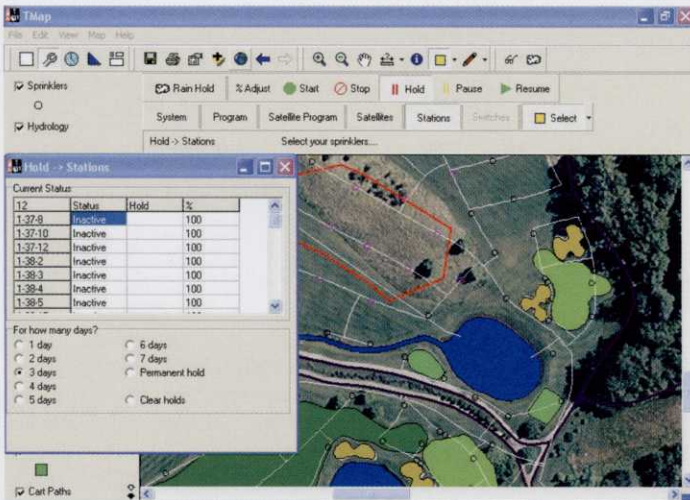


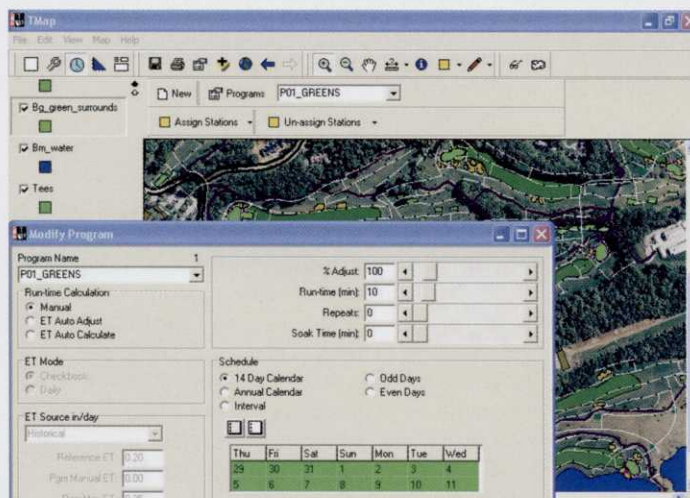
The Way Forward

During the mid-1980s the R&A had the foresight to produce the golf course management document, *The Way Forward*. This document was an attempt to encourage best practice in all aspects of golf course design and golf course management, and over time encourage sufficient development to satisfy the burgeoning increase in demand for the game.

During the past 20 years there have been some outstanding developments. However, during this period there has also been an unprecedented increase in the external factors influencing the development and management of the game, not least of which is climate change.



Here the user has encircled, with a Red boundary, the area that has been placed on a three-day day watering hold



Through the Map, the users can easily make watering adjustments to their irrigation programs and schedules without having to go to the actual database

Historically, both drainage and irrigation designers have used average figures as a basis for design and taken into consideration a 1 in 50 or 1 in 100 worst case scenario. Recent rainfall records and trends seem to indicate that in many circumstances the average is still very much the norm; however precipitation is actually occurring as a boom and bust, famine or fortune, drought or deluge scenario.



This phenomenon has many implications on planning and design. Initially it may be necessary to remove an excess of water from the playing surface by improved drainage techniques; secondly, if we do not consider storage of at least part of this water it will be lost; and thirdly, as natural precipitation is heavier but less frequent the need for irrigation may be increased.

In the 1970s, Adams and Stewart set about the improvement of winter sports pitches by sand slitting. Golf courses have only recently caught up with this technique, which has now become relatively commonplace, especially in new-build work and to existing fairways.

However, as this system allows for relatively rapid removal of water from the playing surface, it may be referred to as a by-pass drainage system when excess precipitation is conducted away before it has time to thoroughly infiltrate the rootzone. In a new-build project this priceless supply of water can be channelled through a series of drainage pipes, lakes and open waterways - flanked with reed beds to filter out undesirable contaminants - to a holding pond. This is then pumped to a storage facility to be recycled as irrigation water, hence conserving an increasingly important resource.

Golf courses were at one time regarded as conservation areas in their own right, a green oasis in the middle of urban sprawl. Conservation measures now far exceed these basic boundaries and demand attention in a modern world. Golf courses have become even greener, with recycling the norm. Removal of surface water has to be done sympathetically and recycled. Application of irrigation water must be carefully calculated and applied, indigenous flora and fauna protected, nutrient and fungicide application reduced to a minimum and the basic archaeological fabric of the site protected.



Count on it.

Adrian Mortram investigates the importance of knowledge and technology when fighting against the varying elements.

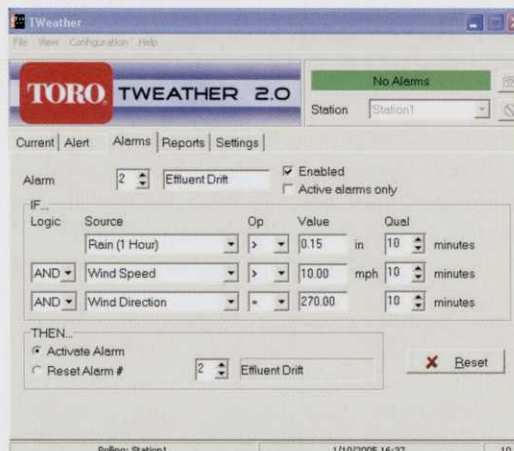
NEW BUILD

The New Dun Laogaire Golf Course, in Dublin, has been designed and built to push back the boundaries as far as possible and encompass these developments. This prestigious project encompasses a 27-hole complex, with 33 hectares of playable surface that constitutes approximately 40 per cent of the total site. For aesthetic and practical reasons, high-tension overhead power lines, which transgressed the site, have been rerouted.

Due to the natural environment surrounding the site, known locally as Ballyman Glen - a proposed Special Area of Conservation, and also proposed for designation as a Natural Heritage Site - there has been a requirement to screen all water leaving the site during the initial construction phase to prevent environmental damage. In accordance with the Environmental Protection statement, it has been necessary to channel all surface run-off through a series of silt fences, establish grips to ponds and create a series of large silt chambers, to prevent the discharge of unsuitable run-off.

Subsequently, the groundwater recharging within the site - by means of recharge ponds, sump, soakaways, and infiltration trenches - has resulted in an ambitious plan to interconnect the drainage water via a 42,000cu metres reservoir to the irrigation system, to collect and recycle the natural precipitation. Reed beds being used as a filter prior to recycling.

Some 140 kilometres of drainage pipe has been installed at a depth of 750mm plus, the system being designed to attenuate for the event of a once in 50 year storm, and was installed with the aid of GPS surveying. The lateral drainage is installed at 500mm plus with sand slitting to the topsoil depth of 300mm to ensure adequate connection with the lateral drainage.



Using the alarm tab, the user has set up an alarm to use with effluent water to control irrigation when the wind or run-off may be a factor due to regulatory issues

As water conservation is of paramount importance in modern irrigation design, accuracy of application is essential. Therefore the irrigation system has been designed to accommodate individual head control, taking into account location, environmental and soil characteristics.

On greens, back-to-back sprinklers allow for differing soil conditions, infiltration rates and vegetation encountered, and between the needs of the putting surface and the surrounds, and prevent minimal overflow into areas of indigenous vegetation. The putting surface has been sown with creeping bent, A4 and A6, while the backdrops of the greens have a predominantly fescue sward to enhance both definition and aesthetics.

The designed annual irrigation water usage is 40,000cu metres, with up to 870cu metres per day. However, actual water usage will be very much dependant on climatic circumstances. Data in the form of daily rainfall records, wind speed and direction and evapotranspiration will be recorded on site by means of a weather station.

There is 39 kilometres of irrigation pipework to satisfy the need of 1,200 irrigation heads each set on a five-way swing joint to aid accurate setting, the whole under the control of a Toro SitePro central decoder control system, while variable speed pumps allow for an energy efficient delivery system.

Water recycling capabilities within the golf course are up to 180 litres per second to the reservoir via a 450mm main. There is also a fire-fighting capability from the main pump unit at the reservoir to the clubhouse.

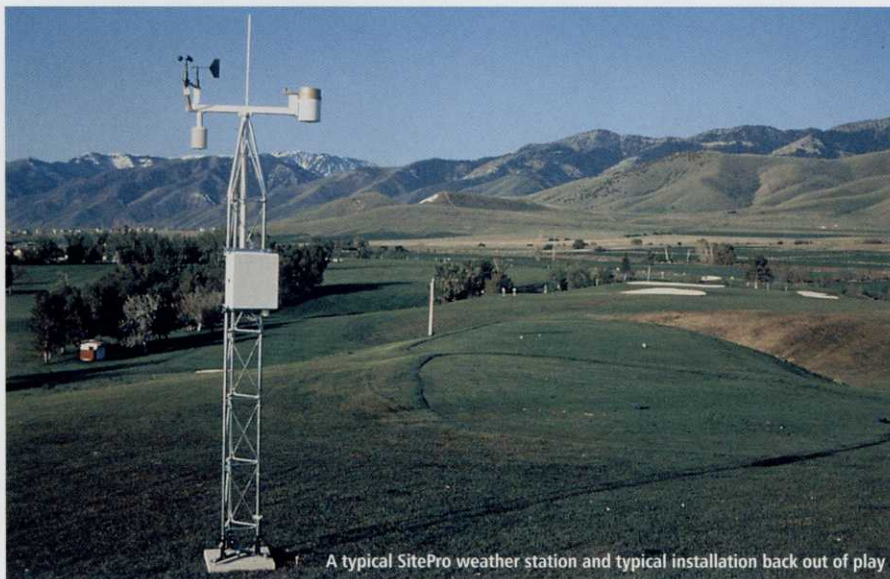
THE MEADOW

In a further attempt to encompass all relevant environmental conditions, five hectares of wild flower meadow has been sown, with the ambitious planting of more than 100,000 trees, to reflect the indigenous population of the area.

In keeping with the sensitivity of the area and the Environmental Protection statement a detailed archaeological survey was undertaken and throughout the initial earthworks a permanent surveyor recorded the site. Minor archaeological finds were identified dating back to Neolithic and medieval times. Within the site, any areas identified to be of significant interest were covered with a geo-textile membrane and buried at depth so that should they be of any interest in the future they may be revisited.

The Way Forward may not be as straightforward for existing golf courses, but current knowledge and technology is available to mitigate most of the problems of the moment, to anticipate some of the problems for the future, and to keep our industry at the forefront of innovative development.

Adrian Mortram is Managing Director of Robin Hume Associates, independent golf course, landscape and sportsturf irrigation consultants.



A typical SitePro weather station and typical installation back out of play