The Mackay Whitsunday Isaac Region Sustainable Forestry Guide provides relevant information and tools to assist producers in achieving sustainable management of their land, whilst maintaining or enhancing farm efficiency and productivity. It is designed to be a resource for finding information rather than a comprehensive manual on forestry management.

This guide has been written for landholders interested in diversifying into forestry in the Mackay Whitsunday Isaac region. It links to the Mackay Whitsunday ABCD Management Practice Framework for forestry.

'A' Class or innovative practices from the ABCD Framework are identified throughout this document.

The Mackay Whitsunday region includes the catchments of the Pioneer, O'Connell and Proserpine River systems and covers an area of approximately 9,000 square kilometres. The climate is subtropical to tropical with a distinctive wet season. The average annual rainfall is 1,300 to 2,000 millimetres and over 50% of this falls in three months between January and March.

Forestry is a minor land use in the Mackay Whitsunday Isaac region, with sugarcane, grazing and natural areas being the most significant. However, this sector offers potential for value-adding. Reef Catchments is working with farmers to explore the possibility of using marginal land for forestry production purposes, to increase returns and deliver environmental benefits.

The Mackay Whitsunday Forestry Management Practices: ABCD Management Framework document has been designed to support the identification, validation, implementation and review of forestry practices that can improve both freshwater and marine water quality and ecosystem health as identified in the Mackay Whitsunday Isaac Water Quality Improvement Plan (WQIP) (Folkers et al. 2014).

The development of ABCD frameworks for a range of industries is pivotal to implementation, monitoring, measurement and continual improvement through the WQIP process. The ABCD frameworks are designed to highlight and facilitate communication about the different levels or standards of management practices (as opposed to resource condition) for different water quality parameters (i.e. sediment, nutrients and chemicals).

The classification provides a definition and scale of improvement from ***Dated***, through ***Conventional*** and ***Best Management Practice***, to future ***Aspirational*** cutting-edge practices. Over time, changes in knowledge, technology, costs and market conditions may validate ***Aspirational*** cutting-edge practices such that they eventually become ***Best Management Practices***. If ***Best Management Practices*** are widely adopted and become the new industry standard, they may become ***Conventional*** practices, while ***Conventional*** practices may become dated.

A *Aspirational*

- New and innovative practices adopted by land managers that require further validation to determine industry wide environmental, social and economic costs/benefits.
- Validation requires R&D and if appropriate, some validated practices will become recommended BMP.
- Development of Farm Management Plans and utilisation of new and innovative technology.

B *Best practices*

- Currently promoted practices referred to as ***Best Management Practices***.
- Widely promoted by industry to achieve current and future industry expectations and community standards.
- Development of Farm Management Plans and utilisation of common technology.

C *Conventional*

- Common practices widely adopted by industry but meet only basic current industry expectations and community standards.

D *Dated*

- Practices superseded or unacceptable by current industry expectations and community standards.

For more information please go to:

Australian Forest Growers (AFG) **www.afg.asn.au**
Timber Queensland – Queensland's peak timber industry body **www.timberqueensland.com.au**
Queensland Department of Agriculture and Fisheries **www.daf.qld.gov.au**
Institute of Foresters Australia **www.forestry.org.au**
Private Plantations Queensland **www.pfsq.net**

Thanks to the following members of the Forestry Working Group for being involved in developing the information used in this guide:

Gary Alsemgeest (Qld Department of Agriculture and Fisheries), Trevor Cavanagh (Australian Forest Growers), Jim Dickens, Ray Greaves (Silviculturist), Carla Lambropolous (Pioneer Catchment Landcare), Peter Muller (Reef Catchments), Daniel O'Keeffe (Reef Catchments), Phil Trendell (Qld Department of Agriculture and Fisheries), Dianne Williams (Forest Grower/Pioneer Catchment Landcare)

Mackay Office
Suite 1/85 Gordon Street Mackay QLD 4740
P: 07 4968 4200

Proserpine Office
45 Main Street, Proserpine, QLD 4800
P: 07 4945 2321

www.reefcatchments.com

REEF CATCHMENTS

Queensland Government

MACKAY WHITSUNDAY ISAAC

FORESTRY SUSTAINABILITY GUIDE *2016*

REEF CATCHMENTS

Queensland Government

Native Hardwoods Forestry Trial

Max McFarlane

The Sustainable Agriculture Innovative Forestry Trials aim to demonstrate new innovations for forestry management and production in the Mackay, Whitsunday and Isaac regions.

Max McFarlane has a cane farm located near Bloomsbury on the O'Connell River. His aim is to diversify his operations and utilise marginal land. The trial will be used to demonstrate native forestry potential on land not suited to cane production and to identify which species perform best. Max has completed a systems repair project on the O'Connell River with re-vegetation to assist in stream bank stabilisation.
The land type is alluvial and quite rocky and the trial site is approximately 0.5 ha. Current Remnant 2011 Regional Ecosystem (RE) mapping identifies the area as non-remnant vegetation, cultivated or built environment. However, the pre-clearing RE is identified as 8.3.6, which is endangered under the biodiversity status classification. Very little remains of this vegetation type due to its occurrence on very fertile alluvial soils, which have mainly been cleared for agriculture. Below is a satellite image of the trial area highlighted in yellow.

The soil type is a sandy, stony, multi-layered, recent alluvial soil that has formed on the active levee of the O'Connell River. The topsoil is a thin (0.1 m) black, loamy fine sand, that has 20 – 50% of small to large (6 to 200 mm), rounded gravels. It overlies a thin (0.15 m), dark brown, loamy fine sand subsoil that contains 10 – 20% of smaller (2-60 mm) rounded gravels that overlies buried soil horizons at 0.25 m. The buried soil materials consist of a thin (0.15 m), very dark grey brown, clayey fine sand, which overlies very stony, dark brown, sandy clay loam former subsoil that extends to at least 1 m.

The analytical data in the table below shows that the topsoil is acidic, with very low levels of soluble salts and has good fertility with very high available phosphorous, moderate total nitrogen and sulphate - sulphur, but low organic carbon levels. Cations are at moderate levels except for potassium, which is low. The copper and zinc trace elements are low, while manganese and iron levels are moderate.

Species were selected based on reports of previous farm forestry trials in the Mackay Whitsunday area. Seed has been purchased (where possible) from commercial forestry seed suppliers (to ensure parents are of good genetics) and propagated through a commercial forestry nursery including:

- Eucalyptus cloeziana – Gympie messmate – northern and southern provenances
- Corymbia citriodora ssp. variegata –Spotted gum – Woondum provenance
- Corymbia citriodora ssp. citriodora – Lemon Scented spotted gum - Hughenden provenance
- E. tetradonta – Darwin stringybark – seed purchased through seed supplier however there was no germination of these species
- E. longistrata – Grey Gum
- E. raveretiana – Black ironbox - local species in O'Connell sub-catchment

Table 1 Soil analytical data for 0 – 0.1m

pH	EC mS/cm	Org. C %	Total N %	Acid P mg/kg	Sulfate – S mg/kg	ECEC meq/100g	Ca meq/100g	Mg meq/100g	K meq/100g	Na meq/100g	Cu mg/kg	Zn mg/kg	Mn mg/kg	Fe mg/kg
5.9	0.045	1.3	0.107	87	4.5	5	3.7	1.1	0.22	0.07	0.3	0.39	7.1	42
acid	v low	low	mod	v high	mod	mod	moderate	moderate	low	low	low	low	mod	mod

PRINCIPLE	MANAGEMENT PRACTICE CATEGORY	**D** DATED	**C** CONVENTIONAL	**B** BETTER PRACTICES	**A** ASPIRATIONAL
		Unacceptable and potentially degrading practices	**Legislative requirement, Forestry Code of Practice, etc**	**Current best management practice**	**Aspirational**
1. Business Planning		No planning undertaken.	Basic plan that takes into consideration immediate financial costs and any legislative requirements (Development Application, Forest Practice Area) as per local or State Government regulations/guidelines.[1]	A costed plan for establishment and maintenance and some consideration of future products and markets.	Same as B plus identification of products and markets.
2. Site Selection/ suitability		No consideration of site attributes for forestry practices, sustainability, resources required to manage the plantation, no business plan/budgeting. No consideration of weed potential of plantation species.	Minimal information on site attributes and species selection (e.g. fact sheets consulted). Compliance with any local or State Government regulation/guideline for Pest plants[3].	Site suitability assessed, species selected are suited to site, amount determined from resources, best quality stock sourced giving consideration to provenance and performance from local trials, from local provider or north of the region. Business/ management plan developed. No species with a high weed potential is planted (refer to Weeds of Mackay Whitsunday region[3]).	Same as B class with consideration of a changing climate (more wind resistance/ heat tolerance, flood and drought etc).
3. Property Planning		No Property Plan, no fire management infrastructure, watercourses not identified and classified. No consideration of natural topography for siting of maintenance, access and harvesting/ snigging tracks.	Aerial photograph of farm with basic site access based on ease/ existing tracks. Have followed the Code[2] applying to a native forest on freehold land. Fire breaks are present and maintained. Watercourse buffer widths identified on plan and marked in the field prior to harvesting and silvicultural activities.	Same as C and Property Plan, mapping layers that include physical and chemical attributes, nutrient deficiencies, water holding capacity of soils, mapping water flow and basing farm plan and access tracks accordingly. Right amount and size of access tracks.	Same as B and complete attributes of the sites with detailed georeferenced soil testing based on EM mapping, elevation/ topographic map, identified planting strategies to overcome soil/site limitations.
4 Soil and Water Management	Site Preparation	Site preparation unsuitable for site attributes, season not considered, no consideration for ground cover during establishment phase.	Site preparation takes some site attributes into consideration and meets any state or local guidelines, minimal groundcover during establishment phase.	Site preparation takes all site attributes into consideration and with relevant management actions implemented, season taken into account, planting time considers position in landscape/time of year (e.g. frost/wet season onset etc.) interrows managed for groundcover (existing or planted).	Same as B interrows managed for groundcover and other benefits.
	Establishment: (in planting zone)	No site preparation to assist with establishment. Boundary of planting zone not marked in the field.	Reducing competition (mechanical/chemical) through heavy reliance of the use of herbicides and herbicide not appropriate for pest species, following label requirements for herbicide. Planting zone marked in the field prior to planting.	Actively managing mulch layer, with strategic use of herbicides based on site/weed type and level of competition. Planting zone mapped and marked in the field prior to planting.	Same as B and herbicide applied with GPS control and from georeferenced weed pressure map. Property plan updated to show planting boundaries and species planted.
	Transport	Access tracks are an erosion source and not managed.	Some management but may become an erosion source, complies with the Code [2].	Whoa boys, filter strips, buffer zones, and sediment detention basin captures runoff.	Same as B with stable road base surface tracks to prevent erosion. Property plan map updated to show location and class of tracks e.g. Planting track, snig track, haul road, fire track, etc.
5. Nutrient Management		No consideration of nutrient requirements, either no nutrients applied or formulation/ application not based on soil tests/ plant nutrient requirements.	Some consideration for nutrient requirements, e.g. soil tests, know how much is applied, may only apply once not annually. Follow Codes of Practice.	Consideration for nutrient requirements, monitoring in place and management decisions are made from monitoring, engage expert advice or agencies, if fertiliser is applied it is applied subsurface in the appropriate location. The type and amount of fertiliser used is matched to site attributes, species requirements and seasonal conditions.	Same as B with automated monitoring, georeferenced records kept on growth rates, applied fertiliser (type, amount and date of application) applied and pre and post foliar analysis etc.
6. Biodiversity and Ecosystem Management		100% exotic species or monoculture of native species with no management for biodiversity or ecosystem services.	As promoted in the draft Code of Practice for Queensland Commercial Private Plantations[5], some management for biodiversity and ecosystem management, mixed plantings.	Leaving or re-instating wider buffer zones on riparian areas, shade trees from previous land use (eg grazing). Plant mixed plantings as individual species plots.	Actively revegetating/ managing riparian zones, maintaining connectivity with biodiversity corridors, maintenance of wildlife refuge areas. Property plan shows each plantation plot with noting of species and planting date. Native forest corridors also recorded on the plan.
7. Weed and Pest Management		Inappropriate weed and pest control, weeds and pests have an impact on growth rates, very poor ground cover or high fuel loads.	Some type of weed and pest control in place, minimise the use of chemicals.	Active maintenance schedule in place for pest and weed control. Appropriate management practices are used to control pests and weeds. Appropriate chemicals are used and label rates are followed, consider diverse plantings to reduce risk of pest outbreak.	As per B and automated monitoring of weeds and pest, link to developed weed pressure map, utilisation of other innovations from other tree crops, keeping records of weed species, abundance and location, collaborate with neighbours. Pest management plan in place and reviewed each year.
8. Stock Management		No stock control resulting in soil compaction, erosion, bare soil, tree rubbing, etc.	Stock excluded until trees are large enough to resist damage.	As per C class plus managed grazing.	Grazing plan in place and reviewed each year.
9. Fire Management		No fire management plan leading to woodland thickening, weed establishment, smothering of rare and threatened flora if fires are infrequent or too cool. Loss of basal area and diversity if subject to wildfires or too frequent burns.	Have followed the Code[2] applying to a native forest on freehold land and follow any local and state regulations including development of a Fire Management Plan.	Same as C and taking in account site, species, seasonal conditions and the use of expert advice.	Same as B and burning for ecosystem and biodiversity outcomes and the use of software. Have acquired third party certification (e.g. AFS, FSC).
10. Harvesting		No harvest plan and inappropriate management practices: creating erosion, compaction, stem damage, etc.	As per Draft Code[5], harvest plan includes: timing, selection, access, fuel storage and types of harvesting equipment, ensure market before harvest. Complies with Harvesting Code of Practice[4].	As per C class with more detail and all actions implemented. Post harvest management plan developed including: progressive rehabilitation/replanting or coppicing and business plan for 2nd rotation.	As per B class and consideration given to seasonal biodiversity requirements.
	Silvicultural Practices	None or very inappropriate silviculture practices.	Standard silvicultural practices are implemented as per draft Code of Practice[4].	As per C class and maximise plantation yield potential through monitoring of yield plots.	As per B and balancing nutrient cycling requirement with profit opportunities e.g. marketing thinnings, plantation auditing maintenance records.
11. Irrigation/ Drainage Management	Irrigation	Inappropriate irrigation management. (Includes over watering, under watering, unnecessary costs).	Irrigate at establishment phase as required.	Same as C and if required into growth phase according to monitoring of seasons, knowledge of water holding capacity and species requirements.	As per B Class and irrigated with water efficiency techniques including irrigation scheduling tools. Property plan includes rainfall and weather records.
	Drainage	Seasonally inundated, actively eroding, inappropriate drainage management in place .	Minimal erosion and drainage management in place.	Planning and management addresses drainage issues, site preparation (e.g. mounding) and appropriate species selection.	Monitoring of runnoff water quality and records kept.
12. Ongoing Monitoring and review		No management plan, no records kept, no regular monitoring.	Management plan in place, monitoring and records kept as per draft Code[5] and Native Forest Code[2] or industry/market requirements.	As per C class and post silvicultural practices auditing, reviewing and updating of plans with continual improvement.	As per B class, and some specific monitoring/ yield plots.