

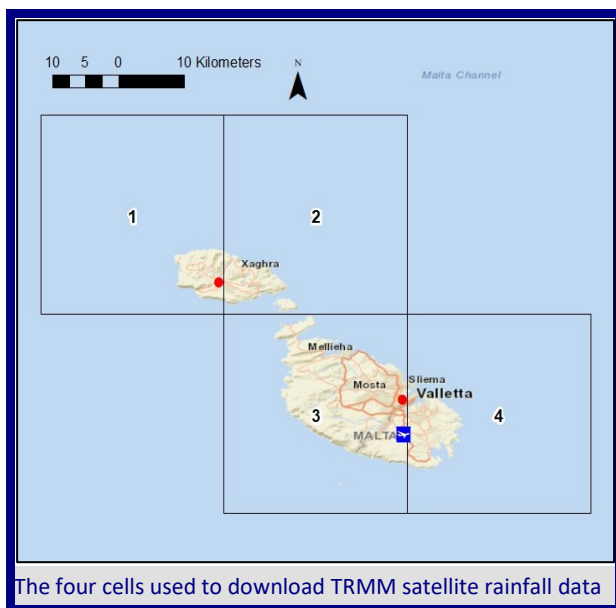
EUROPEAN WORK

Malta and Gozo Extreme Rainfall Study

Partner Harvey Rodda and Associate David Plinston have been involved in a project to generate extreme rainfall data to assist with developments on the islands of Malta and Gozo.

The Mediterranean climate of the area is characterised by intense small depressions which can bring extreme rainfall particularly in the autumn months. These have been termed “Medicanes” as they are also associated with strong winds characteristic of tropical cyclones. The climate also means the islands are subject to summer drought, so water resources are a problem given the islands relatively small land area and the lack of freshwater during the tourist season. New developments therefore need to provide a drainage design which can serve two purposes: to ensure a low risk of surface water flooding, and to allow the storage of surface runoff for potable use.

Due to a lack of readily available rain gauge data, the extreme rainfalls were generated from the TRMM satellite rainfall observation database, a database which WRA has downloaded to provide global coverage of rainfalls down to 3-hour durations.



The four cells used to download TRMM satellite rainfall data

An extreme value analysis was undertaken to estimate rainfalls for a range of return periods for four cells covering Gozo and Malta. These predictions were compared with observations in the scientific literature

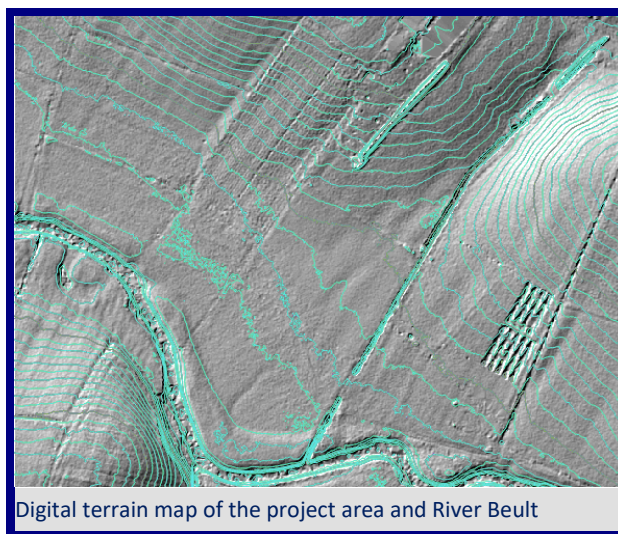
from studies in neighbouring areas of Tunisia and Sicily. In addition to the 3-hour duration, values were extrapolated to estimate design rainfalls for 0.25, 0.50 and 1.00 hour rainfall durations.

Please contact Harvey Rodda (harvey@watres.com) for further information on the use of TRMM satellite data for extreme rainfall analysis.

UK WORK

Wares Farm Wetland Treatment Scheme

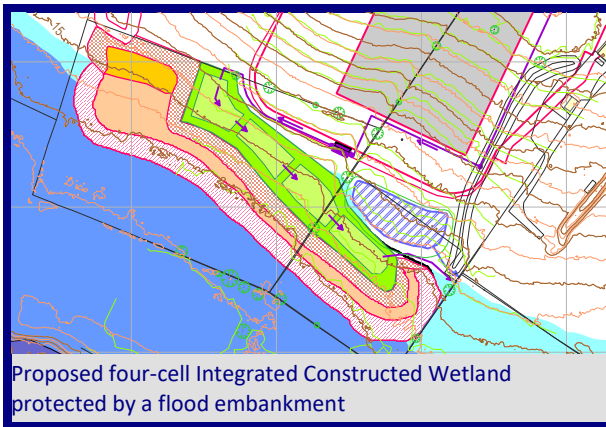
Partner Paul Holmes worked with Aila Carty of VESI Environmental Ltd, an award-winning Irish company at the forefront of Integrated Constructed Wetland [ICW] technology, to design a four-cell system for treating wastewater from a proposed fruit packaging centre at Wares Farm at Linton in Kent. Treated effluent would be discharged to the River Beult SSSI with phosphate concentration constrained to less than 0.2 mg/l.



A preliminary assessment of ecology and hydrology showed that a minimum area of 10,000 m² was required to reduce the nitrate and phosphate concentrations expected in domestic sewage following preliminary treatment in a Kingspan package plant with an effluent flow rate of 50 m³/day.

Further ICW design modifications and discussion with the Environment Agency led to the incorporation of phosphate stripping in the Klargester package plant [by chemical dosing with a precipitant]. This allowed the ICW area to be reduced to 6,000 m² to achieve a

final effluent phosphate concentration of 0.2 mg/l, with four treatment cells.



Proposed four-cell Integrated Constructed Wetland protected by a flood embankment



An example of an Integrated Constructed wetland in Ireland designed by VESI [<https://vesienviro.com/>]

Moreton-in-Marsh Flood Risk Assessment and Design of Surface Water Drainage Scheme

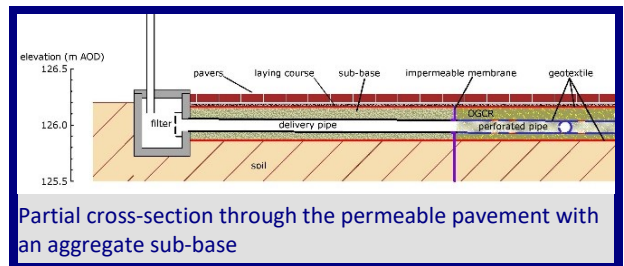
Associate Dr Robin Hall, under the guidance of Paul Holmes, continues to provide support to Cotswold firm, Tyack Architects Ltd, on a wide range of development projects. This section describes one of the projects in the centre of Moreton-in-Marsh, which was badly affected by the July 2007 flooding in the town.



Flooding in Oxford Street in Moreton-in-Marsh in July 2007

WRA prepared a flood risk assessment and designed a surface water drainage scheme to support a planning application for a new dwelling and extension at Vintners House in Oxford Street. Vintners House lies in the Environment Agency Flood Zone 2 of the River Evenlode, and is classified as a minor more-vulnerable development. Modelled flood depths at the site lie between 0 mm and 100 mm for the 100 year event plus 20% for climate change, and up to 400 mm for the 1000 year flood. In 2007 Vintners House was affected by flood waters from west of the town backing up upstream of a culvert in the grounds of St David's School, 180 metres east of the site. With the recently constructed Moreton-in-Marsh flood alleviation scheme and other mitigation measures in place, it is expected that the development would not be affected by the 100 year climate change enhanced flood.

To undertake the design of the surface water drainage scheme, soakage tests were conducted initially, which identified soil infiltration rates of 2.5 m/d, which is acceptable for discharging water to ground. Roof runoff from the new building would be discharged using a shallow infiltration blanket, under part of a permeable pavement. This infiltration blanket was composed of a 0.3m deep pavement sub-base of open-graded crushed rock, which allowed rapid distribution of water through the blanket.



Partial cross-section through the permeable pavement with an aggregate sub-base

New Associate

Marcus Francis has joined WRA as a new Associate. He has a wide background in UK and overseas hydrology covering, the Middle East, Africa, the Caribbean and Central Asia. He brings recent notable experience in reservoir yield studies, reservoir safety and spillway sizing, Water Industry National Environment Programme [WINEP] studies focussing on restoring sustainable abstractions in the UK, and water resources planning for UK water companies.



Next WRA Board Meeting

Friday 17th April 2020, at Marlow.

The WRA Bulletin is a quarterly publication, and relies on contributions submitted by Partners, Associates and Consultants. The document is circulated by email, and published on the WRA web-site, aiming to keep the WRA network up-to-date with respect to current activities. Please email contributions for future issues to Nick Mandeville: nick@watres.com

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