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Siphonless system development

Once a siphonless layout has been designed, successful siphonless development depends on careful construction and commissioning. This factsheet outlines critical practices and checkpoints for each stage of system development.

This factsheet is part of the *Siphonless Irrigation Factsheet Series*. For background on siphonless systems and their benefits, see *Factsheet 1: Introducing Siphonless Systems*. For a detailed description of siphonless system types, see *Factsheet 2: Types of Siphonless Systems*. For planning and design guidance, see *Factsheet 3: Siphonless System Planning and Design Considerations*. See the *Case study on Getting the most from your Siphonless System* for worked example of design impact.

FARM SURVEY AND DESIGN DEVELOPMENT

- » A detailed survey using RTK GPS is required to achieve the accuracy necessary for irrigation design. Survey data must include existing supply water levels and locations, tailwater outlets, and recycling system elevations.
- » The designer should process survey data to



Figure 1: Designers should attend first irrigation to assist the grower with operating the system in the correct manner. Once the siphonless system performs consistently and manual management is well understood, smart irrigation technologies can offer the next step in efficiency gains. See *Smart Irrigation for Siphonless Systems factsheet series* for more.



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create detailed contour plans, then model land grading requirements using engineering programs to reveal cut and fill volumes and provide accurate cost estimates.

- » A preliminary plan showing proposed layout, cut and fill depths, and budget should be reviewed between designer and grower before committing to detailed design. If required, follow up with visits to other farms to confirm understanding of how the layout functions.

CONSTRUCTION MANAGEMENT

Contractor selection

Select contractors who have relevant experience and have a positive attitude to siphonless systems.

Timing

- » Avoid machinery traffic on wet or very dry soil to minimise compaction and structural damage. Ideal to grow a legume, or cereal crop in the field after land grading, to restore the soil condition.

GPS setup

- » GPS control files for laser grading equipment must be created from the finalized design and verified onsite before commencing earthworks. Ensure the operator has set up the GPS system so that the new design is correctly located relative to existing infrastructure.

Cut and fill area management

- » In areas of deep cuts, the topsoil should be stripped and stockpiled, then these areas overcut by 200–250mm before replacing the topsoil.

Ensure adequate ripping of cut areas to minimise later lifting of surfaces. Compact fill areas to minimise subsidence which will cause ponding and waterlogging.

SYSTEM VALIDATION

Construction verification

- » Survey completed earthworks to verify allowable tolerances before installing infrastructure.
- » Pegging of pipe and structure locations must be precise, including setting correct invert and sill levels. Confirm infrastructure is sized as specified and automation compatibility if planned.

First irrigation

- » The designer should attend first irrigation to assist the grower with operating the system in the correct manner.

Regrading

- » Monitor the irrigation events to assess the potential need to re-level the sill and areas that have subsided or risen.

CONCLUSION

A well-constructed and commissioned siphonless system is the foundation for efficient cotton irrigation. Once your system is operational and irrigation management is well understood, smart irrigation technologies can offer further efficiency gains. See the *Smart Irrigation for Siphonless Systems* factsheet series.

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Footnotes

¹ Small PTBs still require two-meter rotobucks. Whilst offering labour saving benefits, they retain most similarities to manual hand siphon systems and therefore are excluded from general siphonless system comparisons in this guide.

² Siphonless irrigation guide. Smarter Irrigation for Profit, 2019.

³ Grower Case Study 'Norwood' Moree. CottonInfo, 2024.

⁴ Siphonless irrigation guide. Smarter Irrigation for Profit, 2019.

⁵ Siphonless irrigation guide. Smarter Irrigation for Profit, 2019.

⁶ Siphonless irrigation guide. Smarter Irrigation for Profit, 2019.

⁷ Irrigation systems, designs and scheduling options. GVIA. 2022.

⁸ Grower Case Study 'Norwood' Moree. CottonInfo, 2024.

⁹ Bankless channels- Bullamon Plains. More Profit Per Drop. 2011.

¹⁰ WATERpak a guide for irrigation management in cotton and grain farming systems. CRDC. 2012.

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REPORT LIMITATIONS

This guide is an educational resource that has collated current information on siphonless irrigation systems and smart irrigation technologies. It provides general layout designs and description of terms to guide discussions between industry and best practice principles for planning and developing new layouts. However, this information is not prescriptive. Performance outcomes and benefits are site-specific and will vary based on individual farm conditions, management capacity, and technology choices. Growers should adapt this information to their specific circumstances.

Smart irrigation technologies are rapidly evolving. Inclusion of specific products, features, photos and suppliers does not constitute endorsement. Growers should conduct their own due diligence before making investment decisions.