



Nursery & Garden Industry
Queensland

“We weren’t satisfied with the performance of our existing sprinkler system. There were areas where plants dried out causing major losses and requiring hand watering”
Sue McCormack



Mackay Natural Environment Centre Best Management Practice Sprinkler Layouts

The Mackay Natural Environment Centre (MNEC), located in North Mackay, is one of the nurseries operated by the Mackay Regional Council. The nursery operates with one full-time nursery supervisor, two part-time nursery assistants, and 30 volunteers who attend two mornings per week.

The MNEC specialises in growing local Central Queensland provenance plants for rehabilitation, revegetation and water sensitive urban design projects from the rainforest to the coast. The nursery has a strong

focus on environmental sustainability, and aims to install and manage infrastructure to minimise their environmental impacts. The nursery is also Nursery Industry Accreditation Scheme Australia (NIASA) accredited.

MNEC is located in a residential area backing onto parkland. The production facilities comprise a propagation house, and a mixture of shade and full sun growing areas, on a 0.66 hectare site. Irrigation water is sourced from water tanks collecting water from



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building roofs onsite, as well as recycling water from the growing areas. The nursery also has access to town water supplies. All recycled water is disinfested using an ultra-violet (UV) water treatment system after passing through a media filter to remove matter that would reduce the effectiveness of the disinfestation. A chlorination system is installed as a back up.

The MNEC was constructed in September 2013, but wasn't originally built to meet Best Management Practice (BMP) standards. There were elements of BMP installed, such as plants being grown on benches and recycling of nursery wastewater, but effective water disinfestation and storage of growing media needed to be addressed.

One of the major failings in the system was the design of the sprinkler system. While the Nelson S10 blue jet green plate sprinklers being used were an appropriate choice, the spacing of the sprinklers was variable, which led to some areas being underwatered. These observations were backed up by catch can tests which showed the Mean Application Rate (MAR) was satisfactory, but the Coefficient of Uniformity (CU) and Scheduling Coefficient (SC) did not meet minimum BMP - see table 1.

Table 1: Catch can test results on the original system

Test area	MAR - BMP <20 mm/hr	CU - BMP >85%	SC - BMP <1.5
Back North	11.3	81.2%	2.5
Back	13.9	64.4%	6.0

MNEC had an Irrigation Drainage and Energy Management Plan (IDEMP) developed for the site under the Rural Water Use Irrigation Futures Initiative (RWUEIF). During the development of the IDEMP a recommendation was made to change the layout of the sprinklers to make the spacing uniform and locate sprinklers to the edges of the growing areas. Before making any changes a catch can test was conducted on the existing system, and this confirmed why there were problems with inconsistent watering. Based on technical data on the sprinklers, and observations of the system, it was recommended the sprinkler spacing be changed to a uniform 4.26 metres between laterals

“ As soon as we upgraded the system we noticed an improvement in the uniformity of water application and improved growth of stock ”
Sue McCormack

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with 4 metres between sprinklers along the lateral with an operating pressure of 250 kilopascals.

Changing the spacing of the sprinklers was made easier as they had been mounted on movable stands with flexible connections, allowing them to be placed at the right spacing without having to relocate laterals or underground infrastructure. However, the benches had to be moved to enable the relocation of the sprinklers and ensure the available area was being used more efficiently, allowing more plants to be grown in the same area.

Once the sprinklers and benches had been relocated another catch can test was conducted, which showed the system now exceeded minimum BMP standards - see table 2.

Table 2: Catch test results after sprinkler system upgrade

Growing area	MAR - BMP <20 mm/hr	CU - BMP >85%	SC - BMP <1.5
Overflow area	7.4	90.0%	1.3
Temporary holding area	16.2	88.6%	1.2
Grasses area	12.8	91.8%	1.3



In addition to changing the sprinkler layout additional growing areas were constructed, increasing the available growing area from 0.22 to 0.38 hectares, including dedicated wetland plant beds and new seed and cutting houses. A web-based Galcon irrigation controller was also installed. Irrigation scheduling changes can be easily made with the web based controller even when away from the site.

The MNEC is a small nursery, but the changes made to the irrigation system have made a significant difference to the productivity from the site, while improving water use efficiency.

The overall effect of these changes saw an increase in water use of 0.25 ML/annum with a corresponding increase in energy costs of \$238. This equated to an increase in water and energy use of 8.9%. The increase in the growing area was 73%,





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but water use/ha/annum decreased by 37% due to the more efficient irrigation system. The change in productivity from the improvements resulted in an overall \$162,400/annum increase in gross income and a productivity improvement of \$47,385/ML.

With a more efficient system now installed the focus for Sue and the team is to now improve the system in other areas, such as irrigation scheduling and fine tuning the location of their crops so the water applied to an irrigation zone matches the amount of water all of the plants require.



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