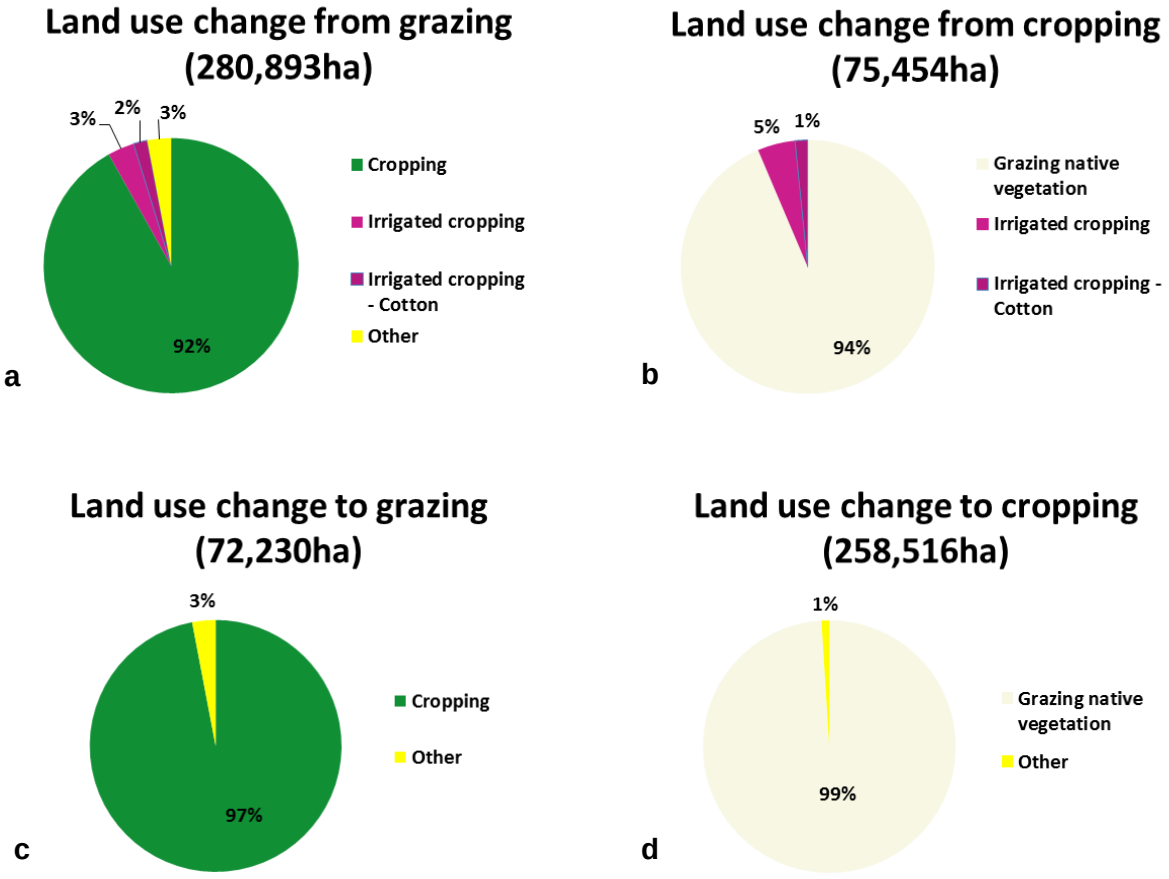


**Figure 10: Charts (a–d) of 1999–2013 land use change within the grazing native vegetation and cropping land use classes**

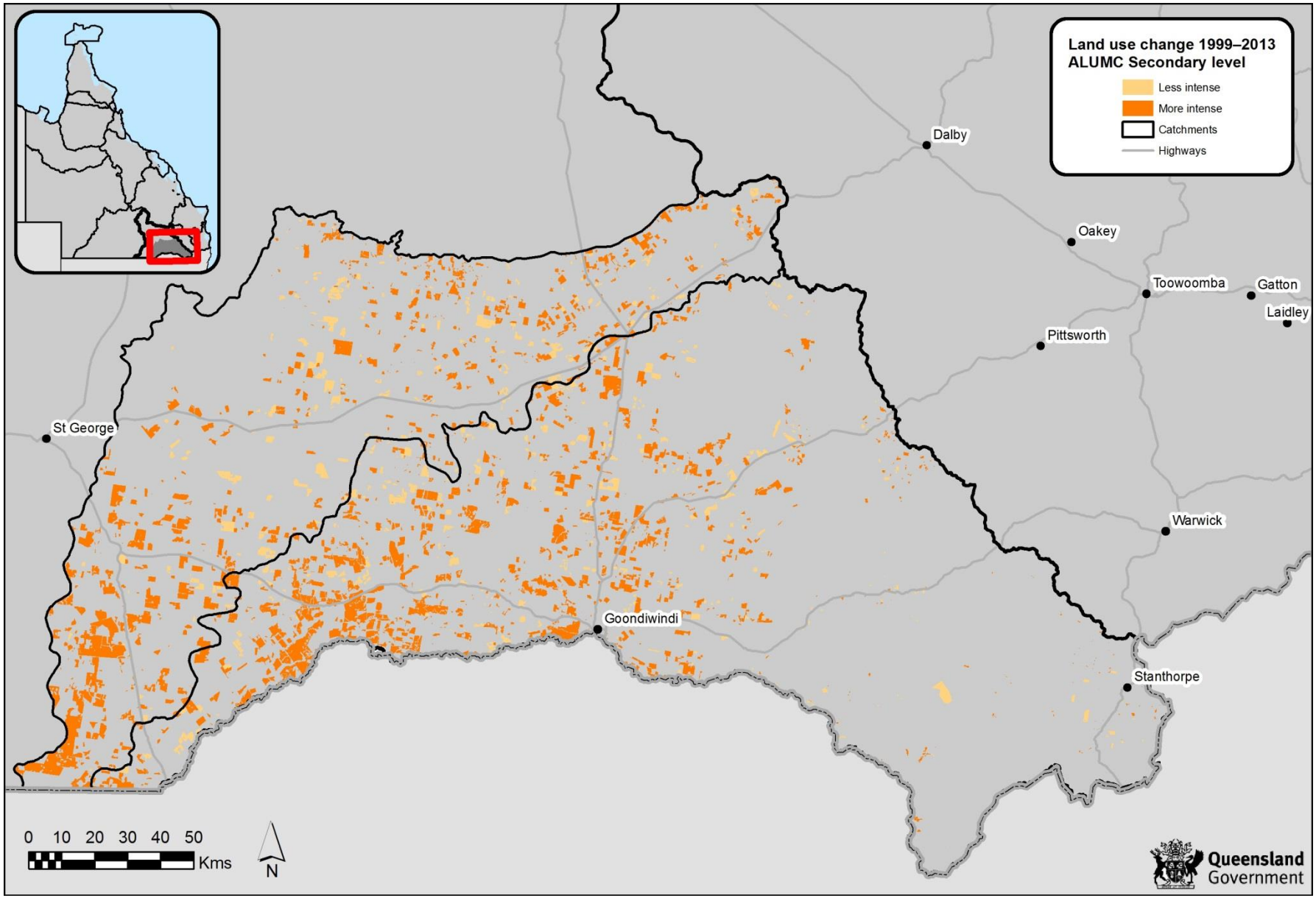


**Figure 11: 1999–2013 land use change map at secondary level for the Border Rivers and Moonie catchments**

# Appendix B Accuracy assessment

The accuracy assessment provided reference data suitable for assessing the 2013 land use map. For each of the sample points, the true land use class was independently determined (this provided the reference data) based on desktop interpretation of the same imagery and ancillary datasets available to the mapper. These points were then compared to the mapped class (map data) and the information summarised in the error matrix. The accuracy is summarised in terms of total accuracy, Kappa and user's and producer's accuracies. Each accuracy parameter is reported using a point estimate and a 95% posterior interval. Accuracy figures are provided as probabilities between 0 and 1.

Total accuracy provides an estimate of the overall accuracy of the map, and can be expressed as the probability that a point is mapped correctly. However, the total accuracy may be misleading, particularly when a dominant class exists. The Kappa statistic attempts to overcome this problem by adjusting for chance agreement. A common rule of thumb suggests a value of Kappa between 0.6 and 0.8 represents moderate agreement between the map and the ground truth, a value greater than 0.8 suggests strong agreement. Values less than 0.2 suggest the map is only marginally improved compared to a map produced by random allocation.

The user's and producer's accuracies summarise the map's accuracy on a per-class basis. User's accuracy for class A is the probability that a point mapped as A is truly in class A. If the user's accuracy of class A is estimated to be 0.84, then from a random sample of 100 points chosen from areas on the map in this class, approximately 84 would be found to be correct when checked in the field. Producer's accuracy for class B is the conditional probability that the map will show a site as class B given its true state is class B. If the producer's accuracy for class B were 0.84, then from a random sample of 100 points known to be in class B, approximately 84 would also be in class B according to the map. An accurate map should have both high user's and producer's accuracies.

The per-class estimates of accuracy are often not precise, as only part of the total sample points are used to estimate them. As a guide, if the upper bound of the interval for either user's or producer's accuracy is less than 0.5, this may indicate a true misclassification problem rather than inadequacies in sample size.

Points that differ between the map and the reference data may be due to positional or spatial errors. Inaccurate registration of datasets is an example of spatial error. Thematic errors are the incorrect labelling of an area due to difficulties in determining the true land use in that area, or by oversight or other operational errors. Spatial errors influence thematic accuracy. The purpose is to assess the thematic accuracy of land use data. However, as described above, the separation of spatial and thematic errors may be difficult and were not undertaken. As a result, the accuracy assessment reflects properties of the land use data as a whole.

Note: the revised 1999 and 2006 land use and the land use change datasets were not accuracy assessed.

## 2013 land use dataset

The 2013 land use dataset was accuracy assessed with 371 points based on a random sampling strategy, using the map classes (area and frequency) as the strata. The stratified estimate of total

accuracy is 0.93 (0.89, 0.96) and Kappa is 0.88 (0.81, 0.93). As the lower bound of the confidence interval for total accuracy is greater than 0.8, the mapping meets the ACLUMP specification.

Table 7 (page 28) shows the error matrix for the accuracy assessment of the 2013 land use data. For the majority of classes, the reference data agreed with the map data. For example, *cropping* had 62 sample points identified. For 56 of those points, the map data was also *cropping* and therefore correct. For five points the map data was incorrect, as the area was found to be *grazing native vegetation* and for a single point *other minimal use*. The misclassification in this case is likely to be related to the difficulty in separating areas of *cropping* from *grazing native vegetation* as land is harvested for fodder or grazed off (these areas are then mapped as cropping). The appearance of these can be highly variable and classification may therefore not be consistent.

The column ‘proportion’ in Table 7 is the relative proportion in area of the classes that were assessed, not of the catchment as a whole. The areas of other classes that are not amenable to assessment, for example, *grazing modified pastures*, are removed from the total area before the proportions are calculated. This column will total 100%.

Table 8 (page 29) provides the user’s and producer’s accuracy for the 2013 Border rivers and Moonie catchments land use dataset. This demonstrates the majority of land use classes in the catchment have been mapped accurately. The largest assessable land use class in this catchment is grazing native vegetation which has been mapped with very high user’s and producer’s accuracies of 0.961 and 0.970 respectively. The next largest class by area is cropping which also returned very high user’s and producer’s accuracies of 0.894 and 0.995. The error matrix (Table 7, page 28) provides more detail on the misclassifications.

Accuracy estimates based on samples with fewer than two points are not considered sufficiently reliable, and are presented as NA (not available) in the table. Examples are *seasonal horticulture and intensive horticulture.*

The user’s and producer’s accuracy results should be interpreted individually for their respective classes. It should be noted that the classes with a small area in proportion to the total area assessed, and also a small sample size, will return a wide confidence interval. The overall accuracy shows a much tighter confidence interval as it effectively summarises the accuracy results for all the assessable classes.

Some classes with low accuracies have insufficient sample points to provide precise estimates. For example, the producer’s accuracy for *irrigated cropping - cotton* is 0.792; however, from the 95% interval (0.579, 0.917) it can be seen that more sample points would be required to confidently determine class accuracy.

**Table 7: Error matrix for the Border rivers and Moonie catchments 2013 land use dataset**

| | | Reference data | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Map data | 2013 land use class | Nature conservation | Other conserved area | Managed resource protect. | Other minimal use | Grazing native vegetation | Production forestry | Plantation forestry | Cropping | Perennial horticulture | Seasonal horticulture | Land in transition | Irrigated cropping | Irrigated cropping - Cotton | Irrigated perennial hort. | Irrigated seasonal hort. | Intensive horticulture | Intensive animal husbandry | Manufacturing and industrial | Residential & farm infras. | Services | Utilities | Transport & communications | Mining | Waste treatment & disposal | Lake | Reservoir/dam | River | Channel/aqueduct | Marsh/wetland | Total | Proportion (%) |
| | Nature conservation | **6** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0.95 |
| | Other conserved area | 0 | **8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0.73 |
| | Managed resource protection | 0 | 0 | **10** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0.18 |
| | Other minimal use | 0 | 0 | 0 | **6** | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0.10 |
| | Grazing native vegetation | 0 | 0 | 0 | 1 | **66** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68 | 63.89 |
| | Production forestry | 0 | 0 | 0 | 0 | 0 | **20** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 9.72 |
| | Plantation forestry | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 |
| | Cropping | 0 | 0 | 0 | 1 | 5 | 0 | 0 | **56** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 20.69 |
| | Perennial horticulture | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | **5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0.02 |
| | Seasonal horticulture | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | <0.01 |
| | Land in transition | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.01 |
| | Irrigated cropping | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | **8** | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 1.00 |
| | Irrigated cropping - Cotton | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **15** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 1.31 |
| | Irrigated perennial horticulture | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **2** | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0.14 |
| | Irrigated seasonal horticulture | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **4** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0.05 |
| | Intensive horticulture | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | <0.01 |
| | Intensive animal husbandry | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **8** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0.02 |
| | Manufacturing and industrial | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **9** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0.02 |
| | Residential & farm infrastructure | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **10** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0.37 |
| | Services | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **5** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0.08 |
| | Utilities | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | <0.01 |
| | Transport and communications | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **3** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0.02 |
| | Mining | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **7** | 1 | 0 | 1 | 0 | 0 | 0 | 10 | 0.03 |
| | Waste treatment and disposal | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | **4** | 0 | 2 | 0 | 0 | 0 | 10 | <0.01 |
| | Lake | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **4** | 2 | 0 | 0 | 1 | 9 | 0.01 |
| | Reservoir/dam | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **23** | 0 | 0 | 1 | 30 | 0.55 |
| | River | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | **0** | 0 | 1 | 10 | 0.06 |
| | Channel/aqueduct | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 1 | <0.01 |
| | Marsh/wetland | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | **6** | 10 | 0.06 |
| | **Total** | 6 | 10 | 11 | 11 | 10 | 20 | 1 | 63 | 6 | 0 | 1 | 9 | 21 | 2 | 5 | 4 | 8 | 11 | 13 | 5 | 0 | 3 | 8 | 5 | 4 | 33 | 0 | 0 | 9 | **371** | **100** |

**Table 8: User's and producer's accuracy for the Border rivers and Moonie catchments 2013 land use dataset**

| Class | User's | | | Producer's | | |
|---|---|---|---|---|---|---|
| | Estimate | 95% interval | | Estimate | 95% interval | |
| Nature conservation | 0.776 | 0.430 | 0.964 | 0.984 | 0.551 | 1.000 |
| Other conserved area | 0.922 | 0.643 | 0.997 | 0.823 | 0.463 | 0.973 |
| Managed resource protection | 0.936 | 0.687 | 0.998 | 0.873 | 0.214 | 0.987 |
| Other minimal use | 0.550 | 0.267 | 0.817 | 0.044 | 0.011 | 0.213 |
| Grazing native vegetation | 0.961 | 0.897 | 0.992 | 0.970 | 0.845 | 0.986 |
| Production forestry | 0.966 | 0.840 | 0.999 | 0.999 | 0.950 | 1.000 |
| Plantation forestry | NA | NA | NA | NA | NA | NA |
| Cropping | 0.894 | 0.800 | 0.955 | 0.995 | 0.967 | 0.999 |
| Perennial horticulture | 0.566 | 0.253 | 0.843 | 0.255 | 0.018 | 0.800 |
| Seasonal horticulture | NA | NA | NA | NA | NA | NA |
| Land in transition | NA | NA | NA | NA | NA | NA |
| Irrigated cropping | 0.576 | 0.313 | 0.807 | 0.978 | 0.466 | 0.999 |
| Irrigated cropping - Cotton | 0.956 | 0.787 | 0.998 | 0.792 | 0.579 | 0.917 |
| Irrigated perennial horticulture | 0.206 | 0.037 | 0.543 | 0.686 | 0.034 | 0.996 |
| Irrigated seasonal horticulture | 0.506 | 0.184 | 0.820 | 0.419 | 0.038 | 0.899 |
| Intensive horticulture | NA | NA | NA | NA | NA | NA |
| Intensive animal husbandry | 0.745 | 0.446 | 0.932 | 0.546 | 0.028 | 0.990 |
| Manufacturing and industrial | 0.929 | 0.668 | 0.998 | 0.500 | 0.025 | 0.947 |
| Residential & farm infrastructure | 0.675 | 0.421 | 0.871 | 0.846 | 0.279 | 0.970 |
| Services | 0.507 | 0.215 | 0.788 | 0.735 | 0.058 | 0.996 |
| Utilities | NA | NA | NA | NA | NA | NA |
| Transport and communications | 0.261 | 0.067 | 0.577 | 0.249 | 0.006 | 0.958 |
| Mining | 0.646 | 0.355 | 0.880 | 0.493 | 0.024 | 0.934 |
| Waste treatment and disposal | 0.360 | 0.127 | 0.663 | 0.077 | 0.002 | 0.580 |
| Lake | 0.397 | 0.140 | 0.704 | 0.137 | 0.004 | 0.924 |
| Reservoir/dam | 0.748 | 0.580 | 0.877 | 0.892 | 0.413 | 0.954 |
| River | 0.000 | 0.000 | 0.038 | 0.000 | 0.000 | 0.269 |
| Channel/aqueduct | NA | NA | NA | NA | NA | NA |
| Marsh/wetland | 0.548 | 0.267 | 0.815 | 0.416 | 0.050 | 0.813 |