



permeable paving



CASE STUDY
SUDS IN CAMBRIDGESHIRE
COMPARING COSTS AND
PERFORMANCE

Interpave

THE PRECAST CONCRETE PAVING
AND KERB ASSOCIATION



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Introduction

The Lamb Drove SuDS Monitoring project in Cambourne, Cambridgeshire, is important for a number of reasons. Despite the modest size of the site, it demonstrates the use of as many Sustainable Drainage System (SuDS) techniques as possible, including concrete block permeable paving, used in combination to form an effective management train. Despite being retro-fitted to a conventional housing layout, the SuDS are fully integrated with landscaping, proving to be both popular with residents and effective.

Perhaps most importantly, it demonstrates that SuDS work and should cost less than conventional piped drainage in terms of initial, maintenance and whole-life costs. In fact, the project is cited in Defra's Consultation on The National Standards for SuDS in those terms. It also highlights the robust performance of concrete block permeable paving and suggests much longer maintenance intervals – and lower whole-life costs – than currently applied.

Cambourne is a settlement located on high ground and its surface water runoff contributes to a watercourse that has caused flooding to nearby villages. By agreement with the Environment Agency, runoff from Cambourne is limited to the greenfield rate of 3 l/s/hectare (developed area).

The Lamb Drove 'Study Site' is around one hectare and contains 35 dwellings owned and managed by Cambridge Housing Society. It has been compared with a conventionally drained 'Control Site' that is similar in size and density, and located nearby. The Lamb Drove site slopes down from north-west to south-east and is bounded by a public footpath to the north and a proposed golf course to the east. Ground conditions are largely impermeable clay.

Background

Completed in 2006, Lamb Drove in Cambourne, was selected as a SuDS Showcase project within the FLOWS (Living with Flood Risk in a Changing Climate) programme funded by the European Regional Development Fund (ERDF). Cambridgeshire County Council subsequently commissioned Royal Haskoning to carry out a SuDS Monitoring project from 2008 to 2011, measuring the performance of the SuDS over time. This research aimed to assess the outcomes of using various SuDS techniques in a management train, compared with those of a conventional piped drainage system.



Residents and visitors are informed about the SuDS scheme and how it works.



SuDS Design

The SuDS scheme was designed by Royal Haskoning with Robert Bray Associates and applied to an existing, conventional housing layout based around two cul-de-sacs. Two SuDS management trains serve distinct sub-catchments A and B (shown in separate site plans), incorporating the following SuDS techniques:

- Concrete block permeable pavements
- Water butts
- Green roof
- Swales
- Filter strips
- Under-drained swales
- Detention basins
- Retention pond.



Concrete block permeable paved carriageway accepting runoff from conventional block paved drives and parking areas. Concrete kerbs laid flat delineate road edges.



Water is retained in Basin B, a landscaped area for amenity and wildlife.



Under-drained swale A close to homes



Sub-catchment A

Retrofit Layout

Despite layout constraints, natural flow routes have been optimised through the site for low and high flows, as well as for exceedance. SuDS have been integrated with landscape design adding amenity, interest and biodiversity to an otherwise unremarkable scheme, and a holistic approach taken. While roof water is piped directly to swales and basins, impermeable areas such as driveways simply discharge onto the concrete block permeable paving. Under-drained swales have been used for dry surfaces near homes while wet swales elsewhere provide opportunities for wildlife.

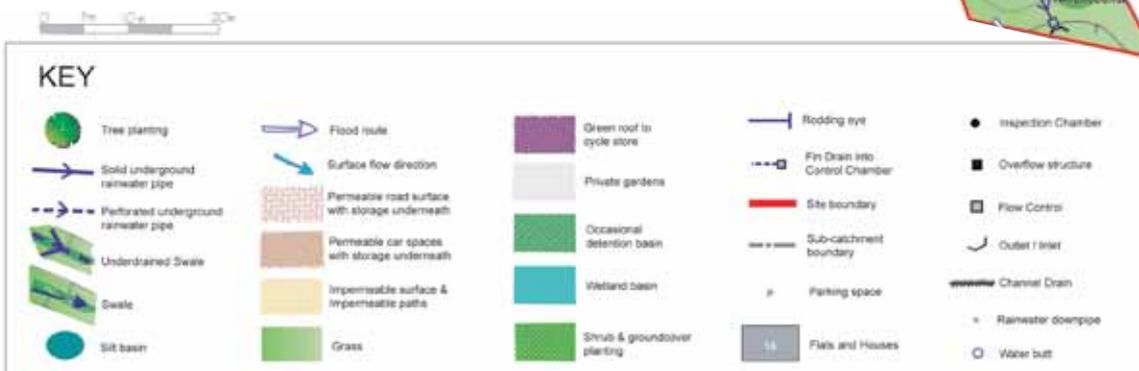


Concrete block permeable paving with conventional block-paved footways/ parking and flat kerb delineation.



Lower swales fed from Basin C.

Sub-catchment B



Conclusions

An Environment Agency requirement of 3 l/s/hectare has been achieved locally with open space for the enjoyment of residents and without recourse to additional measures. The project demonstrates the real value of integrating SuDS with public open space and their capabilities to deliver a controlled flow of clean water at lower costs. It also endorses the growing body of opinion and research that concrete block permeable paving provides effective, long-term performance, requiring less regular maintenance with lower costs than currently recommended.

Main findings of the Monitoring Report confirm that the Lamb Drove SuDS scheme continues to achieve the following:

- attenuated surface water flows and significantly reduced peak flows
- attenuation and reduction of both flow and volume through each SuDS stage
- improved quality of water discharged and reduced pollutant concentrations
- a higher number and diversity of species present and a more natural management regime
- both capital and maintenance costs were lower and therefore whole life costs will be significantly lower than a conventional pipe system.
- residents of Study Site have a high regard for the aesthetics and visual appearance of the open spaces within the SuDS scheme. This agrees favourably with findings from some other SuDS sites, where the positive impact on the immediate areas had transformed into locally higher property values.

For the concrete block permeable paving, the Report concludes:

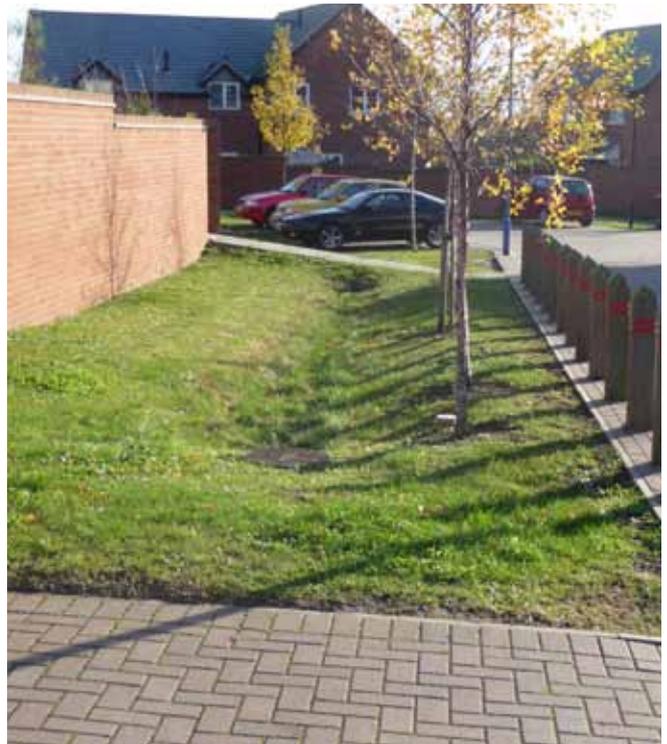
“The permeable pavement infiltration study specifically illustrates the robustness of the performance of this feature to limited maintenance. The infiltration capacity of the permeable pavement is able to adequately cope with the highest recorded rainfall intensity at the Study Site.”

Acknowledgement

Interpave thanks Robert Bray Associates, Royal Haskoning and Cambridgeshire County Council for their help with this case study.

The Lamb Drove SuDS Monitoring Report can be downloaded from:

<http://www.cambridgeshire.gov.uk/environment/planning/drainagesystems/monitoring.htm>



Under-drained swale B handles runoff from conventional block paving.



Precast concrete kerbs and various block laying patterns differentiate areas of paving.



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