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New Nursery Built on the Back of IPPS Seeking and Sharing

David Hancock

Natural Area Nursery, Natural Area Consulting Management Services, 57 Boulder Road, Malaga, WA 6090, Australia

david@naturalarea.com.au

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Summary

Natural Area Nursery in Western Australia started from humble beginnings in 2005 and grew into an 800,000 annual turnover of tubestock from 80,000. Over the 15 years, the Government leased land of the nursery quadrupled in area as well. At the beginning of Covid pandemic, in January 2020, the Government of Western Australia asked for the return of the land for a new train station complex. This paper describes the identification of land, logistics, designing, building and relocation of the massive operation within the two-year timeframe allocated by the Government. In addition to all other factors, the dedication and hard work of the staff of the Natural Area Nursery made this relocation possible.

INTRODUCTION

This paper underlines the international nature of the IPPS. The Natural Area Nursery (Naturalarea, 2024) is a family run business that had operated from a long-term Government leased site at Whiteman Park in Western Australia commencing in 2005. The nursery area quadrupled in size over 15 years to production of tube stock from 80,000 to 800,000 (**Fig. 1**). The piecemeal expansion led to fragmented logistics, with three separate nursery areas across a tight and disjointed area.

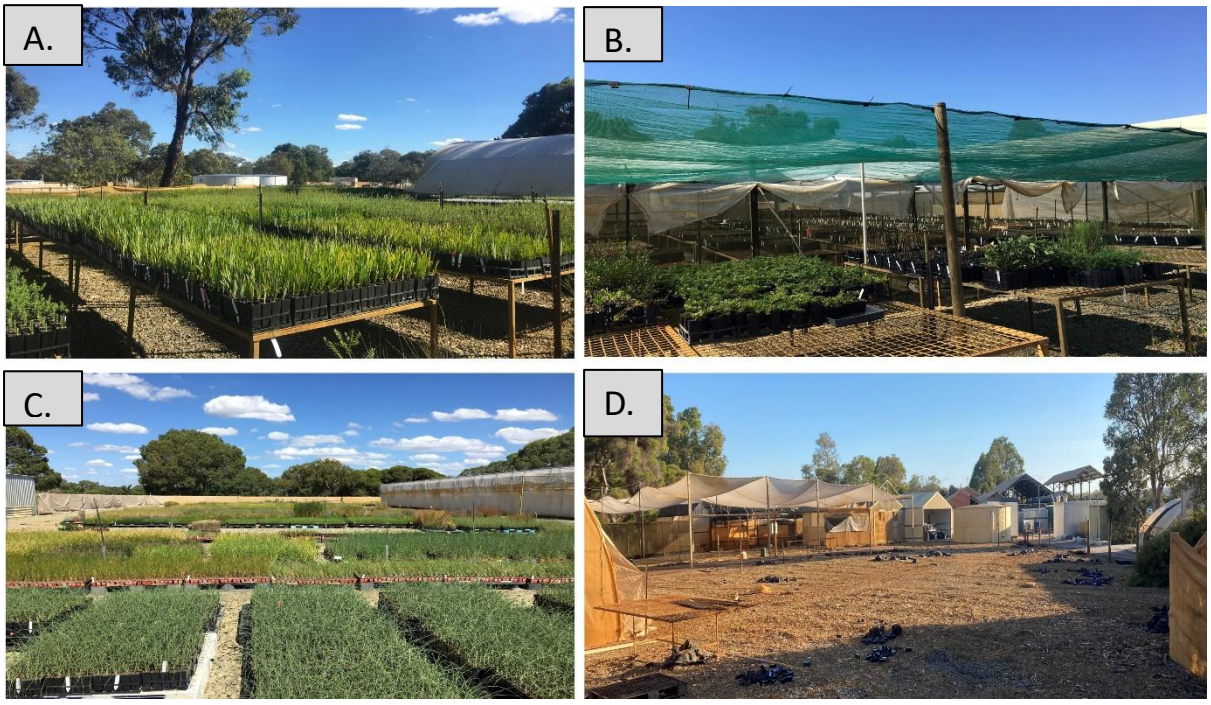

Figure 1. Over 15 years, the old nursery developed into a large operation with three different disjointed area with fragmented logistics. **A**) Open benches **B**) Covered benches and **C**) on ground tubestock. **D**) At the time of moving out to the new nursery.

At the same time that Covid pandemic hit in January 2020, The State Government of Western Australia advised that they wanted the entire site for a new train station complex for a rail line. We were being forced to relocate and needed to exit the site by the end of 2021, giving us less than 2 years. Almost a year went by in searching for a new site, negotiating for relocation, rebuild compensation, appointment of engineer and designs and finding building companies for the works.

A new and level site 4 km away was finally agreed upon in early 2021 and the huge task of managing the existing nursery and at the same time project managing the new nursery construction was underway with a 12-month deadline. The works were undertaken at a time of extreme shortages of labour and material supply delays due to Covid impacts. Despite Government driving the requirement to move, we faced the frustration of dealing with multiple agencies for planning, heritage, environmental, transport and services. The new site had no services and new installations for power, water and communication were necessary. In the very early stages, we had initially hoped to time our relocation to late winter/spring of 2021, but the time taken to deal

with all the preliminaries meant that we were facing a stock relocation in late 2021 early 2022 and at high stock levels, in the heat of Perth's summer.

THE NEW NURSERY

The new nursery design and specifications achieved (**Fig. 2**) was a game of endless brinkmanship as the Government was only committed to replace like for like but the Government required that we project manage the entire build and relocation. An enormous amount of management time was involved effectively taking one Full Time Equivalent staff time for 1.5 years. The demands on the nursery team were extreme but the prospect of a much better work environment and nursery facilities drove them on.

Figure 2 shows that we went for bitumen hardstand around all the traffic areas to allow for heavy vehicles and deep compressed bluemetal for the growing areas. The buildings were spaced to allow machinery and trailers adequate room to allow access by vehicles and forklifts. The growing program remained essentially the same as the old nursery but with enhanced space. It was a good result, well above our expectations.

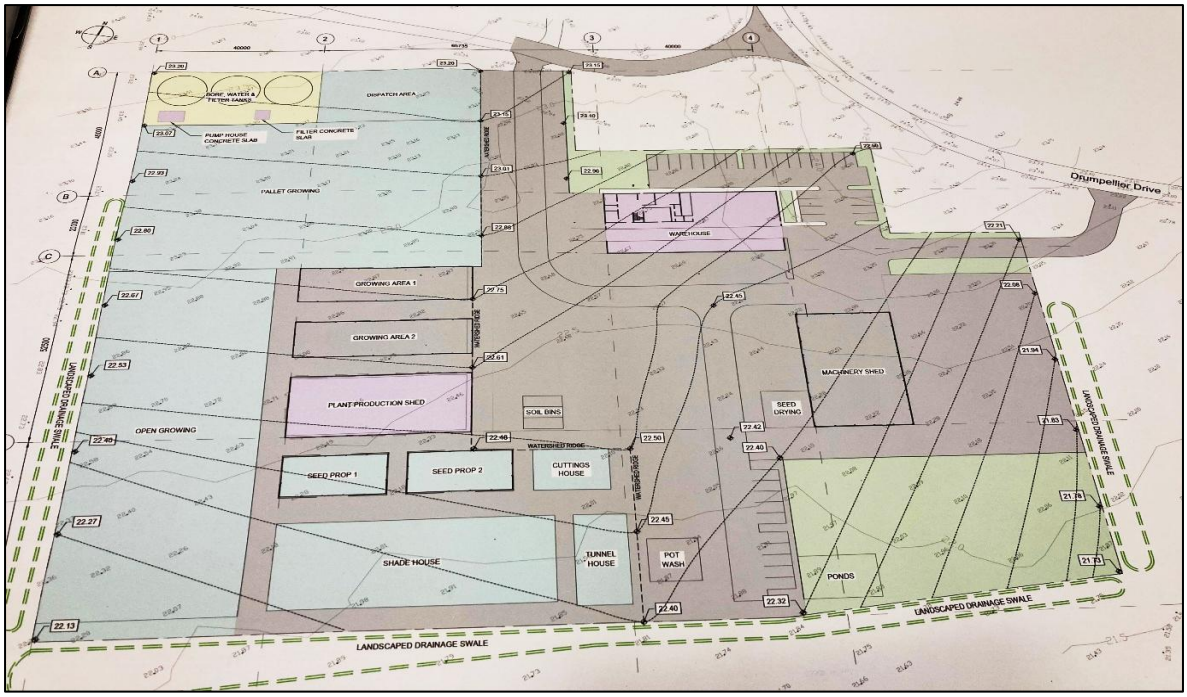

Figure 2. The new nursery plans involved bitumen hardstand around all the traffic areas to allow for heavy vehicles and deep compressed bluemetal for the growing areas. The buildings were spaced to allow machinery and trailers with adequate room to allow access by vehicles and forklifts.

The stock transition in January 2022 was difficult in 40 plus degree Celsius heat and losses in stock and production time were high and for which no compensation was payable. The dedicated staff did an amazing job. In total it took four trucks and four forklifts 10 days and almost the entire company workforce to get it done. The new nursery has superior water quality and systems (**Fig. 3** and **4**) and enhanced production facilities for staff and stock.

Figure 3. The new nursery has superior water quality thanks to the installation of modern **A**) Bore water filter. **B**) Large water storage facilities. **C**) Irrigation pumps with digital control and **D**) Screen filter.

Water Supply in the New Nursery

There is an onsite groundwater bore with automated supply to storage tanks (**Fig. 3B**). Bore water is filtered via Netafim F600 with clay-based media to remove solids (Netafim, 2024) and to reduce iron levels to below 1 part per million (**Fig. 3A**). Automatic back wash water supplies a seed production area. Water storage capacity is 960 KL in 3 x 320 KL steel tanks independently filled (**Fig. 3B**). Storage is for cover in event of bore pump failure. The irrigation system is installed with 4 x Grundfos CRE 20-4 variable pressure pumps (Grundfos, 2024) each on consecutive demand delivering up to 80 KL per hour (**Fig. 3C**). This is sufficient to water the entire outside nursery area at one time if required.

Nursery is watered by station selection based upon plant needs and to minimise power draw, watering in daylight hours to suit 30 kw solar power system output. Service water is supplied via Grundfos constant pressure jacking pump to 25 watering service points across the nursery. Additionally, the water system is equipped with a post pump filtration unit - Netafim screen guard at full pressure with 120 µm mesh (~1.5 human hair width) (**Fig. 3D**) and automatic back wash water used to supply seed production area.

Irrigation control is managed by a Signal SDS 50 system operated by remote cloud app to adjust station start and run times and monitor pump pressure (Signal, 2024) (**Fig. 4**). Willowbank Frost Watch Environment System® is set to operate short run irrigation cycles at 1 degree and lower. For the emergency power system backup, we have a hard-wired generator to bore and irrigation system. For irrigation outlet controls Bermad Solenoids® and Netafim Orkal® disc filters have been installed to fine spray overhead irrigation areas.

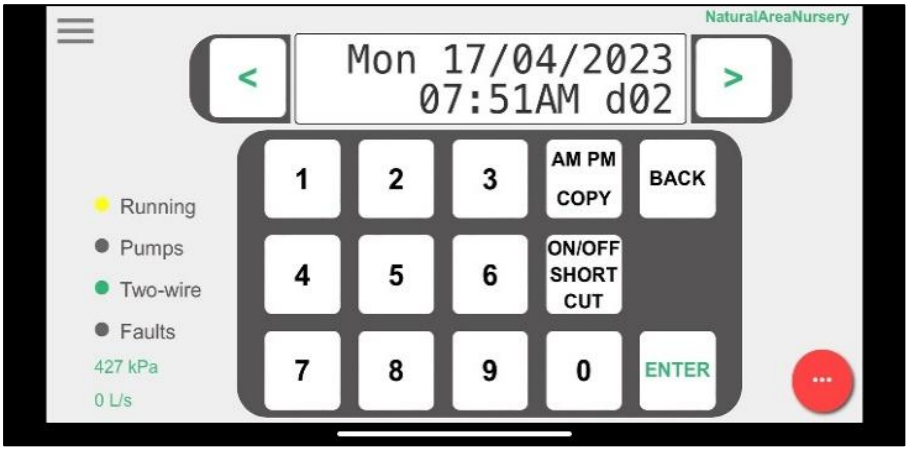

Figure 4. The digital control system of the water pump.

As a result of these improved facilities and practices, the outlook for the 2023/24 season is much improved on what was achieved in 2022/23 and has overcome the stock and sales shortfalls due to the move. The current year (2023/24) production target of 1.4 million plants will be achieved.

Logistics in the Nursery

The site design has allowed the use of imported Combi-trac all terrain forklift and small 4 x 4 ride on vehicles and trailers for improved plant movement (**Fig. 5**) not available to us on the old site and the new covered growing areas provide a wide range of propagation conditions. The production shed is insulated to walls, doors and roof with modern in-built conveniences that provide a quality work environment.

Specifications of the New Nursery

Outside growing areas are installed with 14 irrigation stations supplying 300 Netafim Gyronet turbo rated 160 L/h at 5.5 m rests at 3 bars. The current growing capacity is approximately 1.4 million tubes (**Fig. 6A**). The 1000 m^2 shadehouse is equipped with powered retractable top and side screens (**Fig. 6B**).

Figure 5. A) Improved logistics and better planning of the new nursery means that there is space for large trucks. **B**) and **C**) operation of imported Combi-Trac® all terrain forklift and **D**) small 4 x 4 ride on vehicles.

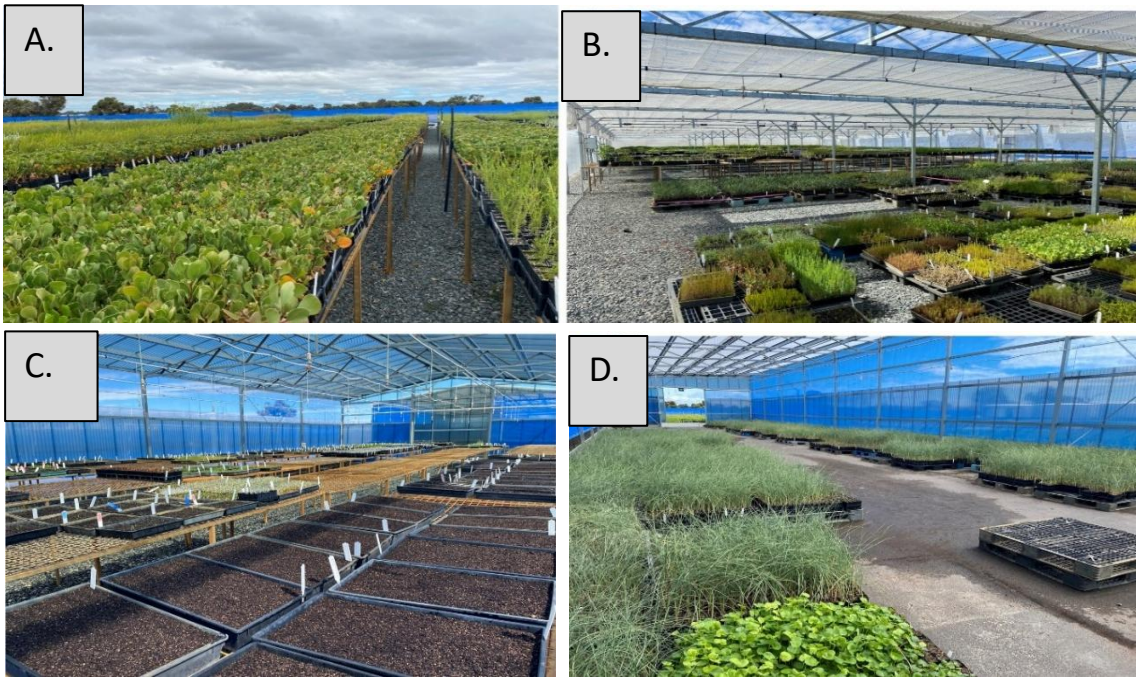

Figure 6. The modern new nursery. **A**) Outside growing areas. **B**) Shade house, **C**) Seed propagation area and **D**) Palletised growing area.

It has overhead irrigation with Netafim Spinnet 90 L/h at 4 m rests operating at 4 bar. The seed propagation area consists of 2 x 200 m^2 enclosed houses with differing polycarbonate roof finish for light and heat control variation (**Fig. 6C**). One house is set at 48% light transfer and 32 % heat transfer and the other at 26% light and 50 % heat. The benches are overhead irrigated with Netafim Spinnet at 90 L/h at 2 m rests at 4 bar. Palletised growing areas have auto seeding in 2 x 350 m^2 with differing polycarbonate coverings. One at 48% light transfer and 32 % heat transfer and the other at 26% light and 50 % heat. Overhead irrigation is provided by Netafim Spinnet at 90 L/h at 2 m rests at 4 bar (**Fig. 6D**). Our design is custom-made for Perth conditions and is working well for our requirements.

Cuttings propagation house is a double skin polycarbonate structure of 200 M^2 with automatically controlled light, temperature and humidity. It is fitted with both conventional and LED lighting. It is equipped with EnviroSTEP™ control system and overhead Netafim Coolnets with 7.5 L/h at 1.5 m rests, 4 bar (**Fig. 7A**). It was supplied by Argosee Greenhouse Technologies, WA, Australia (Argosee 2024). The tunnel house is a 250 m^2 poly film with powered retractable overhead and side shading (**Fig. 7B**). It has a Netafim Gyronet turbo at 160 L/h at 3 metre spacings. This has a capability of higher water output for hotter conditions and was also Supplied by Argosee Greenhouse Technologies.

Plant production shed has an 800 M^2 single-span insulated roof with Bondor double insulated panels to doors and walls (**Fig. 7C).** It also accommodates the air-conditioned office and break-out kitchen/lunch area and wet areas. The sliding doors are 7 x 4 m to facilitate drive through machine movements.

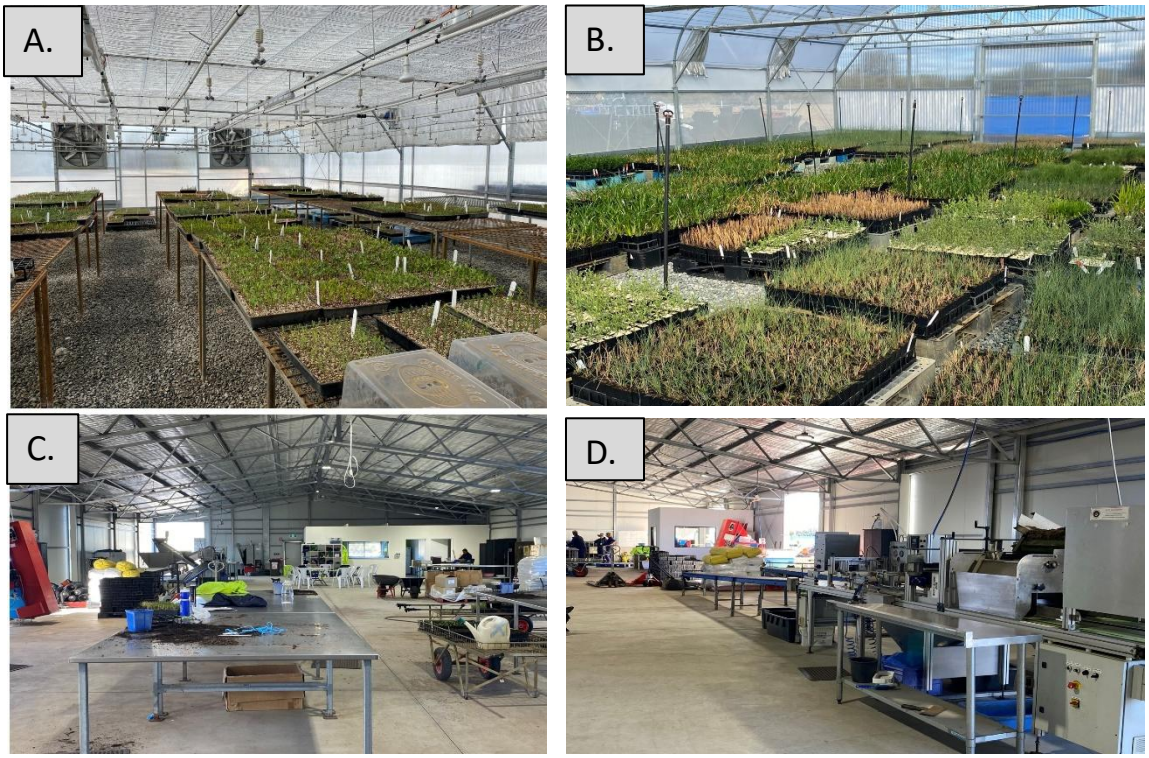

Figure 7. Cuttings propagation house **A**). Tunnel house **B**). Plant production shed **C**) and KW auto seeder and conveyor **D**).

Equipment and other Facilities of the Nursery

The major pieces of equipment include Kanga mini loader, Combi Trac all terrain forklift, Heli HD forklift, 2 x Kubota 4 x 4 ride on with twin 4-wheel steer trailers, KW auto seeder and conveyors (Kwautomation, 2024) (**Fig. 7D**). Also included are Urbinati tray filler (Urbinati, 2024) and a weather station monitored by phone.

The nursery also has three soil bins each with an area of 30 m^2 (**Fig. 8A**). A drone view of the new facility is shown in **Fig. 8B**.

In summary, the vastly improved efficiency, productivity and quality of facilities are being appreciated by the staff. The microclimate and growing conditions within 4 km distance of the old and new nurseries are surprisingly different and it took a full season to understand the site differences. Such a large relocation doesn't come without some shortfalls. For example, the auto retractable shade cloth should have been in separate sections. We brought weeds with stock transfer, and it took a year to clean up, now effectively under control. Additionally, we find that the soil bins are too small for the scale of the new operation.

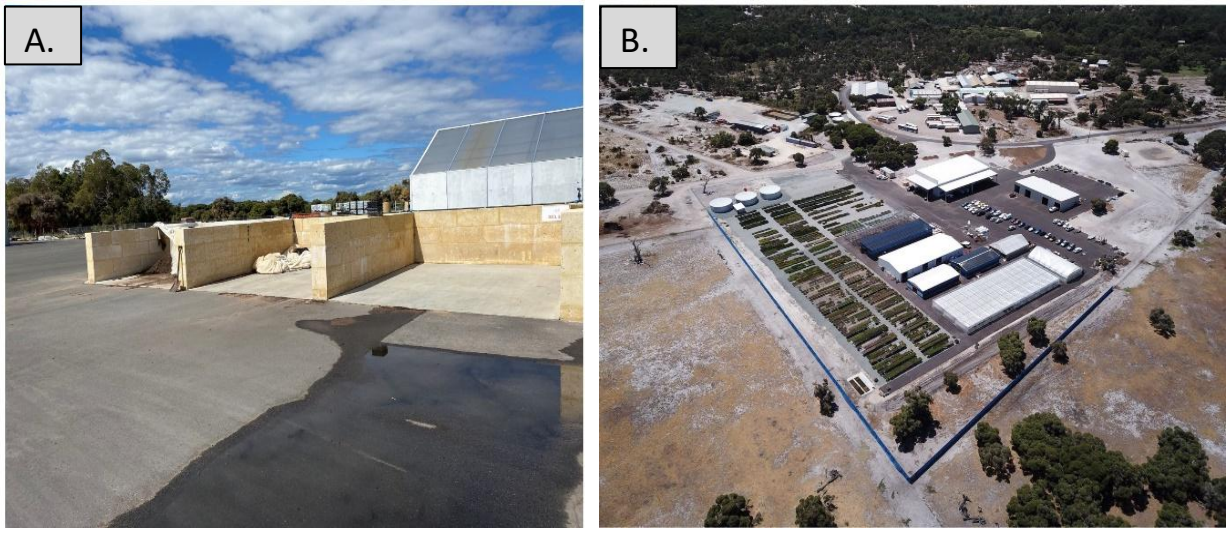

Figure 8. Three soil bins **A**) and drone view **B**) of the nursery.

CONCLUSIONS

Water quality and irrigations standards should be given number 1 priority when planning a nursery. The message from our experience is "Do not underinvest in water systems". Where possible, ease of access, level grounds and hardstand need to be prioritised. Both staff and company will be rewarded when the staff facilities are of high quality. Labour effort can be significantly reduced, and operational efficiency maximised through proper site design. Finally, design space for expansion is important as one never knows how fast operations can expand when properly planned. Without the learnings from IPPS Seeking and Sharing, Natural Area Nursery Team would not have achieved this success.

ACKNOWLEDGEMENTS

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