

# North Stoneham Park Development Stage 1



## SuDS used

- 18 Ponds and 5 swales including 4 wet ponds

## Benefits

- Three stages of natural filtration for the run-off generated by the development
- Caters for the proposed circa 1200 new dwellings, Care Home Village, Local Centre, Primary School and Office buildings.
- Enhancing biodiversity and natural habitat
- Amenity Space
- All Ponds are designed with forebays to further enrich the treatment process of the water run-off
- Number of the ponds are being subsequently retrofitted and replanted to cater for nutrient elimination
- Two major ponds are located within the North Stoneham Park – Capability Brown listed Historical Park and were designed in conjunction with Eastleigh Borough Council and Environment Agency. The ponds blend in into the park creating the illusion that they were not man made keeping the historical integrity of the Capability Brown landscape architecture.
- Reduces the run-off volume discharged to the river Monks Brook located approximately 200 metres east of the development minimising the flood risk to the neighbouring area
- All headwalls on site were designed as green soft vegetated system headwalls to blend in within the surrounding area.

## 1. Location

North Stoneham Park Development, Chestnut Avenue, Eastleigh. Approximate postcode for centre of site – SO50 9QZ.

## 2. Description

The SuDS components of the North Stoneham Park Development in Eastleigh consists of 18 Ponds, of which 4 are permanently wet, and 5 swales. The SuDS caters for the surface water rainfall generated

by circa 1200 new dwellings, Care Village, Local Centre, Primary School and Office Buildings. The system was carefully designed for all the ponds and swales to interconnect following the existing drainage regime on site. Vortex flow control manholes ensure carefully calculated time of concentration across the development for the entire system to discharge at the existing greenfield run-off rate. The SuDS elements footprint is approximately 22,000 m<sup>2</sup>. All ponds are designed with forebays to enrich the natural treatment process of the generated surface water run-off.

The SuDS systems across the development serve as a key component of the enriched amenity space, enhancing biodiversity and natural habitat.

### 3. Main SuDS components used

The main components of the SuDS:

18 Ponds and 5 Swales

Secondary SuDS components:

Permeable Paving, below ground attenuation crates in private areas and enhanced swales (swales with granular material sub-base below swale)

### 4. How it works

The SuDS are designed to collect, attenuate, and treat the surface water run-off generated by the development. The SuDS components are carefully linked together to form a vast network of drainage features, utilising time of concentration for the different elements to ensure that the discharge rate from the development do not exceeds the existing greenfield run-off rate. Where site conditions permitted, some of the SuDS features use infiltration in conjunction to discharge to further enrich and comply with the SuDS hierarchy.

The drainage strategy also utilises different separated sectors to follow the existing drainage regime on site, by discharging the run-off at specific locations within the existing drainage ditches on site. All of the run-off generated by the development is then subsequently discharged in Monks Brook, which is located approximately 200 metres east of the site.

The position, size and sector placement of the strategy ensures that every single millimetre of run-off that is generated by the development will benefit from at least three stages of natural treatment, prior to entering Monks Brook.

### 5. Specific project details

4 of the 18 ponds serving the development are designed to be permanently wet further enriching the amenity spaces, biodiversity, and natural habitat. The wet section of the ponds is located below the designed attenuation values with some of the ponds having a combination of a wet pond in conjunction to an infiltration capability.

The two major ponds and swales with a footprint of circa 10,500 m<sup>2</sup> are located within the Eastleigh North Stoneham Park, a Capability Brown historically listed Park. The two ponds start as a wide swale with shallow gradients of the sides of 1 in 12 and 1 in 20 and gradually open up to form large attenuating structures, before gradually narrowing down to the size of the original swales. The ponds were designed in conjunction with Eastleigh Borough Council and Environment Agency, to ensure that

the drainage strategy will preserve the Historical value of the Capability Brown Park. The structures were designed to blend into the surrounding with even the few manhole covers located within the park, were carefully placed within footways with inset covers. All headwalls of swales and ponds across the development were designed with innovative systems that has vegetation bags instead of the traditional brick and concrete headwalls.

The main SuDS infrastructure is complimented by the secondary SuDS components consisting of Permeable Paving carparks, belowground attenuation tanks and enhanced swales. The added benefits of the secondary SuDS components for the site further enhance the natural filtration processes to the run-off generated by the development. The private researched conducted by Odysey (Design Engineers) on the permeability coefficient of sub-base materials has been successfully implement to aid the crucial time of concentration model for the development.

## 6. Maintenance & operation

All SuDS features are in the process of being adopted by Eastleigh Borough Council. All ponds and swales have been constructed and have been operating as designed.

Currently some of the ponds will undergo a replanting exercise to be retrofitted to suit nitrate elimination and treatment.

## 7. Monitoring and evaluation

As mentioned, the SuDS features have already been constructed and have been operating as designed. Monitoring and evaluation of the performance of the drainage system is still ongoing and monitored by the Design Engineers – Odyssey, Client – Highwood Group and Vivid, Adopting Authority - Eastleigh Borough Council / Hampshire County Council and Drainage Adopting Authority – LEEP Utilities.

Recently the Design Engineers have been invited by Hampshire County Council Flood Water and Management team to submit details of the Drainage Proposals to be included within Hampshire Best Practice Guidance documents.

Some of the Ponds will shortly undergo replanting exercise to be fitted for the treatment of nutrients.

## 8. Benefits and achievements

The Sustainable Drainage Systems designed for the North Stoneham Park development has proven that natural drainage system can be incorporated smartly, discretely, and successfully in large scale developments. The drainage regime provides more than three stages of natural above ground filtration to the surface water generated by the development and safely manages flood risk for climate change events for up to 100 year storm events plus climate change.

Spanning more than 2 hectares the SuDS features enrich the local biodiversity and natural habitat, creating amenity and public open spaces for the new and existing occupants of the area. With soft drainage engineering we have managed to achieve full symbiosis between functionality and aesthetics. The added infiltration to some of the ponds further enriches the recharging on the ground

water within the development area, continuously and fully replicating the existing drainage regime post development.

With careful analysis of time of concentration within the vast network of drainage systems, we have managed to find the right balance between the required attenuation volumes for such large scale development and the functionality of the system.

## 9. Lessons learnt

Due to the requirements for introducing drainage features within a Capability Brown historical park, we learned further lessons in incorporating soft engineering within the designs of our SuDS features. We pioneered headwall systems to be incorporated and carefully designed the 10,000 m<sup>2</sup> features to blend into the surrounding areas alongside inset manhole covers “hidden” within footways across the park and carefully selected angled grills to minimise the appearance of a hard engineering but still complying with the latest Health and Safety Regulations. The overall designed of gently sloping sites and swales that open to form attenuation structures has successfully allowed us to create the illusion that these features have formed naturally within the landscape.

## 10. Interaction with local authority

The Drainage Strategy for the site was designed in conjunction with Eastleigh Borough Council, Hampshire County Council, Environmental Agency and National Trust.






## 11. Project details

**Construction completed:** *Construction is still ongoing on site. Majority of SuDS features completed January 2020.*

**Cost:** *To be ascertain as construction is still ongoing.*

**Extent:** The SuDS features footprint is approximately 22,000 m<sup>2</sup>

## 12. Project team

Funders	<ul style="list-style-type: none"> <li>Highwood Group</li> <li>Vivid</li> </ul>	 
Clients	<ul style="list-style-type: none"> <li>Highwood Group</li> <li>Vivid</li> </ul>	 
Designers	<ul style="list-style-type: none"> <li>Odyssey Consulting Engineers</li> </ul>	

Contractors

- Highwood Construction

