

Using D-Risk to inform turf irrigation management at The Wisley Golf Club (Surrey)

Business profile

Location	Woking, Surrey
Main irrigated crop	Fine turf on the golf course
Irrigated area	38.2 ha
Dominant soil type	Sand and sandy loams
Licensed abstraction	101,924 m ³ /year
Storage capacity	0 m ³

The Wisley - business overview

The Wisley Golf Club is a private members' club established in 1991. It comprises three loops of nine holes (27 holes total) and is ranked in the Golf World Top 100 courses. All parts of the course including tees, greens, approaches and fairways are fully irrigated. With increasing demand for high quality playing surfaces, this approach to golf course irrigation is becoming much more widespread. The business is aware of the need for ensuring efficient use of water; and is committed to improving its water management practices on site through investment in new irrigation infrastructure to include the latest innovations in sprinkler design and pumping.



Managing irrigation abstraction and drought risks for optimal playing conditions

The Course Management and green keeping staff are acutely aware of the implications of running out of water and the importance of minimising water use on turf to avoid problems associated with thatch (a layer of accumulating dead turf material) and increased disease risk. Water and energy use across the site are therefore monitored closely to control water use, running costs, and minimise the environmental impact of irrigation on the environment.



One of the major concerns at the Wisley now is how they can plan for the future risk of droughts within a new regime of abstraction licensing, which makes long term forward planning and investment difficult. Their main challenges include securing enough water to maintain optimum playing standards across the course and minimising water abstractions from public mains used in dry years to 'top-up' water during periods of peak turf water use, when peak rates of direct abstraction are insufficient to meet turf irrigation needs.

D-Risk – underpinning decisions with evidence

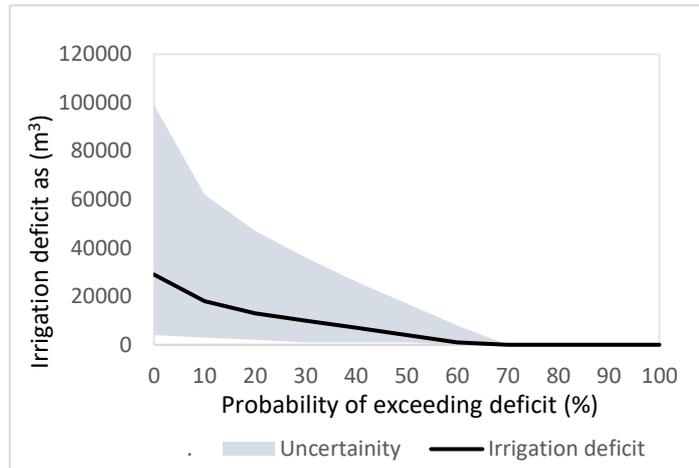
D-Risk uses a dataset of equally probable weather series to calculate multiple estimates of annual irrigation demand, and its reliability considering current abstraction licence limits. A monthly time-step water balance model is then used to assess how irrigation demands compare against the licensed

abstraction. From this, it is possible to assess any annual irrigation deficit and changes in licensed abstraction 'headroom'. Examples are shown below.

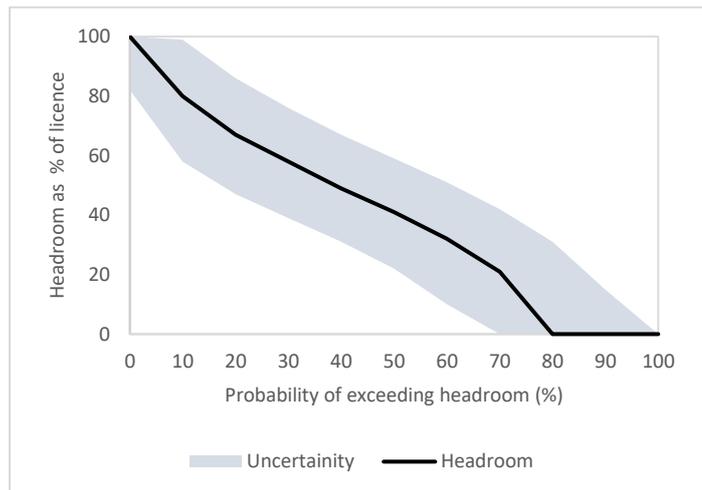
Using D-Risk to assess potential irrigation deficits and changes in abstraction 'headroom'

An irrigation deficit is assumed to be any proportion of demand that was not met by available supply either due to annual or daily licence limits, given the lack of reservoir storage. 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 need is consistent with the long-term D-Risk profile, The Wisley Golf club will have a 60% annual risk of an irrigation deficit, with an expected 10% annual probability (or 1 in 10-year risk) of having a deficit above 18000m³. If the coming years are generally drier and/or more variable than the long-term average, then the 1 in 10 year risk of an annual irrigation deficit could increase to more than 60,000 m³ (see figure above).



The irrigation deficit is a consequence of both utilising the whole annual licenced volume and being unable to meet peak irrigation needs. If the distribution of annual irrigation need follows the long-term average, then there is an 80 % annual probability (or 1 in 5 year) of abstracting the total licenced volume in a given year. Under the worst-case conditions, this increases to an estimated 31% probability (or around 1 in 3 years).



Using D-Risk to inform business decision-making

The D-Risk results reinforce the The Wisley's understanding of the water resources risks they face, as shown by both the high annual likelihood of having insufficient annual licenced volume and being unable to meet irrigation needs in dry years. Such risks are likely to increase in the future due to climate change and the increased competition for scarce water resources in south-east England. The consequence of these challenges for The Wisley is significant use of public mains in dry years, leading to vulnerability to risks of drought restrictions and consequently reduced quality playing surfaces. In this context, D-Risk can help provide valuable insights to The Wisley's management on how modified irrigation strategies, water trading, and investment in new reservoir storage capacity may reduce vulnerability.