More to SuDS than meets the eye

In this briefing Ron Henry, Peter Brett Associates, outlines how SuDS have been used in the Hampton development, south-west of Peterborough

Introduction

The Hampton development is located to the south-west of Peterborough and built largely on the brownfield site of several former brickworks. This mixed use development, consisting of 8000 residential units, was conceived around the need to manage surface water. This approach required creative thinking and a collaborative approach from the project team and key stakeholders to realise the delivery of a multi-functional surface water drainage strategy. This strategy was conceived before the development of recent SuDS guidance that is now considered common place.

To deliver SuDS successfully, it is clear that collaboration and communication is essential between all parties involved. The project team and key stakeholders at Hampton include:

- O&H Hampton (client)
- Peter Brett Associates (designer)
- David Lock Associates (planning and urban design)
- LDA Design (landscape and ecology)
- Peterborough City Council (local planning authority)
- Anglian Water Services (water authority)
- Environment Agency
- Natural England
- Parish councils
- Schools and the local community
- Local residents (over time).

History

The site previously consisted of several brickwork operations dating back to 1881 (Figure 1), and because of the former operations, many challenges were created for the development of the site. These included:

- Contaminated land
- Demolition (of stacks and kilns)
- Extreme ground temperatures (residual heat from the old kilns, creating desiccated soil)
- Pulverised fuel ash (a deal was established to take waste from coal fired power stations to fill the voids left from clay extraction used to back fill brick pits)
- Filled ground (clay waste, brickbats etc)
- Settling lagoons (up to 10 m deep).

Figure 1 *Hampton brickworks (c1900)*

Development scheme proposals started to evolve around 1990, before SuDS concepts were fully established, at a time when the interface with water was discouraged (ie everywhere was fenced off), and before guidance for the development and integration of SuDS was in place. This was also long before water cycle strategies, strategic flood risk assessments and the recent Flood and Water Management Act 2010, all relatively new in respect of water management.

Outline planning consent was obtained in 1993. A drainage strategy was established and agreed with the outline planning consent. This was subsequently updated with the introduction of

Planning Policy Guidance (PPG) 25 (CLG, 2010) and a revised strategy was agreed in early 2000.

The development is now about halfway through the construction programme with some 4000 residential units built and occupied.

Scheme details

Hampton development is a mixed-use development consisting of 8000 residential units, 165 ha of employment and associated retail, community, education and leisure facilities (Figure 2).

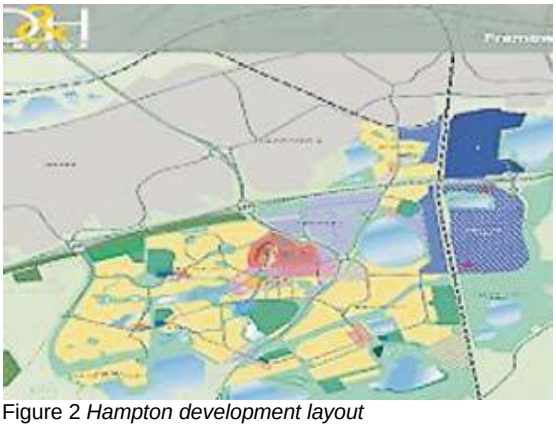

Figure 2 *Hampton development layout*

The site area is about 1010 ha with 50 per cent of the development area designated as open space, including a country park. The total area of lakes/ SuDS features within the development is 116 ha, with another 100 ha designated as a special area of conservation (SAC) and nature reserves.

The robust works associated with the historic brick making created “ridge and furrow” terrain across much of the site, which later became home to the largest colony of Great Crested Newts in Europe (Figure 5). This protected area also holds the rare Lesser Bearded Stonewort (aquatic plant) (Figure 5). The surface water strategy had to accommodate this within the design and management to keep water networks separate, which was an important design requirement.

Figure 3 *Nature reserve at Hampton*

Strategy and design

The proposals to manage surface water and flood risk on this site were vital to the successful delivery of this development. The proposals took a perceived constraint (the pulverised fly ash pits and lagoons created by the brickworks), and turned them into an opportunity to enable new development to take place. This then maximised the actual developable area, as well as creating a sustainable community.

Earthworks across the site totalled three million cu.m excavated and placed to maximise drainage by gravity. The final point of discharge from the site is via a pumped solution. While the need for a pumped solution may not always be viewed as sustainable, it is required in this specific instance to create the most efficient design solution for the site.

The design strategy was reviewed in accordance with PPG25 and the design was carried out using the 1:200 year storm event in accordance with specific Environment Agency requirements for the area. Sensitivity calculations also were undertaken to allow for climate change.

The total discharge for the whole site is limited to 2 l/s/ha and the pumped outfall solution has the flexibility to be increased in times of drought (to help the wider area/ecosystems) or stopped completely in times of extreme events, or when the receiving watercourses, Stanground Lode or the River Nene, are in flood.

Figure 4 *Special area of conservation*

What has worked well and what could be improved

SuDS, when planned and executed correctly, offer many benefits as truly multi-functional entities. Main benefits include not only the engineering functions (e.g. attenuation, flood risk mitigation and water quality improvements) but also biodiversity benefits, ecological and landscape improvements, the provision of public amenity and health and well-being advantages. An appreciation and understanding across the professional team of each stakeholders' specific requirements helped to produce a comprehensive design solution in terms of flood risk, SuDS, urban design, landscape and ecology.

Other successful alternative uses at Hampton include the creation of a local angling syndicate, using the lakes for water sports, and ice skating on detention areas during the winter. Also, there are marketing benefits to be gained in respect of attracting buyers and increasing the value of property on the development.

Communication is vital to maximise the integration of SuDS within a development scheme and community, to gain local buy-in and engender a spirit of ownership. Information sharing was achieved via environment forums, signage schemes, community events and community uses.

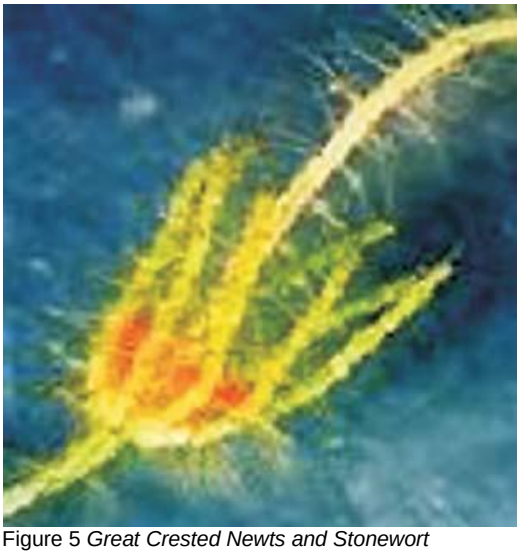

Figure 5 *Great Crested Newts and Stonewort*

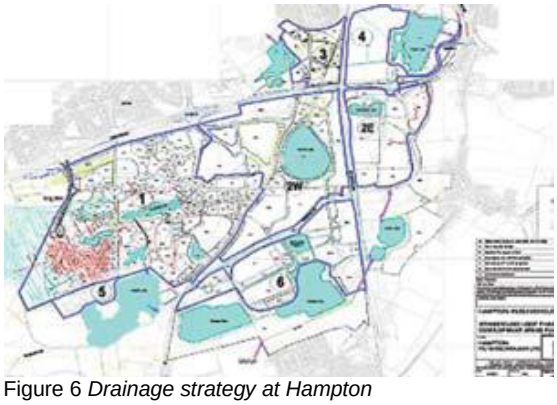

Figure 6 *Drainage strategy at Hampton*

The signage (Figure 8) not only conveyed the health and safety aspects, but also highlighted walking routes, health benefits (calories used for a given route), provided contact details for any queries and identified the wildlife to be observed in and around the SuDS features. Tree planting days were arranged with the local community and local school children.

Pollution control is achieved by a series of hard and soft measures. The vast water bodies (up to one million cu.m of water) include vegetative treatment measures, eg reed beds, to provide pollution control, in addition to more traditional hard measures, e.g. trapped gullies, catchpits, interceptors and penstocks.

Every three months water quality monitoring is carried out during operation to ensure the measures conceived in theory and put in place on site actually work in practice, which they have proved to do successfully.

Also, the importance of health and safety can never be understated. When mixing water and residential development the perceived risks are

obvious. Historically, the attitude was to segregate people from water, restricting access, fencing off areas and discouraging any alternative use.
However, this has been overcome by the creation of shallow (slack) gradients to the waters edge, which allows for easy and safe access/egress (Figure 9). Good design of the development's layout also has meant that SuDS features are offered good surveillance, ensuring that any problems are identified immediately.

In addition to risk assessments and post construction reviews, weekly inspections are continued after completion to ensure continued improvement of the SuDS scheme. Every year an independent RoSPA inspection is commissioned, with a formal report prepared and acted on where necessary.
However, there have been many challenges with such a major development. The revised drainage strategy took three years to agree with the approving authorities and also, while the strategy agreed gives some security and comfort for the future, it can be restrictive in not being flexible enough to deal with any change during adoption that might be for the better.

The national flood mapping could have been updated quicker (they are still to be fully updated for some parts of the development) and this has caused marketing and sales problems, especially during the conveyance of new properties.

Finally, adoption of SuDS has proved to be the biggest challenge, with the landowner/developer still maintaining the SuDS. There is a S106 requirement for the development stating that SuDS will be adopted by "the relevant local authority", which is defined in the S106 as one or more of the local authorities, but this has yet to be confirmed and finalised.

Figure 7 *Landscaped SuDS pond*

Future potential

Great Haddon is a proposed new development (consisting of 5350 units), to the south of the existing Hampton development, now going through the outline planning process.

This new scheme uses a similar integrated SuDS design and strategy to that delivered successfully at Hampton. It benefits from the Hampton drainage strategy by using the existing lakes/SuDS features for surface water storage. This helps to maximise developable area, reduce upstream and downstream flood risk, reduce the risk of flooding to the protected SAC area and also will draw upon the drainage system as a source of water supply to maximise water resource efficiency across the development (irrigation, grey water uses etc).

Figure 8 *Information boards providing details of SuDS schemes*

Again the diversity of different SuDS features (formal, informal etc) has been used to establish a variety of environments benefiting the community, the development, public realm, flora, fauna and biodiversity as a whole.

Part of the success in the good planning of many towns and cities has been accompanied by an improved public realm focusing on high quality and accessible water spaces, highlighting the importance of ensuring SuDS are designed into any given development correctly.

Figure 9 *A SuDS pond with a shallow gradient*

Conclusion

Can SuDS work for multi-functional uses? The answer is an emphatic yes – albeit good planning, design and execution, is critical to the success.
Using the Hampton development as a case study has proved that SuDS can be delivered successfully to offer wider benefits over and above the basic engineering, technical and flood risk/drainage function.

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References

CLG (2010) Planning Policy Statement 25: *Development and flood risk*, Communities and Local Government, London (ISBN: 978-0-11754-099-6)

Statutes

Flood and Water Management Act 2010