



Using D-Risk to inform potential business expansion at LF Papworth Ltd (Norfolk)

Business profile

Location	Felmingham, Norfolk
Main irrigated crops	Potatoes
Irrigated area	47 ha
Dominant soil type	Very fine and medium sandy loams
Licensed abstraction	82100 m ³ /year
Storage capacity	0 m ³

LF Papworth Ltd - business overview

LF Papworth is a contract farming company, who have been farming in Norfolk since 1926. The major crops cultivated includes sugar beet, potatoes, wheat and maize. Their Felmingham farm is dominated with very fine and medium sandy loams. The business is acutely aware of local and regional water pressures on agriculture and the environment, and are actively engaged with the local agricultural water abstractors group as well as involvement in the NFU Water for Food Group. The business has won several awards including Norfolk County Farms Supreme Championship, and the Environment Agency 2004 Water Efficiency Award.



Managing future irrigation abstraction and drought risks

Maincrop and early potatoes are the irrigated crops at their Felmingham farm. In 2018, the most recent drought year, the business grew 47 ha of high-value irrigated potatoes using the ground water from their borehole. However, the business would like to expand their irrigated area to increase wheat yields on their sandy soils. The annual area of wheat on the farm varies from 20 ha to 140 ha in a given year. The main challenges to this expansion includes understanding how rainfall uncertainty might impact their future irrigation demand and how much area of wheat can be irrigated without compromising their ability to meet the irrigation need of the potatoes.



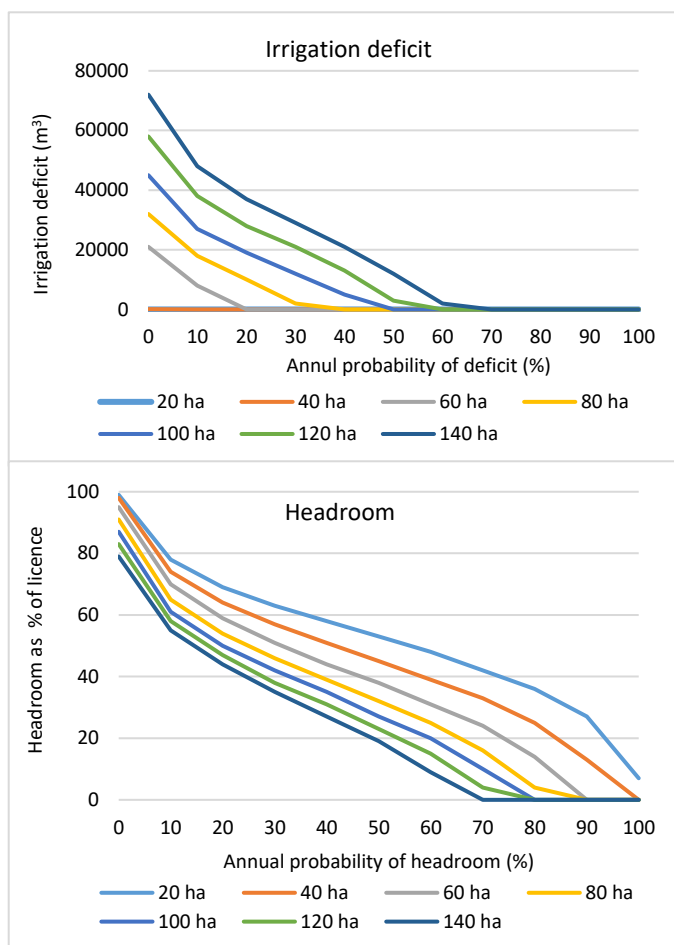
D-Risk – underpinning decisions with evidence

D-Risk uses a dataset of equally probable weather series to calculate multiple estimates of annual irrigation demand for the farm, and its reliability considering current abstraction licence limits. A monthly time-step water balance model is then used to assess how irrigation demands compare against the licensed abstraction for the farm. From this, it is possible to assess any annual irrigation deficit and changes in licensed abstraction ‘headroom’.

Using D-Risk to assess the potential irrigation deficits and changes in abstraction 'headroom' associated with the business expansion

An irrigation deficit is assumed to be any proportion of demand that cannot be met by available supply, either due to annual or monthly licence limits and any abstraction restrictions. Licensed 'headroom' is defined as the proportion of licensed volume that is not used in any given year.

If the future distribution of annual irrigation needs is consistent with the long-term D-Risk profile, LF Papworth Ltd can expand their irrigated area by irrigating up to 40 ha of wheat, without risk of water shortage. However, if the area expanded beyond 40 ha then there is a risk of an irrigation deficit; for example, expansion of the area by 60 ha would lead to an expected 10% annual probability (or 1 in 10-year risk) of having a deficit above 8000 m³. The irrigation deficit associated with expansion of 60 ha or more is a consequence of both utilising the whole licenced volume and being unable to meet peak irrigation needs.



Using D-Risk to inform agribusiness decision-making

D-Risk provides valuable insights on how business expansion may alter the future drought risk profiles at the farm location. It demonstrates how the expansion of irrigated areas to new crops can lead to irrigation deficits due to the alignment of the timing of their peak irrigation needs, despite having headroom. The impact of climate change on the business's risk profiles in the near future are likely to be negligible and mostly within the current natural climate variability represented within D-Risk, unless there are future reductions in groundwater licence allocations. D-Risk can be used by LF Papworth Ltd to help plan their business expansion into irrigated wheat without exposing their high-value irrigated potatoes to unacceptable risks of an irrigation deficit.