The Stag Little Easton – Residential Development
Submitted by Refolo Landscape Architects

Awards category
Early housing scheme – not yet completed

Lead or collaborating organisation(s)	Client: Montare Group Landscape Architect: Refolo Landscape Architects Architect: Torner Architects Planning: Magenta Planning Drainage Engineer: Stantec Highways: Watermans Ecology: Hybrid Ecology Arboriculturalist: Sharon Hosegood Associates
Location of SuDS	Little Easton, Land to the rear of The Stag Duck St, Dunmow CM6 2JE

1. SuDS overview

SuDS components used	• **No.18 Green Roofs to intercept rainwater, offer temporary attenuation and ecological benefits** • **No.4 Communal Rain Gardens (140sqm combined) as part of the SuDS management train, providing runoff conveyance across the site, towards the lower end of the topography. The gardens provide amenity and ecological benefits. The rain gardens are designed with shallow margins and varied contours to create a richer opportunity for wildlife habitat.** • **Swale (230sqm) – conveyancing runoff and exceedance, as well as ecological benefits.** • **Exceedance Dry Pond (260sqm) – providing storage for exceedance, as well as amenity and ecological value.** • **Pond (400sqm) – to the south-eastern lower end corner of the site, with a retained water level and shallow margins for ecological and amenity value.** • **Permeable paving across hard surfacing within the communal pavement and access roads to receive runoff and convey it towards the nature based SuDS solutions in the northern-eastern part of the site (the swale).**
Size of the scheme and its local context	Mixed use development in Little Easton (Uttlesford District Council, Essex), including 44 residential homes, 3 commercial units and 3 self-built plots designed over a 3.7ha site with associated car parking and landscape. The existing site comprises of rough grazing and agricultural land located to the rear of the Stag Public House on the Eastern side of Little Easton, in Essex. It is bounded by residential properties and by fields. The site has extensive boundary vegetation creating an important visual buffer. An area of woodland flanks the site to the East and South. Several Public Right of Ways (PROWs) surround the site, with one running along the inner side of the eastern boundary. The River Chelmer lies approx. 120metres to the north-east of the site. An ordinary watercourse (an outfall from the nearby ponds located further away to the southwest), runs along the south-eastern boundary of the site. The site existing surface water drainage is via natural overland runoff (and partial percolation) from the agricultural or grazing field towards the adjacent land channels that drain to the River Chelmer. The underlying London Clay does not make the use of direct infiltration into the ground a feasible design option. The development parcel slopes west to east towards the river Chelmer, with site. Within the site boundaries ground levels vary, with a 10m difference between the highest and lowest end of the site (67.0mAOD to 57.1AOD). Part of the site sits on the boundary of Flood Zone 2 and therefore the site is at low risk of river flooding.
Approximate age of scheme (years)	Approx. 2.5 years counting from Planning Approval with Conditions in October 2021).

Benefits of the scheme	The masterplan is designed with green and blue infrastructure as the drivers of the concept from the start. The masterplan: • considers existing wider settings from the start of the design process. • addresses local flood risk issues around and within the site boundary • local improvements to the drainage ditch, with clearance operations, increased capacity, and associated biodiversity benefits. • reduces run-off rates across the site • treats stormwater treatment close to its source • achieves surface and rainwater attenuation within the site • addresses water neutrality and improves water quality by capturing the highest concentration of pollutants in the first flush of initial rainfall • brings vegetation and wildlife health benefits • reduces local heat island effect • sequesters carbon from the atmosphere • creates green, spacious and vibrant amenity areas • provides biodiversity across the site. • addresses the 4 Pillars of SuDS from design inception.
Briefly describe the scheme	The masterplan was created using a multidisciplinary approach, emphasizing the interaction between landscape and the built environment. The landscape architect, the architect, engineers and ecologists worked closely together to design the project. The drainage engineers enthusiastically embraced the landscape-oriented approach, in line with the Essex County Council 'SuDS Design Guide, the NPPF, and Building Regulations, leading to a fruitful collaboration with the landscape architect. The scheme comprises of large communal and private amenity areas, a productive allotment zone and a variety nature-based SuDS features, which create a SuDS management train taking advantage of the contours of the site. The stormwater discharges into the existing smaller watercourses and ultimately into the nearby River Chelmer. The proposed drainage strategy utilised a range of SuDS features which form a management train conveying rainwater to a balancing pond via gravity, with retained water for ecological benefits. The pond would allow for attenuation and would feature an overflow towards a central dry attenuation basin (dry pond), which would discharge into the adjacent stream along the site boundary, which ultimately connects to the River Chelmer. The discharge rate is designed to be equal or less than the equivalent greenfield rates for the proposed impermeable areas (which include the Highways adopted main access road). Permeable pavements on the non-adopted the hard surfacing would receive runoff from the communal areas, the houses and commercial units and convey the stormwater through the development parcel to the soft swale, which then connects to the existing ditch along the site boundary.

2. SuDS details

No.	Question	Answer

1	What difference has this scheme made to the local community or area?	• The site undergoes a transformation from a heavily exploited arable land (with associated potential water neutrality issues and soil depletion) to a home for people and wildlife.
		• The proposed **design layout connects the site beyond the red boundary** by
		  ○ **responding to the local wider contexts through the creation of similar wildlife corridors** and creating new connections for wildlife, linking these to the existing ones beyond the site.
		  ○ **addressing existing water flows within the surrounding wider setting outside the boundary**, including the existing ponds and the River Chelmer, and the impact these have on the site and its vicinity. Although the south of the site is marginally within Flood Zone 2 (hence low risk), there is evidence of existing flooding on the road during heavy rainfall. These issues were addressed within the overall SuDS strategy and maintenance regime.
		  ○ **linking the site to the rich PROW network** through a series of internal connecting paths that are interspersed with incidental play and fitness trail to foster wellbeing and social cohesion.
		• **The site creates beautiful natural amenities** with vibrant rain gardens filled with colourful perennials and grasses contributing to creating additional food resources and habitat for wildlife and biodiversity. A balancing pond serves as a lively community amenity picnic area, while a large dry pond is ideal for a kickabout. Over 100 new trees are scattered throughout.
		• **Treats stormwater close to its source**, reducing any impact to adjacent sites and the River Chelmer.
		• **Addresses climate change** impacts by reducing run-off rates, heat island effects, and sequestering carbon through nature-based SuDS solutions.

2	What is exceptional about this scheme beyond a standard approach?	• **The landscape architect was able to provide an initial holistic sketch proposal of the site at a very early stage of design** due to them being in the unique position to being sensitive to all the necessities of a site and the surrounding area, including SuDS, wildlife habitat and people's wellbeing. This fostered a close collaborative approach with the architectural team, the drainage engineers, and the wider multidisciplinary team from the start, providing the route towards a successful scheme, which achieved an expedited Planning approval after only 6 months. A landscape-led masterplan approach was not as widely accepted in 2020 as it is today. • **The proposal for Little Easton begins with the land and its surroundings**. The landscape-led masterplanning process starts with a GIS analysis of the wider settings, including site contextual assessment of watercourses, soil, wildlife connectivity, human settlement and 3D modelling of the site's surrounding and local topography to identify opportunities and constraints that will inform the site design with an aim of improving the area for people and nature. This enabled a speedier design process, where a well-connected multidisciplinary team was able to work together to achieve the common design vision. • **The proposed drainage strategy has no cellular storage underground solutions, with a strong emphasis on shallow nature-based SuDS solutions which offer wider amenity and ecological benefits**. According to Stantec the overall strategy achieves a discharge rate marginally above the ECC target of 2l/s/ha, with the proposed surface water discharge rate from the final flow control either matching or being less than equivalent greenfield runoff rates for the proposed impermeable area, and the proposed development runoff volume being less than the equivalent greenfield value. • **Addresses all 4 Pillars of SuDS** from design inception – Water Quantity, Water Quality, Amenity and Biodiversity. The design principles are guided by Ciria **as well as Building with Nature (BwN) principles**, the first UK Green Infrastructure accreditation. • **All the SuDS features are interconnected and will function as a holistic whole**, including the green roofs within each plot.
3	How much work went into getting this scheme realised?	• **The design development took place amidst the COVID19 lockdown period of 2020-2021**. The scheme later received Planning approval in October 2021. The initial multidisciplinary meetings were conducted face-to-face, where the design objectives and preliminary sketches established the overall design goals. As the circumstances evolved, meetings and design collaborations swiftly transitioned to online platforms, which posed several connectivity obstacles due to the less prevalent nature of virtual interactions at that time. These challenges were further compounded by the prevailing COVID19 situation. • **Despite the challenges posed by the pandemic, there was a strong commitment to involve a diverse multidisciplinary team from the start**, which was key in developing a design where blue and green infrastructure played a crucial role in the design inception and development. Several iterations ensured the design achieved high environmental and sustainability credentials. • **3D contour manipulation and long cross-sections across the wider site,** using LIDAR contour data**,** were used to understand the relationship of the overall development in relation to the wider landscape. • **Virtual online Design Review Panel meeting and Pre-application meetings** with the Council ensured design direction was crosschecked

		throughout the process. • **Despite the pandemic, an extensive virtual public consultation ran for 2 weeks.** This was augmented by 3000 leaflets delivered to homes in the surrounding areas, newspaper adverts, social media and e-mail distribution. The Virtual Public Consultation app featured detailed boards covering all aspects of the proposed development and encouraged to provide thoughts and feedback. A questionnaire with a scoring system covering key areas helped understand the priority needs of those visiting the site. The Virtual Public Consultation had 768 visitors and generated 19 questionnaire responses and 18 direct questions. The appropriate feedback was received in a suitable time to test and consider the designs further and address various perspectives.
4	Is this scheme part of a masterplan or integrated into other initiatives?	• **The landscape-led masterplan is designed with a holistic approach in mind**, taking into consideration the wider hydrological, ecological and human settlement, before developing the design within the site boundary. • **The design of the scheme starts from the wider landscape**, informing the design within the site boundary and then ensures the latter reconnects with and enhances the wider settings. • **The SuDS strategy covers the whole area** of the proposed development masterplan. • **The Masterplan design is limited to the site itself.** However, the SuDS strategy proposed has have a positive impact on adjacent existing land and any potential future developments.
5	What value does this scheme provide to the local area and beyond?	• **The proposed SuDS strategy embraces an approach that considers the land and its surroundings in its entirety, not just focusing on the immediate benefits of the local scheme**. The design delivers high-quality drainage solutions whilst supporting surrounding areas to cope better with severe rainfall. This includes measures to reduce local flooding, especially within the highway's areas immediately outside the site main entrance, which regularly disrupt regular traffic flow. The nature-based SuDS designs for this scheme improve the quality of life within the development and the surrounding areas, making the space visually attractive, sustainable, and resilient to climate change by improving urban air quality, addressing water scarcity, water treatment and increasing biodiversity, reducing noise and delivering recreation and educational opportunities. • The River Chelmer flows 40miles through the County of Essex. Once it passes the district of Uttlesford it continues through to Maldon, where it meets River Blackwater and discharges into the North Sea. **The water attenuation and treatment in the Little Easton scheme needs to be viewed in relation to the wider impacts on the surrounding areas and beyond**. • **The new development introduces new wildlife corridors reconnecting the site to its surroundings, the adjacent streams, and the main river corridor**. It also enhances the environmental outlook and aesthetics aspect of the new development through important biodiverse amenity spaces featuring accessible pedestrian routes connecting with the local community and PROWs.

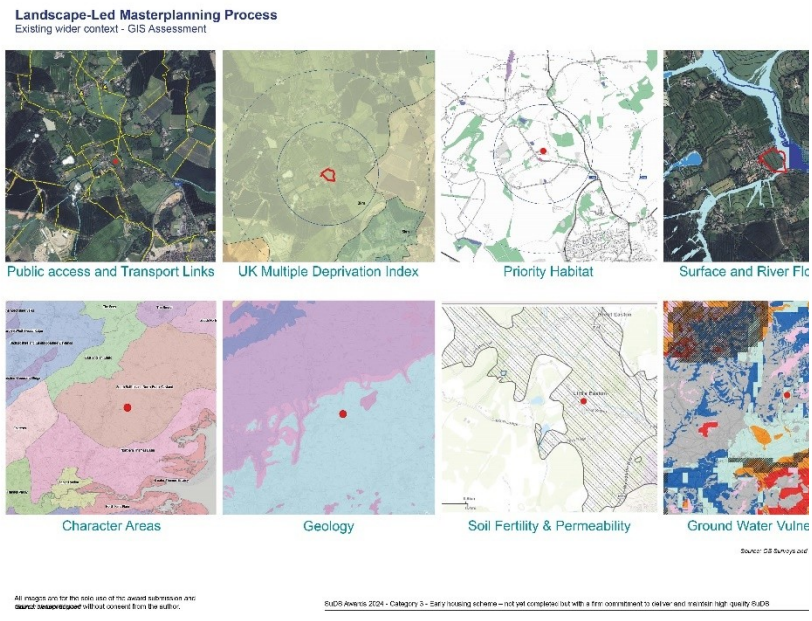
6	What challenges/ problems needed to be addressed to realise this scheme?	• **London Clay Soil** The GIS desktop studies and later site investigations revealed a soil typology (London Clay) characterised with impeded drainage. As a result, a design approach that avoided infiltration was necessary. This favoured a cascading of nature-based SuDS management train, with natural water treatment at every phase before ultimately discharging into the existing watercourses surrounding the site. • **Steep Site Contours** The site contours opened up the possibility of designing nature-based SuDS solutions that would operate through gravity. However, the permeable paving constraints of 1:20 gradient meant that the roads had to be designed closer to the contour lines to derive the levelled surface as much as possible. These designed considerations were clearly defined at the concept stage of the landscape-led masterplan. • **Half Drain Time** Nature-based SuDS principles were the drivers of the overall design and these were embraced by the drainage engineer team at Stantec. As a standard for Essex County Council (ECC), half drain times need to be provided for all SuDS storage features, which need to empty within 24hrs (1 in 30 plus 40% climate change). However, the algorithm within the software (MicroDrainage), did not automatically account for the half drain-down times for the nature-based SuDS solutions (rain gardens, swales, dry pond and attenuation pond). Stantec devised a way to derive this from the maximum volume results graphs, which created initial confusion when the results were formally issued to the local authority. This was later resolved and the methodology accepted as sound. • **Nature based Suds and runoff rates** The Essex Design Guide requires that LTS should discharge at "no greater than 2 l/s/ha". However, there are no real LTS on site but rather permeable pavement and raingardens that naturally slow the rate of runoff through the site before it reaching the open attenuation features further east. As part of the design process Stantec did consider limiting runoff to the required 2l/s/ha, but because the rain gardens are shallow features, this would likely cause unacceptable levels of flooding. Stantec also considered using deeper below ground attenuation features such as cellular storage (technically more volume efficient) further up the site to achieve the desired runoff of 2l/s/ha. However, due to the steep topography across the site, it was clear that it would produce little benefit due to the spatial layout across the development parcel and further such storage would also be required at the lower part of the site. While the proposed discharge rate was marginally above the ECC target of 2l/s/ha, Stantec concluded that the proposed surface water discharge rate from the final flow control either matched or was less than equivalent greenfield runoff rates for the proposed impermeable area, and the proposed development runoff volume was also less than the equivalent greenfield value. The proposal included runoff restriction from impermeable areas with 10% allowance for urban creep to the equivalent greenfield runoff rate

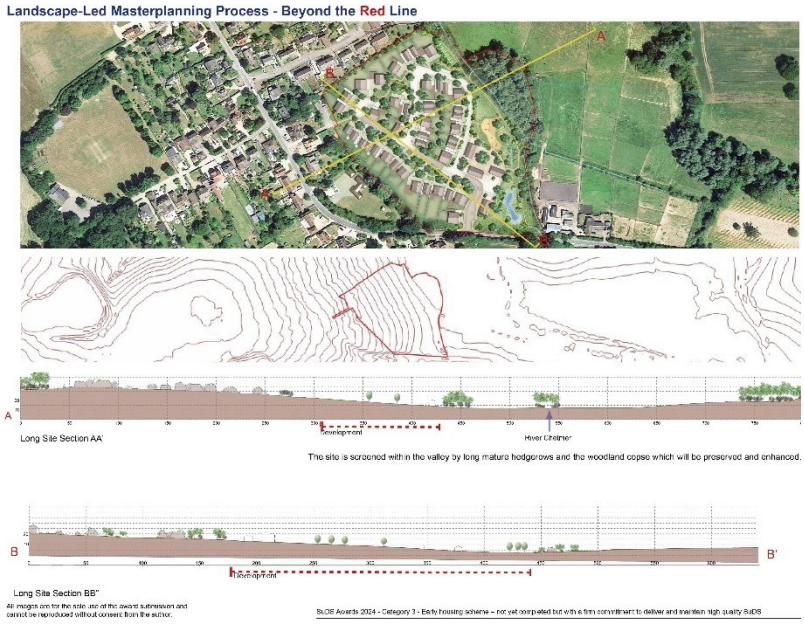
		for the impermeable area with no urban creep applied, thereby providing an improvement over the standard design criteria for such areas. In summary, Stantec concluded that the proposed design either matched or, in most cases, provided improvement via reduced discharge rates compared to the greenfield scenario for the site, while introducing a comprehensive SuDS strategy that utilises a variety of nature-based SuDS features with significant wider ecological and amenity benefits. This was ultimately found acceptable and approved by the Local Authority.
7	How does the scheme address related issues such as water scarcity, nutrient neutrality, or biodiversity net gain?	**Water Scarcity:** Rainwater naturally feeds vegetation within the rain gardens and marginal planting around the attenuation pond. **Nutrient Neutrality:** The use of nature-based solutions including rain gardens, swale, green roofs, an attenuation pond, a dry pond, as well as permeable paving maximises the capture of pollution and nutrients, before being discharged into the River Chelmer. The use of rainwater to naturally irrigate the nature-based SuDS features is an added benefit to plants due to its PH and nitrogen levels and thus avoids the introduction of chemicals to the soil from the water mains via traditional irrigation methods. **Biodiversity Net Gain**: The landscape strategy retained and enhanced the existing perimeter hedgerow vegetation around the site and the adjacent woodland. The previous arable land within the central areas of the site was enhanced by a variety of natural SuDS features, nectar rich perennials, grassland and over 100 trees. The nature-based SuDS features would provide new enhanced habitat for a variety of invertebrates, especially within the pond marginal vegetation.
8	Is learning from the scheme continually captured and communicated? Please give examples.	An important takeaway from the scheme is that by integrating a nature-based SuDS strategy early in the design process, using a landscape-led approach from the outset with a multidisciplinary team, leads to a design resolution of the masterplan that simultaneously satisfies all hydrological, wildlife, biodiversity and human wellbeing aspects in a balanced way. This approach ultimately leads to a quicker Planning Approval. The initial sketch draft of the masterplan must encompass the landscape and hydrological considerations, which will inform the initial layout of the new homes. Various iterations will then follow as other new elements are simultaneously considered, including vehicular movement and refuse truck and fire engine access. The design process is a simultaneous one, with nature-based SuDS design serving as the central focus. The effectiveness of the end design ultimately hinges on the collaborative efforts and proficiency of the diverse multidisciplinary design team, united in pursuit of a common design objective and original vision. It is anticipated that the water quality of the River Chelmer will be monitored prior to and following the execution of the development in order

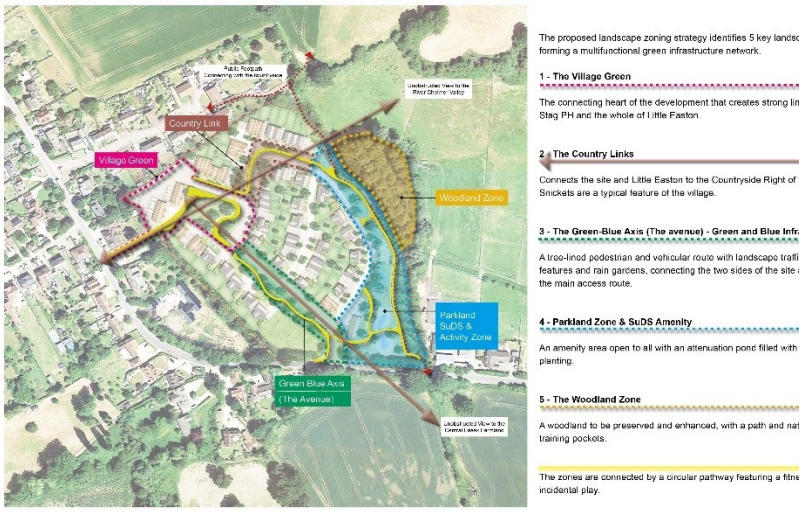
		to gauge the beneficial effects of the new project. Ongoing inspections and proof of the upkeep plan will be communicated to the local community with an aim to educated on the positive impact of the new green and blue infrastructure.
9	What approaches/measures are taken to ensure the scheme is properly managed and maintained?	The maintenance requirements of the site were included in the Planning documents from the start, with the details of the private management company responsible for maintaining the non-adopted proposed surface water drainage system to be confirmed post Planning. Rain gardens, swale, dry pond and attenuation pond would need to be inspected at least twice annually to verify that the inlets and outlets remain unobstructed, and the plants are thriving. Regular soil testing is essential to confirm proper drainage and prevent any unintended compaction that may compromise its performance. All nature-based SuDS features would be inspected annually to avoid silt accumulation. Permeable paving would be brushed and vacuumed twice a year to avoid debris build-up. A full rehabilitation would be required every 10-15 years. Any broken blocks would be replaced, and surrounding landscape soil levels would be kept at 50mm below the pavement. The green roofs would need to be inspected annually to clean the drainage outlet, remove any unwanted self-seeded planting, and ensure the plants are thriving. Flow control chamber would need to be inspected bi-annually, including de-silting of the inlet sumps. Water quality within the surrounding watercourses and the River Chelmer would be regularly monitored.
10	Have you collected any feedback on your scheme? What do people say about it? Can you provide any quotes?	The scheme was well received by the Local Authority who were engaged and involved at regular intervals throughout the process, via pre-application consultation and Design Review Panels, despite the challenging times posed by the pandemic. The proposals adhere to the Essex Green Infrastructure Strategy to ensure that the designs are implementing multifunctional green/blue features effectively. Comments from Essex County Council Green Infrastructure Environment & Climate Action on the Planning Application included: '*We very much welcome the landscape-led approach that has been taken to this scheme and the provision of multifunctional public open space is supported'.* *The scheme has kept in mind design principles in the Essex Design Guide and 'Building for a Healthy Life' as endorsed by Homes England. (…) a well-integrated approach between built form and landscape from inception and carried through the later design stages to Planning Submission. This can be seen in the proposed scheme though the incorporation of an extensive landscaping scheme including a new green, allotments, open spaces, trim trail. Walking and cycling links are of fundamental importance (…) in line with supporting healthy lifestyles and a vibrant community.* *'The design team has also carefully considered the previous reasons for refusal (*based on schemes from previous years designed by others*) and has radically altered both the conceptual rationale for the design and significantly reduced the quantum of development. Climate resilience and*

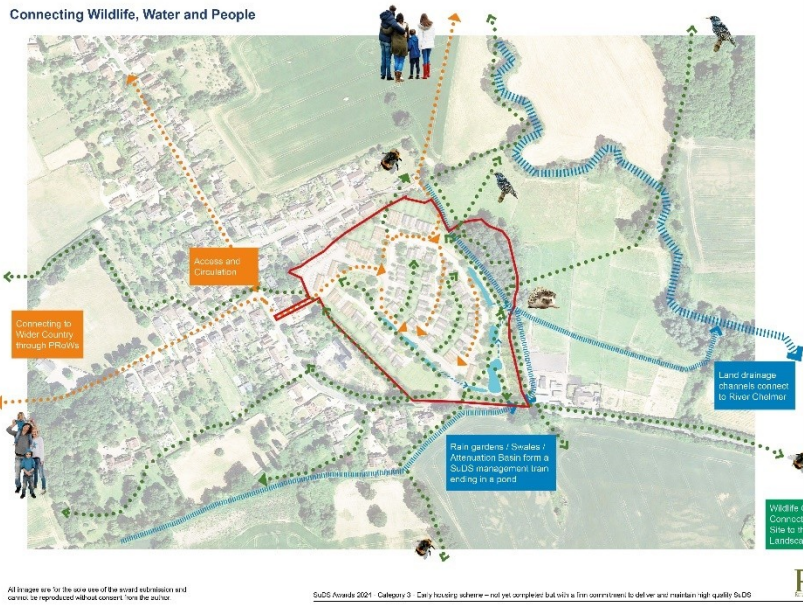
		the wider ecology are integral to the multi-disciplinary approach that has been applied'. *The proposals are intended to follow best practice through the next stages of design and to be delivered as an 'exemplar project' which will provide significant benefits across all three strands of sustainable development; economic; social and environmental".* '*The proposed layout and illustrative landscape masterplan is considered to be well conceived. The proposed mix of planting is considered to be appropriate for this edge of settlement site*. (Planning Officer Delegated Report Jan 2002) Quote from Stantec: …'*the surface water drainage strategy for this site has played a fundamental role as the layout has developed, and we consider it an exemplar SuDS scheme with its incorporation of a range of measures and emphasis on soft engineered surface features providing ecological and amenity benefit.'…*

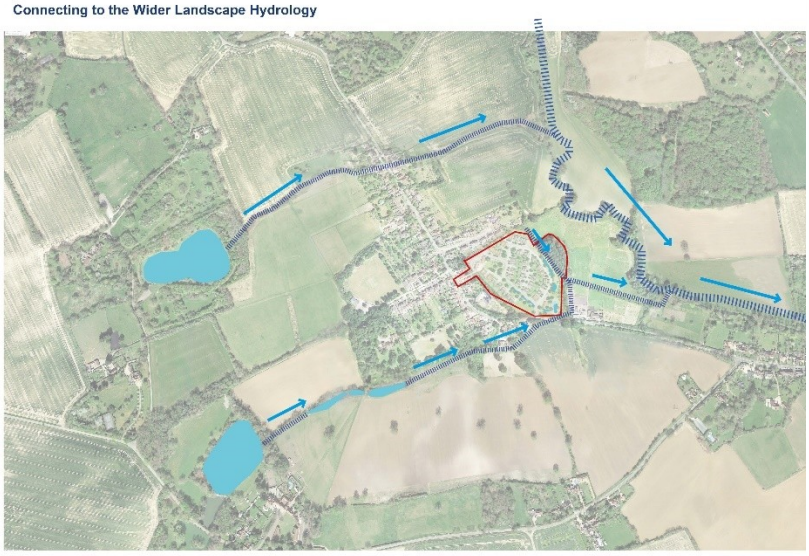
3. **Supporting materials**

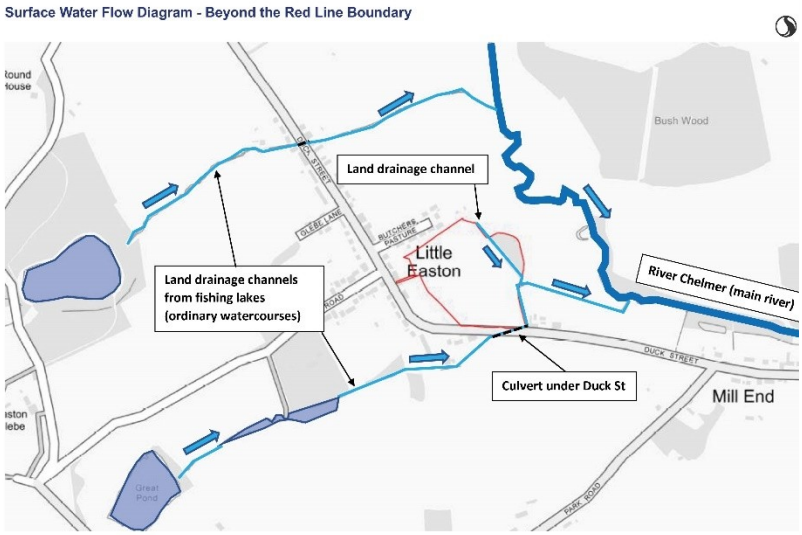
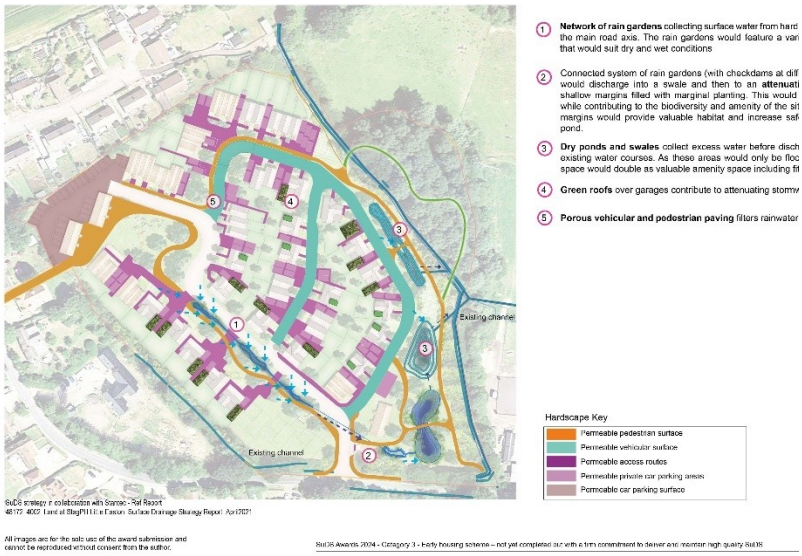
Image (low resolution)	**Caption**	**Image credit**
	R-LA starts the design process by exploring the wider landscape through layered GIS data. This multi-layered holistic approach right from project inception is crucial for a successful masterplan	R-LA

	Landscape-led Masterplanningg Process: The masterplan was developed using an iterative design process between architecture and landscape with topography and preservation of long view corridors as an initial guiding line. The arrangement of the homes along the contours is designed to allow for an inclusive access across the site as much as possible.	R-LA
	Designing with SuDS. Design development in simultaneous layers stemming. A first sketch design concept, stems from the baseline research of the site and beyond.	R-LA

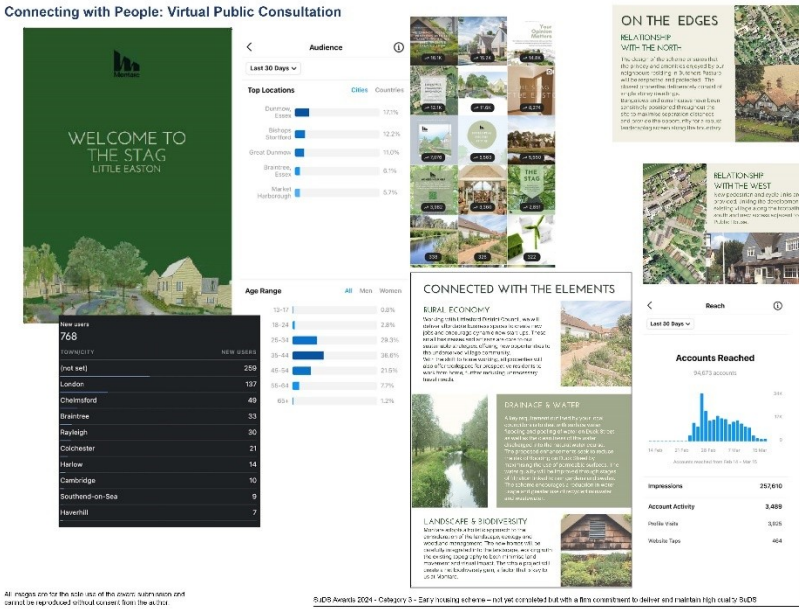
Illustrative Landscape Masterplan and Surrounding  	Illustrative Landscape Masterplan and Surrounding: the site can be split into six main areas.	R-LA
Landscape Zoning Strategy  	Landscape Zoning Strategy which identifies five key landscape areas forming a multifunctional green infrastructure network	R-LA

	**Soft landscape areas** including amenity parkland and front and back gardens have an important role within the SuDS strategy.	R-LA
	Connecting Wildlife, Water and People. By studying the wider context of the site it is possible to design access and circulation paths that not only suit people but also provide wildlife corridors and make space for water within the site whilst simultaneously connecting it to the wider context.	R-LA

Connecting to the Wider Landscape Hydrology  All images are for the sole use of the award submission and cannot be reproduced without consent from the author. SuDS Awards 2024 - Category 3 - Early housing scheme – not yet completed but with a firm commitment to deliver and maintain high quality SuDS	Connecting to the wider landscape hydrology	R-LA
Surface Water Drainage Flow Diagram  All images are for the sole use of the award submission and cannot be reproduced without consent from the author. SuDS Awards 2024 - Category 3 - Early housing scheme – not yet completed but with a firm commitment to deliver and maintain high quality SuDS	Surface water hydrological flow diagram.	Stantec

	Existing eider hydrology connecting with the site	Stantec
	**Landscape Surface drainage strategy – hard and soft landscape**	R-LA

	The Village Green with the new commercial premises and The Stag PH, would create a vibrant and welcoming atmosphere for the whole village. A small natural play area for young children (LAP) would create an important focus for the whole village.	R-LA
	The green axis route across the site links the Village Green and the Parkland Area to the south with a 2m wide pedestrian path that meanders through trees and rain gardens. Incidental play items along the route - in the form of boulders or stepping logs - create an active and well-lived space.	R-LA

	Connecting with People: Virtual Public Consultation due to Covid restrictions.	Montare