



## Product:

# Irrigated Forest Plantation and Cropping Program

## The Challenge

Tree Crop Technologies' Irrigated Forest Plantation and Cropping Program is an environmental response to the Coal Seam Gas (CSG) Industry's problem of managing large volumes of marginal quality water produced as a by-product of CSG production.

Rapid growth in the Australian CSG industry, combined with a desire to turn CSG water from a waste product to a valuable resource, led Tree Crop Technologies (TCT) to apply its unique expertise in forestry, effluent irrigation and salinity management to the challenge and devise a triple bottom line solution that provides economic, social and environmental benefits.

## Overview

TCT's Irrigated Plantation Program complies with the Queensland Environmental Protection Agency's (EPA) strict operational policy for beneficial use of CSG water.

Relative to the other options, we offer an environmentally sustainable alternative to traditional water management practices at a substantially reduced cost.

The Irrigated Plantation Program has 6 key elements:

- Detailed feasibility study
- Planning and environmental approval
- Site preparation and plantation establishment
- Irrigation system design and construction
- System operation and maintenance
- Detailed monitoring and continual improvement

Each component is tailored to meet site specific factors, water quality conditions and client gas production needs to create an integrated, whole-of-life forestry and agricultural based water management system. A full function project delivery service integrates all aspects of project execution. TCT's systems and corporate governance comply with CSG industry standards.

## Integrated Turn-Key Water Management

### Detailed feasibility study and system design

Soils, landform, hydrology and CSG water quality vary significantly by location. The initial stage of the irrigated plantation program involves evaluation of land and

## Program Capabilities

- Scalable with the capacity to use large and variable volumes of water.
- Can be safely established close to the gas fields to reduce infrastructure costs.
- Environmentally sustainable; most CSG water is taken up by plantation trees and re-evaporated into the atmosphere.
- Highly cost effective relative to other water management options.
- Adaptive irrigation management balances environmental considerations such as plant health and soil integrity against variable CSG water flows and changing weather conditions.
- Creates a carbon sink to reduce greenhouse gas emission intensity.
- Restores cleared land to forest cover, enhances biodiversity and expands wildlife corridors.
- Provides commercial crops.

water resource parameters, then tailoring the management approach to meet the site and water quality conditions.

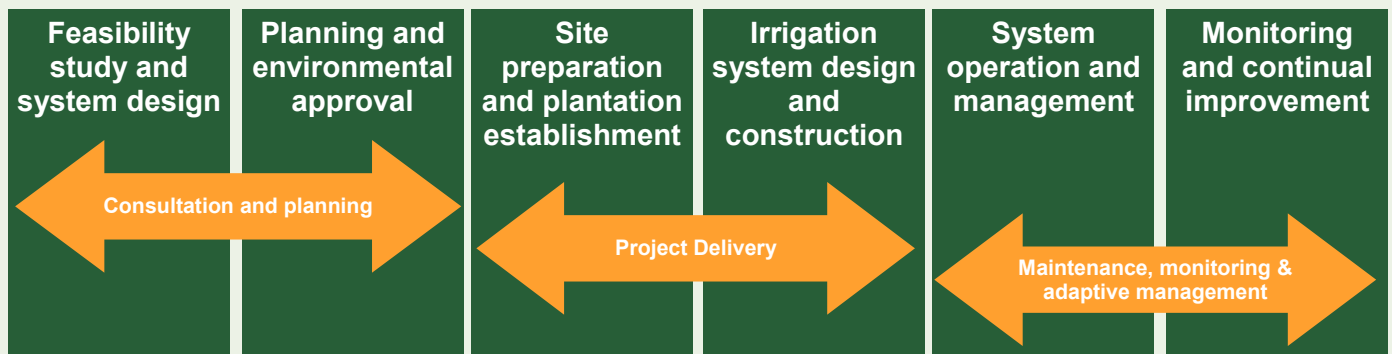
TCT's research and consultancy services include review of landform and climate conditions, cultural heritage values, protected vegetation, site appraisal, evaluation of CSG water quality and quantity, detailed soil physical and chemical analysis, site hydrology and species evaluation and selection.

Data gathered in this process is used to model processes including water balance, salt balance, soil sodicity, leaching fraction, irrigation scheduling and hydrology.

The modelling informs plantation and irrigation design. Critical design elements are plant health, soil structural integrity and surface and groundwater quality.

### Planning and environmental approval

Having established the parameters of a sustainable system, we form an operational plan detailing crop establishment and management, irrigation system specifications, monitoring and reporting, stakeholder engagement and risk management. Together with the



feasibility study, this plan forms the basis of a Resource Utilisation Plan required by State Government Environmental Protection Agencies for regulatory approval of beneficial use of CSG produced water for irrigation.

**Site preparation and plantation establishment**

Our forestry professionals were instrumental in developing Australian silvicultural systems and the breeding and domestication of suitable species for hardwood plantations. This expertise has been employed in the establishment of 10,000ha of hardwood plantations in Queensland and throughout Australia.

Elements of the silvicultural system include site clean-up methods that conserve soil carbon, cultivation methods that conserve soil moisture and reduce erosion risks, weed control approaches that minimise chemical herbicide use and planting techniques that maximise survival and minimise manual labour inputs. Our technical cropping expertise includes land preparation, cropping management and harvesting.

**Irrigation system design and construction**

In conjunction with our strategic alliance partner, The Pump House, TCT can design, construct and maintain water amendment plant and associated irrigation infrastructure to receive, amend and distribute CSG water in accordance with EPA regulations. Operationally, our water management solution takes control of by-product water from the point of the outflow manifold and manages it to the point of release. Water is amended to a standard consistent with the Australian and New Zealand Conservation Council Guidelines for irrigation quality water. The large volumes of CSG water equate to irrigation on a large scale involving significant capital investment requiring the highest standards of design, construction, operability and accountability from an economic, financial and environmental perspective. Proven experience in system design and construction is paramount.

**Operation and maintenance**

In addition to providing the short to medium term benefits of CSG water management, irrigated plantations are a long term commercial investment in timber and carbon. Maximising the value of the asset requires informed and professional management throughout the

entire timber rotation. We provide cost effective plantation asset management services to capitalise upon the commercial value of the forests.

**Detailed monitoring and continual improvement**

Long term sustainable CSG water management relies on detailed monitoring, feedback and adaptive management. The entire hydrological cycle is monitored using world class telemetry. Key environmental performance indicators are made available via a web interface to provide up-to-the minute data and provide transparency to interested parties. Data is regularly analysed, interpreted and used to inform the adaptive management system.

**Carbon sequestration and environmental benefits**

The forestry plantations are established as a long term commercial crop. Storing carbon in new forests is one of the few immediately available, cost effective options to significantly reduce atmospheric carbon dioxide levels. Carbon sequestered in the plantations may later be used to reduce carbon emissions intensity and liability under the proposed Australian Carbon Pollution Reduction Scheme. One of the benefits of irrigated forestry is that the trees survive as a dry land crop when the CSG water flow declines and eventually stops.

Tree Crop Technologies is an integrated forestry research, consulting, plantation asset management and project delivery company. Our objective is to improve productivity, enhance value and maximise the environmental benefits of forestry plantations and other plant production systems.

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