

Background

The uptake of Sustainable Urban Drainage Systems (SUDS) globally has led to some innovative drainage designs.

This project in Spain emphasises the importance of managing surface water runoff through retention and infiltration techniques at source, to overcome the difficulties experienced using traditional separate drainage systems.

La Marina is a rapidly growing urban area within the Municipality of Elche, South of Alicante. This case study documents the drainage design in one of the new developments, called Sector MR-10 shown in Figure 2, an area which accounts for 50% of the total new urbanised area in La Marina de Elche.

SUDS Design at La Marina

The original urban area at La Marina is drained by a combined sewer system, but separate foul and storm water systems are now compulsory for new developments.

Sector MR-10 is located next to the sand dunes which form a natural barrier to the surface water runoff flowing from the mountains (to the west) into the sea.

The drainage design aims to mimic the natural hydrology as much as possible, minimising runoff and laminar flow. It was important to not only control runoff quantity but also quality. Therefore a range of drainage ditches and bio retention areas (see Figure 1) were incorporated to enable the natural removal of contaminants through filtration, adsorption and biological transformation.

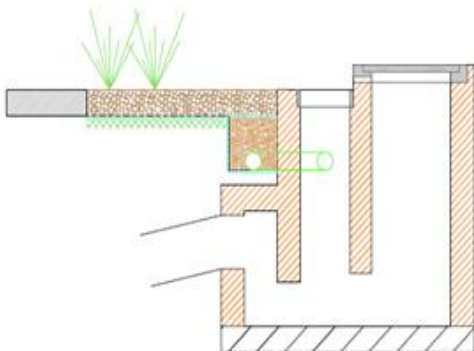


Figure 1: Bio Retention Area



Figure 2: Sector MR-10, La Marina de Elche, Alicante

For ease of surface water management the area was divided into four sub-basins. The runoff generated in each of them is captured using bio retention areas, drainage ditches and subsequently conveyed through a network of pipes to orchard areas for gradual infiltration.

Designing and Modelling

WinDes was used for the preliminary design, detailed design and analysis of the storm water infrastructure.

At preliminary design stage the "SUDS Planner" tool in Source Control was used to select the most appropriate SUDS element(s) for each area.

The detailed design was then carried out using System 1, Drawnet and the Source Control modules.

System 1 and DrawNet were used to create a network of collectors capable of conveying the runoff, without overflowing, for the designated design storm.

Source Control was used to design and evaluate the performance of the SUDS elements as a 'SUDS train'. This process ensured that the optimum solution was provided for each individual component whilst testing the overall performance of the system.

Graphical modelling in Simulation was utilised to enhance the design process. Figure 3 illustrates the top water levels within a series of filter drains, linked with pipes, during a simulation for one specific storm event.

Visualising the system such as this helps the engineer to make design decisions quicker and easier.

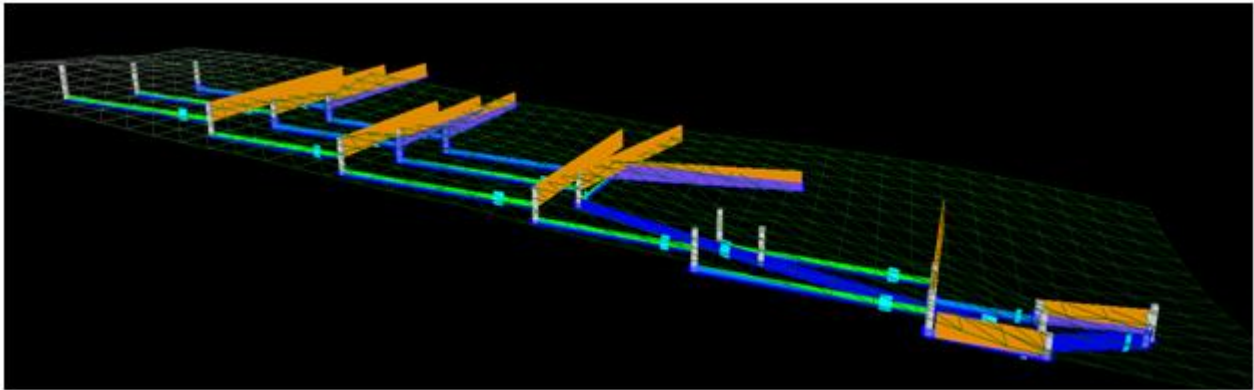


Figure 3: Simulation to identify top water levels

Summary

This case study highlighted how innovative drainage design can provide synergy between cost-efficiency and floodwater management.

The design maximises the integration of drainage infrastructure within the urban landscape producing an innovative, cost effective intervention in the water cycle.

The design achieves a low environmental impact, based on the control and sustainable management of rainwater. It solves the issue of reducing the amount of diffuse pollution from urban run-off whilst enabling natural infiltration to reduce run-off quantity and provides a high amenity value, preserving biodiversity and providing aesthetic benefits.

The use of WinDes enabled this optimum integrated sustainable drainage system to be designed, addressing the location's specific local issues.

Acknowledgments

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Perales, S. (2010).

Diseño y Modelización de Sistemas de Drenaje Sostenible (SuDS). Caso de Estudio: MR-10 de la Marina de Elche (Alicante).

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If you have been struggling to keep abreast of the latest guidance, rules and regulations visit the Micro Drainage Blog at <http://pipedup.wordpress.com>



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