



Sustainable drainage and new housing developments

Editor: Liz Sharp

Authors: Sarah Payne, Louise Walker,
Sue Illman and Liz Sharp



One in every three mouthfuls of food we eat depends on bees. Since bumblebees only feed on flowers, a flower-rich landscape is essential to their survival, and to the whole food chain.

Grey to Green
— Phase 1
West Bar, Bridge Street
and Snig Hill
www.greytogreen.org.uk



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Foreword and executive summary

This report provides evidence about the perceived challenges of implementing Sustainable Drainage Systems (SuDS) in new housing developments as a means of managing surface water. It juxtaposes the rarely heard perspective of speculative housing developers (Section 1) with the views of those seeking to promote higher quality sustainable drainage across our urban landscape (Section 2). Taken together, these commentaries provide an interesting window on the opportunities and challenges of better managing our surface water.

This report is important because of the urgent need for enhanced surface water management to reduce flood risk and to improve the health of our waterways. Given the Government's recent signal that they are about to make SuDS mandatory, it is also highly topical, offering evidence to inform the implementation of that legislation (Defra, 2023).

The report includes three sections:

- This **Foreword and executive summary** offers the context for this work, describing the need for good surface water management and why the implementation of SuDS can be seen as challenging, as well as summarising the content of the other two sections.
- **Section 1** draws on interviews with volume housebuilders to articulate their rarely heard perspective on SuDS.
- **Section 2** provides a commentary from long-standing sustainable drainage practitioners (henceforth 'SuDS practitioners') in response to the housebuilders' perspectives, and on how these perceived challenges may be overcome.



Context

‘Surface water’ is rainwater that falls on roofs, roads and surrounding natural and man-made surfaces. The need to improve surface water management is increasingly urgent in the UK, with 3 million homes already at risk of surface water flooding in England alone (Bevan, 2018), including 325 thousand properties in the highest risk category (NIC, 2022). But it is not only flood risk that should drive our focus on surface water. The rapid flow of surface water into sewers is a cause of the many combined sewer overflows that spill into UK waterways, often to the detriment of river health. Furthermore, by draining water away quickly, the potential for freshwater to infiltrate the ground is reduced, increasing our collective vulnerability to drought.

For over a decade, policy has favoured the use of SuDS which replicate natural drainage, where possible, holding water close to where it falls, and on, or near the surface, to slow the pace of its flow and reduce its quantity by encouraging reuse, transpiration and infiltration (susdrain, 2022). Consequently, housing developers’ drainage designs for new housing sites are expected to comply with external requirements. Specifically:

- Design must ensure that the quantity of flow out of the site during a rainstorm is equivalent to that which would have occurred had the site been a green field.
- Housebuilders must demonstrate to the local planning, flood, and sewerage authorities that they have followed a hierarchy of drainage types, prioritising re-use over infiltration, and infiltration over other means of disposal, only discharging into the combined sewer if no other options are available.
- Drainage features should be designed so they can and will be ‘adopted’ (either by local authorities, water companies, or private management companies) to be managed as functional assets into perpetuity.

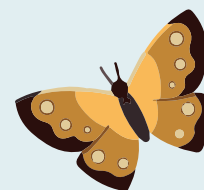
A historical focus on surface water flood risk has meant that the past management of surface water within new housing development has primarily focused on the first of the above requirements, that is, attenuating the volume and speed of runoff. Attenuation on housing sites has typically been provided by a large storage tank or a pond. As public concerns about river health have increased, however, pressure has grown for ‘nature-based solutions’, which offer multiple benefits in terms of providing the opportunity for water re-use, improved runoff water quality and increased biodiversity, as well as attenuation. Implementing these nature-based solutions typically involves several smaller SuDS devices (such as bio-retention ditches and wetlands) in combination and spread through a site.

On 10 January 2023 the Government signalled a change in legislation to make SuDS ‘mandatory’ through implementing Schedule 3 of the Flood and Water Management Act 2010 (Defra, 2023). Although the precise implementation is subject to public consultation, the expected effect is that multi-functional nature-based solutions will be required.

The changing emphasis in terms of SuDS type and function can be seen in the report. The housebuilders informing Section 1 show a preference for ponds and other large SuDS, highlighting some of the constraints felt to be limiting their use of nature-based solutions in 2021. In contrast, the SuDS practitioners authoring Section 2 at the beginning of 2023 argue for more frequent use of nature-based solutions.



Section 1: The perspective of housebuilders on implementing SuDS



Section 1 describes the process and constraints that impact on housebuilders' use of SuDS. It is based on interviews with the technical directors of large volume speculative housing¹ developers working in the Yorkshire and Humber region, where the research was carried out. Nine technical directors were approached, and a positive response was received from four. These four were then interviewed. Although this is a small sample, this is a hard-to-access group, and the interviews offer important insights into housing developers' experiences in seeking to implement SuDS. Moreover, although all developers came from one region, many of the issues highlighted are equally applicable elsewhere in the UK.

The interviewees in Section 1 described how their selection and design of SuDS occurs in the wider context of land bidding/purchase and site design, as illustrated in Figure 1. Key factors influencing their decisions included the requirements of the local plan, the competitive dynamics of the land market and the requirements of the land management companies that manage estates after housing has been sold. Notably, all housebuilders preferred 'off-plot' SuDS, positioned on the shared land within the housing development site, rather than 'on-plot' interventions on individual housing plots.

The interviewees agreed that nature-based solutions did not add value to the sale price of properties. However, some housebuilders acknowledged a positive impact on the marketability of a site.

Interviewees mentioned physical conditions, such as soil composition and topography, as key factors constraining the selection of nature-based solutions. The routine use of nature-based solutions was seen to be sometimes inhibited by regulatory systems and, in particular, by complexities in the

adoption and maintenance of SuDS. The land market was also perceived as a significant constraint on the use of nature-based solutions, with interviewees indicating that landowners anticipated high prices based on unrealistic expectations about the number of housing units that could be created onsite, because they did not realise how much land would need to be devoted to SuDS.

In terms of changes for the future, housebuilders identified the need for clear, consistent, and easy-to-apply rules within and across different local authority and water company areas. Insofar as on-plot SuDS are valued, they argued that their contribution to attenuation should be recognised. The housebuilders also suggested that their negotiations with landowners could be made easier if local authorities explicitly articulated the minimum percentage of a housing site that must be allocated to blue-green infrastructure (for biodiversity net gain and SuDS). Finally, they stressed that as water quality requirements come on-stream, training will be needed to upskill the housebuilders' teams.

¹ Speculative housing developers are generating profit through buying land that does not already have planning permission.

Section 2: The perspective of SuDS practitioners

Section 2 was developed in December 2022 - January 2023 to clarify some points of agreement and divergence between Section 1 and the views of the SuDS practitioners, and hence to highlight how the perceived challenges of multifunction SuDS based on nature-based solutions may be overcome.

The authors of Section 2 welcome the insight into development provided by Section 1. Like the housebuilders, the authors call for a mandatory and consistent approach to SuDS development, highlighting that as well as delivering on regulatory expectations in terms of drainage, SuDS also contribute to compliance with biodiversity and placemaking requirements.

The SuDS practitioners argue that 'on-plot' SuDS provide an excellent way to manage surface water. They hence support the housebuilders' concern that 'on-plot' devices' contribution to attenuation should be recognised.

Contrary to the perspective of the housebuilders reported in Section 1, however, the SuDS practitioners' experience highlights how:

- Multiple small SuDS features are more flexible, easier to integrate into sites, and provide more benefits than 'pipe to pond' designs.
- It is eminently possible to construct SuDS on 'difficult sites' with complex topography or with a clay soil.
- Permeable paving offers an excellent long-lasting SuDS feature.
- Water butts are only effective SuDS if they have an automatic discharge for 50% of their volume.





SECTION 1:

Housebuilder interviews on sustainable urban drainage systems and new housing developments

Author: Sarah Payne

Introduction

This report provides an overview of the findings of four interviews with volume housebuilders which took place in winter 2021. The interviews focused on examining housebuilders' experiences and perspectives of using sustainable urban drainage systems (SuDS) in new housing developments in the Yorkshire and Humber Region. Specifically, the interviews focused on the following four key lines of enquiry:

- The processes used to decide how surface water will be managed on sites, including the wider land-bid and site design context.
- The technical, cost, and planning constraints that inhibit the routine use of nature-based solutions for surface water management in new developments.
- What, if any, added-value nature-based solutions bring to new housing developments.
- What needs to change if nature-based solutions are to be routinely used for surface water management.

We contacted nine speculative housebuilders operating in the Yorkshire region: predominantly large firms specialising in volume construction. Interview requests were made to their technical directors over two repeat tranches to maximise the response rate. Positive responses were received from four housebuilders, and in-person and online interviews of between sixty and ninety minutes were conducted with the technical directors and engineering managers for each. The interviews were

semi-structured to maximise the opportunity for an open discussion. An interview guide was used to steer the conversation around the four key lines of enquiry.

Due to the commercially sensitive nature of speculative housebuilding, no identifying information about the research participants is provided in this report and no quotes are attributable to a particular housebuilder or job title. This anonymity was necessary to maintain confidentiality and to ensure housebuilders felt able to discuss topics that might otherwise have been considered commercially sensitive (Payne, 2020). Other identifying information, such as site names, local authority names, and water company names, has been removed from quotes to maintain anonymity and maximise confidentiality, as well as to respect privacy.

Where necessary, some wider contextual information on speculative housing development within a market-led system is provided to assist in explaining the results. We hope that the findings will be of interest to policy makers and practitioners operating in other market-led housing systems, both nationally and internationally; particularly those looking to enhance the uptake of SuDS for surface water management within new housing developments.

Finally, discussions focused on housebuilders considering surface water management on *potential* development sites.² These are sites considered for acquisition by a housebuilder from a landowner for residential development, for which planning consent is sought.

² A schematic and accompanying explanation of the speculative residential development process is provided in Appendix 1 for context. It shows the key stages of the development process and demarcates work done prior to land acquisition, which includes site design and planning permission where surface water management is considered. Also shown is the construction process and an indication of cash flow and risk influences through the process. This schematic offers a basic understanding of the speculative residential development process to assist in contextualising the findings in this report.

The decision-making process

This section outlines the key processes of decision making identified by interviewees when discussing how they set out to bid for and acquire new development sites, including the interactions between this process and their decisions about surface water management. The findings reveal heterogeneous influences over decision making, with significant emphasis on the wider development context, particularly regulators and landowners. Internal corporate strategy was of comparatively less influence. Whilst each housebuilder adopted their own approach, some basic commonalities were evident. This section starts by outlining a basic approach to decision making, drawing on the steps that housebuilders indicated that they followed. It may be useful to those readers with less background knowledge of speculative residential development. Thereafter, the section moves on to discuss the varying impacts of the wider development context on decision making, emphasising that surface water management in new developments is subject to varying influences.

A basic approach to decision making

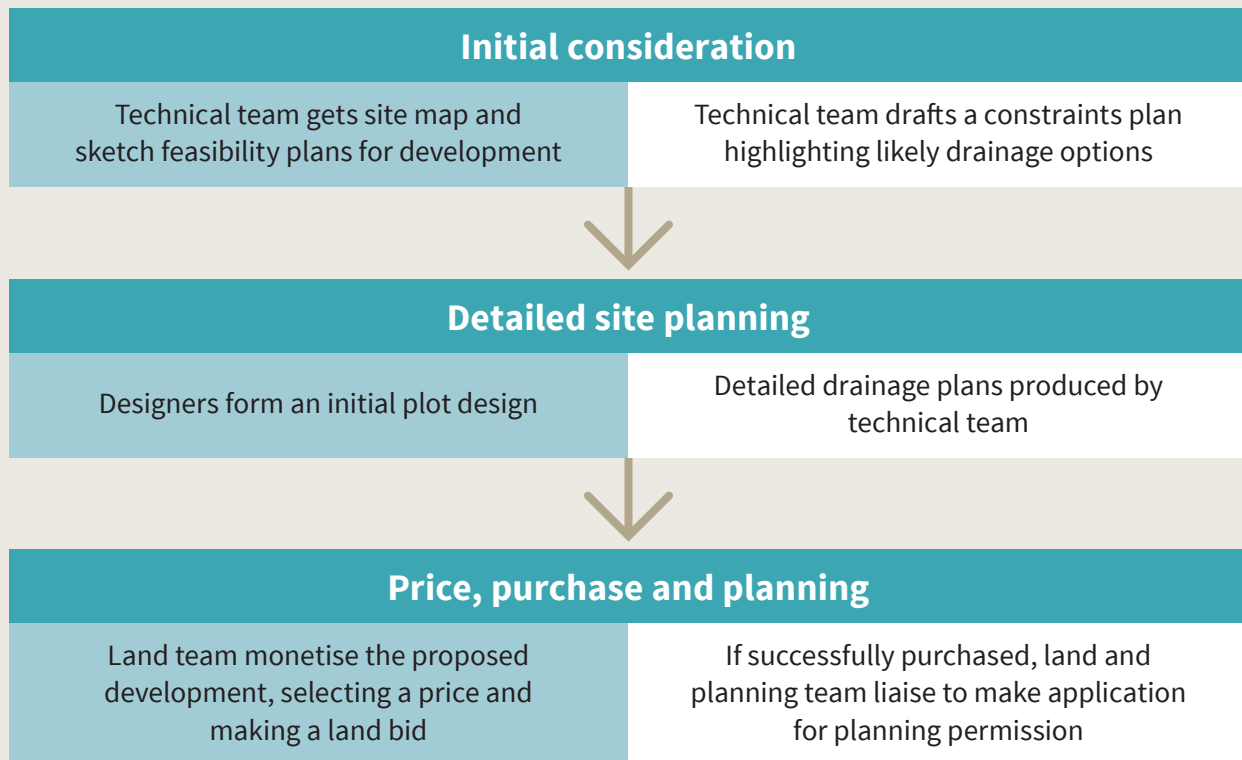
The interviews revealed that housebuilders initially considered surface water management in new developments in different ways. This was partly due to the differing composition of their technical teams (some used in-house engineers, others relied on external consultants) and partly as a result of the varied and dynamic development context. However, a few common, rudimentary steps were revealed, which are summarised in Figure 1 (a more detailed discussion of the speculative house development process³ is provided in Appendix 1):

1. A potential development site is received by the technical team from the land team.
2. The technical team develops feasibility drawings for the site, working with the basic information available. This information varies from site by site, but may include a flood risk assessment, topographical survey, and site investigation. This 'trio' is considered necessary to price up the site.³
3. The technical team produces a constraints plan, which outlines how they would design the layout of the drainage system. During this process, they consider the points on the site where attenuation and drainage can be placed.
4. Designers (or architects less commonly) then produce a sketch site layout, incorporating the drainage system as well as any public open space (if below ground tanks are used, public open space is typically placed above them).
5. The sketch site layout is then returned to the technical team, where a high-level drainage design⁴ is produced, using in-house expertise or external consultants, depending on requirements. This stage is influenced by ground conditions and watercourses available within the landowner's legal ownership boundary.
6. The technical team then communicates their site design to the land team, who pursue the acquisition of the site by formulating a land bid. If successful, they work with the planning team (in house or external consultants) to secure planning consent. The communication between the technical team and the land team might be iterative, particularly if commercial pressure to maximise developable space is required to strengthen land bids and re-designs are required.

³ One housebuilder confirmed that while this 'trio' is not always available for every site, it has become more common over the past three to four years as landowners (the vendors) become more aware of what is needed to price up a site. Prior to this, the housebuilder typically only received a topographical survey and would undertake local searches, use open data, draw on local knowledge of soil composition, or use external consultants to fill in the blanks.

⁴ Each housebuilder approached this step differently. One housebuilder adopted a hierarchy driven by the planning process, which was to start with soakaways, then drainage to a watercourse, then drainage to a sewer. Another would start with drainage to a sewer and work with regulatory authorities to achieve compliance through negotiation. However, it is worth emphasising that the influencing effect of the wider development context on these approaches is important in understanding how housebuilders achieve hydrological compliance, as will be discussed in the subsequent sections of the report.

Figure 1: How surface water management decisions are embedded within the land-bid and site design processes



The basic process set out above does not take place in a vacuum. It is subject to influence and change from a wider, dynamic context in which development decisions are made. This section therefore now turns to discussing these influences on housebuilder decision making.



The influence of regulatory authorities

“To be perfectly honest, the local authority requirements, or constraints, shape most of the decision-making process ... [but] then there’s what’s practical to deliver.”

When considering surface water management on potential development sites, some interviewees noted that, in the early stages, they were led by the initial views of the authorities who regulate the use of development land. As one builder explained:

“... we’re kind of led initially by, obviously, planners, local authorities, and water companies on what their initial view is. Both in terms of flood risk management and discharge rate. And that pretty much sets the scene then for what we can look to incorporate and how we do so.”

These initial views provide housebuilders with a general sense of what might be required in a planning application, allowing them to begin feasibility drawings, constraints planning, and site layout sketching. However, housebuilders did raise concerns about the differences of opinion between various local authority departments, and the consequent confusion that could arise. The same housebuilder noted:

“... quite often there’s a conflict within the local authority itself, in terms of what the planners and urban designers are looking for versus what the flood risk management team might be looking for as well. So that tends to be a little bit of a trouble, because the developer is quite often caught in the middle with that.”

Housebuilders also distinguished between the varying influences of different regulatory authorities. One indicated that, in their experience, the lead local flood authority’s (LLFA) steer was towards softer SuDS⁵ and water quality, whereas the water companies were more interested in flood prevention.

They explained:

“... you’ve got this trade-off between sort of allowable discharge rates and that’s predominantly the parameter that we would work to, rather than volume of runoff. And it would be ... well if we are going to sewer, obviously then it would be the water company that would dictate flow rates to that sewer. If we’re going to watercourse, then that would be dictated through the lead local flood authority in terms of discharge rate.”

The same housebuilder goes on to further illustrate their point, drawing on recent experience:

“... quite often what will happen is that we will have an underground structure to store the storm events up to the 30-year event, so that then can be adopted by the water company. And then we have an overflow facility or basin that will cater for the difference between the 30-year event and the 100-year event, and we would normally get that adopted by a management company. Very few councils will, in our experience, adopt that particular feature.”

While most housebuilders did not report that management companies had a significant influence on their approach to high-level surface water management, they did acknowledge that land management companies have requirements around the specification and design of their chosen interventions. One housebuilder explained:

“... there might be a restriction on what the maximum depth of water could be in that feature ... [and] a limitation on the gradient of the embankment or the batter slopes creating that pond or basin. Then there may be a particular maintenance regime that they would want to follow and that would all then get incorporated within the overall management agreement for the site.”

⁵ The housebuilder refers to soft SuDS as surface features such as reed beds, ponds etc. Comparatively, hard SuDS are underground solutions, tanks, pipes etc.

For example, management companies could dictate the type of planting used in SuDS, requiring the use of low maintenance schemes involving grasses and shrubs. This has obvious implications for the multifunctional benefits that SuDS can achieve, particularly around biodiversity, which will be discussed later in the report.

In general, the influence of local authorities was welcomed by housebuilders and played an important role in their decision-making processes. Early involvement and good relationships were considered important, enabling housebuilders to **“... get to talk to them, understand what they want and try and negotiate with them.”** Agreeing aspects of development such as discharge rates in advance of making a formal planning application meant that housebuilders did not waste time **“... submitting something that they’re just going to kick out of the door.”** Most housebuilders preferred to work to a solution and **“come to a happy medium.”** However, as the next section discusses, conflict can arise as housebuilders seek to achieve a balance between the requirements of local authorities, the recommendations of non-statutory bodies, and the practical delivery of construction on the ground.

The influence of the land market and landowner expectations

“... the brief that the landowner gives the consultant [is to] ‘Just get me planning’. Whereas our brief would be ‘Get me planning and make it buildable’.”

Housebuilder approaches to achieving surface water management on potential development sites were heavily influenced by the land market, and particularly the question of how ‘land hungry’ SuDS were perceived to be. Indeed, water attenuation design was strongly impacted by the route through which land arrived on the desk of the technical team from the land team.⁶ To explain the importance of this finding, a little context on housebuilders’ land acquisition methods is first required.

First, housebuilders seeking to buy land on the open market⁷ often respond to calls for bids on potential development sites (with or without planning permission) owned by landowners. This is the remit of the land team. These ‘on market’ sites can be of interest to multiple housebuilders operating in a given area and intense competition can arise, particularly for sites that are in good locations with significant development potential. As one housebuilder expressed it:

“... everything is very cut-throat at the moment in the land market. It’s the most competitive it’s been in years. So it’s something that’s so heavily driven ...”

Second, for a housebuilder to submit a bid for a site, their land team is required to produce a land value, which is calculated using the residual valuation method. This method utilises an initial design, produced either by the landowner or the housebuilder’s inhouse technical team, to calculate the gross development value (i.e. the value of the houses to be sold). From this, the total costs

⁶ Housebuilders’ land acquisition methods vary, but most speculative housebuilders do purchase a proportion of their housing land via the land market. Land purchase is not legally completed until planning permission is granted and satisfactory ground conditions are established, which can take many months or years. Where planning consent does not already exist on an advertised site, it is the housebuilder’s responsibility to pursue this at cost.

⁷ Alternative forms of land acquisition exist, which may afford housebuilders more flexibility in the design of flood attenuation. For instance, forward land, whilst not legally owned by housebuilders but for which they have an exclusive option agreement, is promoted by housebuilders on behalf of landowners through the plan making process, with the hope of achieving a housing allocation in the next local plan. Planning permission is subsequently sought. These sites remain ‘off market’ and arguably are not subject to the same commercial pressures compared to ‘on market’ land.

of development are deducted (including construction costs, professional fees, profit and finance costs) to arrive at a residual land value. This process requires the housebuilder to make a series of assumptions about these costs and values, since the valuation occurs a considerable time before development begins (sometimes the two can be separated by years). Assumptions about the design and layout of the site form part of these calculations, which include, amongst other things, the location, size, cost, and type of surface water attenuation. In some cases, outline planning permission will have already been granted; however, in such cases the residual valuation process remains the same.⁸

The key point to emphasise is that the landowner puts their land on the open market at a price they think is achievable. However, landowners often do not have the development expertise of a housebuilder. In some cases, their assumptions about surface water management may be ill-informed, unrealistic, or undeliverable, particularly where topographical or soil composition factors have not been properly accounted for. Landowners may also be unaware of industry-specific SuDS guidance or other relevant planning legislation. One housebuilder commented:

“Generally, we get handed something. And more often than not it’s something that doesn’t work ... we will either get information that’s been produced for an allocated site, so a kind of high-level flood risk assessment which might have a drainage trap in it ... or we’ll have an FRA [Flood Risk Assessment] and a drainage trap, which has been produced by a consultant on behalf of a landowner to sell their site.”

Where surface water management measures have been factored into the initial design of a site by the landowner (vendor) or their consultants before it comes to market, their estimates of the space that is required can raise issues, as one builder noted:

“... the main thing we get from vendors is they’ll show us the shape of the pond, just as it is... they’ll work out what area it’ll take ... [but] they don’t take into account the sculpting of the pond as well ... So literally, if it’s like that, you’ve got to cut out that much ... and then you’ve just got this ridiculous ski slope of earthworks ... So they’ve erred on the side of optimism. I dare say we err on the side of caution.”

When submitting a bid for an ‘on market’ site, housebuilders must therefore balance surface water management with the need to produce a competitive land bid that maximises the land value. As one housebuilder noted, “There’s no point in us having a wonderful robust bid if they don’t look at it because it’s tenth or fifteenth in the pecking order”. Another housebuilder clarified the extent to which this shapes their approach to SuDS, indicating that below ground interventions were their initial preference:

“We need to make sure that we’re competitive in the market for acquiring the site ... so our philosophy really, is we would probably look at the hard SuDS⁹ options first because we know that we can maximise the value of the land.”

Another housebuilder expressed a similar point in a slightly different way, acknowledging that where SuDS were used because ground conditions were amenable and planning policy clearly required them, the land price offered would be caveated to ensure that the development was viable and deliverable:

“... we may as well start off with soakaways, because the chances are it’s going to be, but then our land price would be caveated on getting a site investigation done to prove that soakaways are viable.”

Interestingly, one housebuilder demonstrated the confluence of land market competition and local authority policy in shaping their approach, emphasising that where SuDS policy was not mandatory it would not be followed by some housebuilders, since it would lose them their competitive edge:

⁸ In such cases, and if successful in their land purchase, the housebuilder will submit a reserved matters application to gain the right for development in relation to appearance, means of access, landscaping, layout, and scale.

⁹ In this context, the housebuilder refers to hard SuDS as underground solutions, tanks, pipes etc. Comparatively, soft SuDS are surface features such as reed beds etc.

“... if you, for example, are looking at swales, basins, things like that, if it’s not something that’s pushed by the local planning authority through something like the Water Framework Directive, then if you went down that route you’re going to have less coverage generally, because you only have your one metre deep water that can be attenuated. And then, actually, you get a larger area that takes up, that might mean you have to increase your public open space, it means you drop coverage. So then that has a knock-on effect for the land price. Whereas if someone’s [another housebuilder] quite happy to pop it in a below-ground tank, say, then they can increase their coverage, they can have a more competitive bid.”

As the above quote implies, the competitive dynamics of the land market mean that some housebuilders may offer a strongly competitive land bid simply to win the right to purchase the site, but then subsequently ‘chip away’ at that value as they prepare a planning application and produce a detailed design. Other housebuilders might adopt a different approach, producing a competitive land bid, but caveating it with a series of statements that explain to the landowner that their site may be overvalued if their concept design turns out to be undeliverable with current legislative requirements. The latter approach, whilst ostensibly creating a competitive land bid and gaining ‘a foot in the door’, acts to challenge landowner assumptions about what is viable and deliverable and to outline potential sticking points. One housebuilder noted:

“It’s all about how the land person carefully words their letter to kind of, well I did tell you that and I have an opportunity later on, but at least I’ve got my foot in the door to have the conversation.”

In any case, the production of a land bid requires communication and negotiation between the land team and the technical team about what is and is not commercially



and technically feasible for the proposed development site. The process for this discussion varied among the housebuilders and was influenced by their own strategic business priorities. Indeed, even internally, the teams didn’t always agree, as one housebuilder explained:

“Normally I’ll write a report to the land team that says this is what’s probably going to happen eventually ... they said you’ll need this amount of storage there, this is what other people will bid on, bidding blindly because some people don’t even consult their technical teams. They’ll just use the information they’ve got and throw a bid in. And then hopefully they’ll catch [the] landowners’ attention because it’s the highest bid and then they’ll work through and kind of chip away later on.”

In summary, the influencing effect of the land market and landowner expectations in shaping surface water management decision-making cannot be understated. Housebuilders are required to balance commercial pressure to acquire land with regulatory requirements. Problems may arise where regulation does not exist, or is not clear, consistent, or certain. The competitive nature of the bidding process means that non-statutory standards are likely be overlooked in favour of doing what is minimally required to achieve planning permission in order to maximise land value.

The influence of corporate preferences

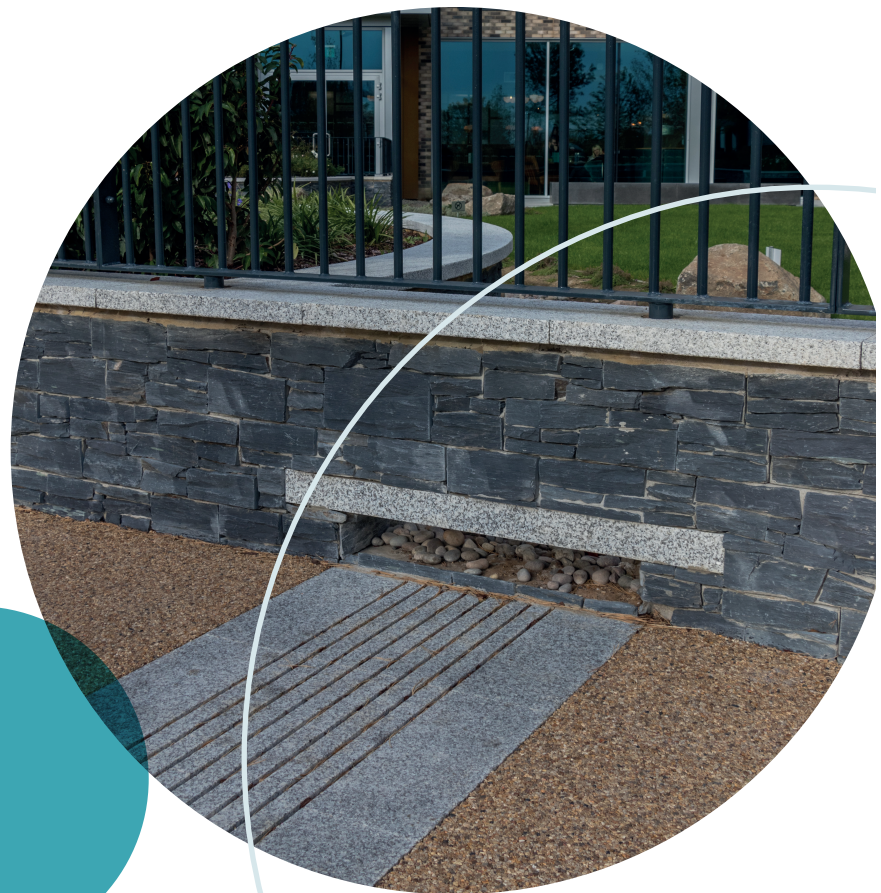
“... each site is looked at site-specifically really, on what can be accommodated.”

Interviewees did not have SuDS-specific corporate strategies and did not utilise standardised corporate approaches to surface water management. To some extent, this finding is expected, since such measures are very much dictated by the specific and often unique features of a development site, such as topography, soil composition, existing watercourses, etc. Therefore, it was up to technical teams to draw on their own expertise and experience of developing sites in specific LLFA areas, working with the information available to them to devise surface water plans that balanced technical, commercial, and regulatory requirements. In cases where the necessary in-house expertise was not available, housebuilders accessed this through their network of external consultants.

In place of formal strategy, housebuilders were asked to talk about their standard corporate preferences around SuDS types. In their answers, an interesting distinction emerged between ‘on-plot’ and ‘off-plot’ interventions. ‘On-plot’ interventions refer to SuDS that sit within individual house plots, comprising features such as water butts, permeable paving, rain gardens, and in some cases, swales (though these tend to abut the edge of driveways). Conversely, ‘off-plot’ interventions are those placed elsewhere on the development site, such as detention basins and ponds, often in public open space.

All interviewees revealed a standard preference for ‘off-plot’ interventions, most typically ponds and detention basins, for a range of reasons:

- Attenuation could be focused to a specific area on site, and the layout of the remaining areas designed around that space.
- Topographical issues meant some areas of the site were more suitable for drainage and storage than others.
- Land market pressures discouraged housebuilders from routinely considering ‘on-plot’ interventions, since maximising developable space (i.e. the number of homes achievable on a site) was a commercial priority.
- Placing responsibility on homeowners for the maintenance and upkeep of ‘on-plot’ interventions created additional costs and risks.



In relation to the last point, one housebuilder contended that they had resisted permeable paving because it was impossible to ensure that people maintained it to the standards necessary to maintain regulatory discharge rates:

“... permeable paving... again, great idea in theory. However, after the first three, four, five, six years, it blocks up, it soaks up and it needs to have a lot of maintenance to make it successful. So, again, you’re asking people who are buying a house to then start thinking about, well I’ve got to pull my drive up every five years to clear it all out... and the pushback we give on permeable paving is, usually, you can’t allow for people maintaining that. So you can’t allow for these designs.”

Another housebuilder perceived that potential homeowners might not want to be bothered with the responsibility of dealing with flood issues on their private property, and noted the potential issues this might raise in terms of marketing and sales:

“Some people are interested, but most [are] not bothered ... the way somebody else is dealing with all that strategy is a bigger plus than “Oh you’ll have to deal with it, you’ll have to rip up your drive every five years to maintain your permeable paving. Make sure your green roof’s working, make sure your rainwater harvesting infrastructure and everything”... you’re putting more onus on the individual. And I think that would put a lot of people off. I’m probably speaking for quite a few people there but knowing you’re paying X amount for your house, you just want it to disappear and somebody else do it.”

Another housebuilder recounted their experience of consumer worries with soakaways:

“I mean it’s a hard sell for the customers, I think, knowing that they’re responsible, and 99% of them are used to water disappearing and then forgetting about it. Unfortunately,

with the soakaway, I think the sales team had a bit of a hard time saying that all your own water drainage you’re responsible for, and you’ve got to maintain that soakaway in your back garden. And I think it scared a few people a bit. But they’ve all sold, so it’s not enough, but I think the more nervous of people probably think ‘I don’t want that’.”

In the spirit of seeking a practical next step, one housebuilder explained how they sought to overcome these consumer behaviour issues by designing drainage systems for ‘urban creep’:

“... quite often post-development we can’t then dictate what the homeowner wants to do. They may remove that rainwater harvesting, they may resurface that drive with an impermeable material, or they may want to look to extend the property and increase the impermeable area connected to the system there. So you know it comes back to, I suppose, us making sure that we’re not uneconomic in terms of what we’re making allowance for, to make sure that we’re competitive, versus what may happen in the future, by way of the end customer really.”

Housebuilders highlighted that water companies were unwilling to consider ‘on-plot’ interventions in their drainage calculations because the drainage benefit could not be guaranteed due to its reliance on consumer behaviour.¹⁰ One housebuilder explained:

“One of our competitors... they went down the route of putting gravel on the drives, and it’s not a hard-surfaced area, so therefore were allowing drainage calculations. [water company] rejected that and said you’ve still got to size your tank accordingly and they were having this bit of a battle between each other. And [water company] said the first thing somebody’s going to do is when they buy that house, they’re going to tarmac that drive, and then that water’s going to run into the drainage...”

¹⁰ Sewerage sector guidance approved by Ofwat only enables sewerage undertakers to adopt certain types of SuDS, and generally not those which are included within the plot curtilage.

Another housebuilder indicated that the water company's putative unwillingness to consider runoff from 'on-plot' infiltration reduced their ability to deliver a combination of 'on-plot' infiltration and adoptable underground storage on a recent site:

"... So we had, say, 50% of the site going to soakaways in rear gardens, serving individual properties, and the rest of the site goes to below-ground storage that's adopted as a sewer. And [water company] were insistent that the whole site was designed to accommodate the runoff in case the soakaways weren't maintained and stopped working. So, then you don't do that because you've got to build two things then, so why would you?"

Water butts were viewed more positively by housebuilders and were for some the only 'on-plot' attenuation they had utilised, often because local authorities had clear policies to support it:

"I think that's a relatively easy quick win. Because it's something that customers recognise, and they might buy their own one from B&Q... and it's something that, for the customer as well, is a low maintenance. It's just a barrel at the end of the day, and it's got an overflow. So, if they don't use the water, it'll just carry on going where it was going to go in the first place. But equally it's a source of water to water their garden. So that would be for the customer and not so much for the developer."

However, as above, the housebuilder noted the butts were not considered in the drainage calculations by the water company and were simply additional. This was problematic, since in some cases, the landowner utilises 'on-plot' interventions in their sales pack. The housebuilder stated:

"It's additional... You can't guarantee that the customer's going to keep it, so they won't allow it... there's no saving for us doing that because we still have to account for it as though it isn't there... And we... do occasionally get packs from landowners which has on-plot storage as part of their calculations... little tanks under everybody's drive, which, in theory would be great, but again the regulator, [water company], won't allow it because they can't control that that customer isn't going to rip out that tank at any point."

Section summary

This section has shown that housebuilders do not have a SuDS-specific corporate strategy, and do not adopt a standardised corporate approach to surface water management. Rather, their approach is site-specific and influenced by a range of factors. Housebuilders did, however, declare a preference for 'off-plot' interventions and were dissuaded from considering 'on-plot' interventions because of customer perception and water industry attitudes.

The report now turns to the next key line of enquiry and explores whether SuDS add value to new developments.



Do nature-based solutions add value to new developments?

The interviews revealed a strong degree of consensus among the housebuilders in this area: All participants argued that nature-based solutions did not directly impact on the sales values of properties. That is, potential homeowners did not express a willingness to pay more or less for a property simply because it was on a site with SuDS or had 'on-plot' SuDS features. However, housebuilders did acknowledge the positive impact SuDS had on the marketability of a site, as one builder described:

"... they tend to feature quite a lot in some of the sites that are winning awards and things like that. So, I think it's something that's looked at and appreciated by customers, you know, I think that understanding is growing more."

Despite the lack of sales value uplift, some housebuilders indicated that nature-based solutions could drive sales and enhance the sales rate¹¹ of houses on active development sites. Housebuilders explained how, when installed early on in site construction, SuDS present a positive and attractive vision, where properties or street scenes might not yet be built. One housebuilder explained:

"... what we try and do is get the infrastructure in early, whether that's a tank or SuDS, so that when a customer comes onto site... they can see the open space¹² being established as well. So, we'll get the value by laying it out earlier, and if we can lay out a wonderful pond system that customers can access early on, then they're not necessarily going to pay an extra ten grand for the plot but it's more likely to get that sale. And you're more likely to buy [our] house than the [competitors] house if [competitors] are still a construction site and you can't work out what's going on. So it's more about rate of sale, I think... [it] drives sales."

However, other housebuilders were less positive, and did not notice any increase in site interest or sales rates resulting from the use of SuDS. Nor did they recognise the potential marketing benefits such interventions might yield, as one builder commented:

"No, not really. Obviously, we need to provide landscaping anyway, and areas of public open space as we call it, you know, for the estate. But it's not something that we've particularly looked at from a marketing point of view. Yes, we make the area look, you know, try and make that look pretty and things like that, but it's not something that we've... seen any sort of real benefit from a marketing point of view."

One explanation for this may be in the health and safety issues raised by some interventions where a natural break point is needed to public access, thus affecting the integration of SuDS into the site landscape.

Housebuilders explained that detention basins and ponds sometimes need to be fenced off with knee-rails, or even kept fully separate from the public realm.¹³

Boundary treatments, even where natural or sympathetic, may look incongruous when the basins are dry for most of the time. The use of lifebuoys might add a sense of danger in these areas. Another housebuilder commented that detention basins can also often become *"just a bit of dry grass that's got overgrown and rubbish starts getting in there."*

¹¹ An increased rate of sale adds indirect value to a housebuilder since it speeds up return on capital by having a positive impact on cashflow. This is depicted in the Schematic in Appendix 1. The faster the return of income in the construction and disposal period, the faster the rate of debt repayment, cashflow neutrality, and subsequently profit generation.

¹² Open space is routinely placed on top of tanks to maximise developable space.

¹³ For the authors of Section 2, the need for a barrier is suggestive of poor design.

Section summary

In summary, whilst interviewees did not link a direct monetary value to SuDS provision, some housebuilders did acknowledge there were marketing benefits to nature-based solutions, and that they could enhance the sales rate of properties on site. Others did not agree. Whilst further research is needed to establish the causal relationship between SuDS and sales rates, it is clear that nature-based solutions do have some potential to offer a positive impact on consumer perception and on the corporate reputation of housebuilders.

The report now turns to the next line of enquiry, where the constraints inhibiting the routine use of SuDS by housebuilders are discussed.



Constraints inhibiting the routine use of nature-based solutions

This section reports on the various constraints inhibiting the routine use of SuDS for surface water management in new developments, as reported by housebuilders. They revolve around a series of technical, regulatory, land market, and maintenance factors across the wider development context. Discussion of these constraints problematises any straightforward narrative that enhanced SuDS uptake can be achieved simply by overcoming engineering issues. The discussion unpacks these factors, drawing on the interviews and wider context to explain and illustrate.

Technical constraints – topography and soil composition

“There’s parts of Yorkshire where, you know, there’s no point even looking [at soakaways] because you’ve got a lot of clay in the area... Or there’s other parts where sand and gravel is more predominant, so you can have a fair stab.”

All housebuilders acknowledged that site topography had a significant bearing on the drainage strategy for their sites. A central question was where housebuilders could accommodate storage, irrespective of whether it was below or above ground, and whether they could incorporate on-surface features. One housebuilder commented:

“... you need a gentle grade to the site to get it to a pond and then that pond has to have a high enough infiltration rate in that area to deal with all the water in one place. Whereas, if you have a number of smaller geocrates you’d have them positioned where you know you’ve got reasonable infiltration, but the infiltration doesn’t have to be as good to support that volume of water in one go... you need a flatter area where you can have your basin without a big, huge amount of earthworks. But then, to make sure your drainage is shallow enough to get into it, you need the site to kind of gently slope towards it.”

Topographical issues led to further practical issues for builders, like added excavation costs:

“Obviously, if you have a really long site that’s perfectly flat, then drainage that’s a couple of hundred metres away is going to end up kind of three or four metres deep by the time it gets to the basin. So, you have to have a considerably deeper excavation to form your basin. And obviously, you take out of that... there’s that cost, obviously it has to be exported away because you know there’s nowhere to reuse it.”

Also important was soil composition. Much of the soil found on residential development sites in the Yorkshire area is clay-based, which is problematic since water drains slowly after rainfall, resulting in standing water after a rainstorm. This means water may need to be directed towards drainage points where it can be attenuated, limiting infiltration-based interventions. One housebuilder explained:

“West Yorkshire is not a great place... Infiltration basins generally don’t work... it’s rare and uncommon if we can get water to soak away naturally... it’s just the clay. Going out to the east coast you start to get away with it, but certainly West Yorkshire, we have to prove that soakaways don’t work. But nine times out of ten we know they’re not going to work before we start there because you dig into the ground and it’s just such a thick band of clay.”

In relation to their experiences of development in the Hull area, one housebuilder stated that whilst a greater preponderance of chalk makes infiltration more viable, it does not necessarily remove the risk. This is because site investigations are limited to boreholes: because builders cannot dig up the entire site to check for soil composition, they run the risk of discovering impermeable soil once construction starts:



“... it’s risky, because we did a site in... Hull, and the ground investigation showed it had chalk, but it had chalk and clay. So, we had soakaways, and it was potluck. You know, you design and put your soakaway there, but it was all clay, so you had to move it and trying to do that on a housing development was just awful. So yeah, it’s good if you know it’s all chalk, but a mismatch is a real problem.”

A less important technical constraint was the housebuilder’s ability to design and engineer SuDS. All housebuilders were technically proficient in building ponds, detention basins, swales etc. Some had in-house engineers who oversaw the process, whilst others sought expertise from specialists experienced in SuDS design. Thus, access to knowledge (for options on the choice of SuDS) or skills and technical prowess (in designing and engineering nature-based solutions) were not considered core constraints affecting uptake of SuDS on new developments. This is an important finding and may go some way to explaining current approaches to onsite SuDS provision in mainstream housebuilding.¹⁴

Regulatory constraints

“We’re very much driven by what people will adopt and what will get past planning. We’d have our own ideas. If we could do whatever we wanted to do, then it might be very much different. But we don’t have that option, we have to provide something that, one, will get planning, two, will be adopted and, three, is safe I suppose.”

Housebuilders identified a range of constraints emanating from the planning and adoption process that shaped their approach to surface water management on new development sites. Some raised concerns about the conflict they experienced within local authorities, alleging that they found themselves in the middle of inconsistent messages, from LLFAs on the one hand and planners/urban designers on the others. This frustrated their planning application work. Interestingly, one housebuilder commented on the responsibility they perceived planners had, to resolve this conflict due to their strategic interest in meeting housing delivery targets:

“And it’s almost a case of saying to the authority right, well you know, which way do you want us to go, you know, who’s going to win the battle here? Is it the lead local flood authority on what they’re wanting to see or is it planners? Quite often it ends up being planners, you know, they’ve got a requirement to deliver the housing, you know, that they need to as well.”

Another housebuilder reflected on this issue further, noting the lack of expertise planners often have in managing the diverse and divergent inputs of surface water decision-making:

“Because you haven’t got one person that makes all these decisions, it’s so complicated. And it’s only when it comes into the housebuilder, because we are Jack-of-all-trades-master-of-none, we deal with all of it. So nobody does anything deliberately to cause the problems, it’s just you haven’t got this one central point where

¹⁴ This claim is contested by the authors of Section 2 who argue that SuDS can be designed for all sites, whatever the topography. Their perspective is that housing developers’ focus on ponds and detention basins is indicative of their limited experience of implementing the variety of SuDS available.

it all marries together. And people in local authorities have their own agendas, you know, the SuDS person wants that, the landscape person wants that, and again, planning officers don't necessarily have the expertise to pull rank and go "Well that's what you should do". You've just got consultees almost arguing against each other."

In a similar vein, housebuilders commented on their frustrations with local authorities who appeared not to understand how SuDS work, or what might be appropriate on a particular site. Two housebuilders provided the following examples:

"One particular authority is looking for us to push permeable paving, even though the ground conditions don't lend itself to that."

"Yeah, we did a site... it's a joint development, they've got [a supermarket]... a care home and... houses... and a woodland. And it all goes that way. And so, they've just carved out two, lovely, kind of like oval shapes in the woodland to put the ponds in. So, assuming you can get the tree officers to go "Yeah, you're fine, you can get rid of that mature woodland", that's one thing. But then, when we went to site, it's been regraded... the ponds are [now] on the top of a five-metre-high hill. So, I don't know who's looked at it, but... and that's what we're bidding on the site."

Another housebuilder recounted an experience where the lack of joined-up thinking led to a 'daft' suggestion from the planners:

"... the one in [...] always strikes me as a bit of a daft ... the land fell away from the road, so naturally the place you put your attenuation is the bottom of the hill. The planners didn't like that, they wanted the pond to be visible and they wanted it to the front of the site. And we're going back all the time saying, but that's at the top of the hill... water doesn't go uphill, it goes downhill."

Housebuilders also aired their frustration over the indecisiveness of local authorities in determining what was required on sites. They perceived that this was caused, to some extent, by new design codes for SuDS adoption, that have come into effect over the past two years. It represented a particularly problematic issue for them due to the impact of the new codes on costs, land intake, and overall viability, which have often already been agreed through the land bid process:

"We're going through that process now, where we're submitting things and seeing how it comes back via the planners, and what their comments are. Initially they're saying, "You've got a tank and I want it to be a pond now," and we have to say, "We can't do it as a pond, not in this particular instance because of the sheer land take". And these are sites we've already bid on; we've already got our own assumptions and all our normal costs. So, to change it now would severely impact our costs."

The housebuilder explained why these inconsistencies are so problematic, drawing on the impact of the wider development context, and alluding to other constraints to be discussed in forthcoming sections of this report:

"... the standards do have an influence on us, but housebuilding is such a complex industry, and land buying is so complex that there's loads of factors that push us down this way. So, nature's pushing us this way. Legislation's pushing us this way. The fact that we need to turn our cash so quickly means that we need to get consent incredibly quickly."

Interestingly, the same builder goes on to explain that ponds, as opposed to tanks, may alleviate some of these frustrations, because consent is often easier and quicker to obtain by including them:

"... I'd much prefer to have an FRA and a drainage strategy going to a local authority that's got a pond in it. Because I know they're going to read it and go "Wonderful!" As soon

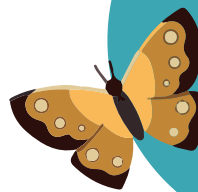
as we put a tank in, you just know that we're going to have a challenge because it'll take longer to get it through. So, I've got my boss going "Well, have we got planning yet?" "Well, no because it takes longer". So that's pushing us down it."

The interviews revealed that water companies also produce important constraints by resisting certain features, and pursuing stringent requirements for others (for example, the constructional requirements of basins, and their use under various types of storm). The perceived strictness of these demands prevented or dissuaded some housebuilders from using nature-based solutions. One builder commented:

"... as a developer, we wouldn't want to proceed with somebody where we knew we were going to have difficulties in getting it adopted. Basins is something ... we're still struggling with [water company] in terms of basins being adoptable. So, the idea of them moving on to swales and things like online ponds or wet ponds that act as part of the drainage system is, you know, it's too much of a risk with their attitude towards it."

The demands of the water company¹⁵ around the ongoing maintenance of SuDS sites also affected the multi-functional benefits that could be delivered with a scheme, leading some housebuilders to consider the alternative of a residents' management company:

"Because [water company], when they adopt a basin, it has to be short mown grass and maintained like that. And that's how they would maintain it when they adopt it, which for a biodiversity and a water quality point of view that basin is restricted by how much it can offer. Whereas, when you go to a management company, if it's something from a biodiversity or water quality point of view, you want to plant things or you want to ... we had a site where, for kind of crustacean-type creatures, you know, bugs and things, they wanted rocks embedded in



the banks. And that's then something you can do to create habitat around it. And it's something [water company] would never take on, because of the maintenance, but as a residents' management company, they would accept that because they have landscapers that work for them, as opposed to [water company] who just have a grass mowing team."

The adoption and maintenance of SuDS by private management companies (other than the water company) may enable housebuilders to work around some of these regulatory issues and relieve some of the commercial pressure arising by offering more relaxed codes. There are other advantages to such arrangements for housebuilders, such as improved speed of approval, lower costs in terms of design checking, and accelerated adoption programmes. For example, housebuilders noted how the lateral size of the ponds could be reduced, owing to the less restrictive sizing standards of private management companies, thus enhancing the amount of developable space on site. Candidly, one builder thought these management companies would create a wakeup call for the water company to "get their act together in terms of timescales and approvals" but also as a mechanism to "make them adopt the features more readily".

This section has revealed how the behaviour of regulatory authorities - one aspect of the wider development context - constrains how housebuilders approach drainage strategies on new developments. While housebuilders are undoubtedly driven by the need to achieve planning consent and adoption of SuDS, the process of obtaining these can be complex and full of conflict, adding frustration and risk to the development process.

¹⁵ What are perceived as water company demands probably arise from the Design and Construction Guidance (Water UK, 2022)

Land market constraints

“Obviously, if our bid’s less because we can’t get the development coverage that we need because there’s a mandate to incorporate SuDS or on-surface SuDS, then landowners see it as a loss of revenue.”

Discussion earlier in this report highlighted the significant influence of the land market and landowner behaviour as drivers of surface water management decision-making practices amongst housebuilders. However, a further series of issues emanating from the land market also constrain their approach to utilising SuDS on potential development sites.

First, landowner assumptions about the design and layout of their marketed site can cause conflict between the technical teams and land teams within the housebuilding firm, as they attempt to balance technical realism (attenuating the flow of surface water) with commercial realism (a competitive land market). One housebuilder discussed their experiences of landowners ‘designing in’ infiltration interventions that turned out to be unsuitable for the site:

“... generally, that will be a lovely amorphous-shaped pond, topographically independent of where it needs to be, and we’ll get... engineers in-house to scrutinise it. And generally what happens is that we’ll go “Well, that’s what they’ve told us, but this is how big it needs to be”, but we’ll bid on what they’ve told us otherwise we won’t win the site... and then we’ll have to have an awkward conversation with them later on to say ‘It needs to grow...or it needs to go from being a lovely, soft nature-based solutions feature to a concrete tank’.”

Another housebuilder highlighted these tensions:

“It’s the people bringing the land to us accepting that, in order for this to pass through, we can’t just stick 100 houses on here, you might have to only fit 75, and have a 25 area space, to accommodate a suitably-sized attenuation basin. But then

you’ve got to ask the question: is it realistic for a landowner to commit that amount of resource and expertise to something that they don’t necessarily need? You can’t mandate that.”

This highlights a core constraint emanating from land market pressures: the need for layout efficiency as a commercial driver of success in speculative residential development. The amount of developable space that can be achieved on site determines development value and thus land value. This can constrain the use of otherwise suitable SuDS solutions, as one housebuilder explained:

“... the layout is a key driver... a pond, as much as its loveliness it’s the cheapest, it’s the most natural, and it’s how everybody wants it to work, it’s often not the most efficient.”

In other words, soft SuDS, that seek to achieve surface water management through infiltration, are often perceived by housebuilders as being land-hungry, which affects their ability to maximise developable space and potentially their commercial success. Another housebuilder noted: “... soft SuDS... they can be quite land-hungry. And therefore, in terms of land acquisition, it eats into sort of the economic side.”

Paradoxically, while above-ground basins are cheaper to build than below-ground storage solutions, one housebuilder emphasised: “...losing plots to fit something in costs a lot of money”. Another housebuilder explained how, for them, this meant going for commercial rather than ideal solutions. Forthcoming policy transitions towards biodiversity preservation and water quality enhancement were perceived as adding commercial pressure:

“... the biggest thing against ponds is commercially. We’d always want to build them because they’re much cheaper for us to build. But the biggest drawback is the amount of land taken, it’s just getting ... it’ll get bigger and bigger with the water quality now, and the shelving for the planting, and



all the other aspects of it. It's going to make the ponds ... unless you've got an allocated space for it, it's going to make them unviable."

Whilst the above issues are not necessarily insurmountable, it is clear from the discussions with housebuilders that the space afforded to SuDS on development sites is under constant pressure from the commercial realities of land value calculations and bidding processes. Maximising plot efficiency and developable space is necessary for housebuilders to secure land to continue their business of building new homes. Solutions to address these constraints, which the report will go on to discuss, must therefore seek to negate these commercial pressures if they are going to be impactful. In other words, technical and engineering-based solutions will not mitigate against these wider developmental constraints.

Maintenance constraints

"... whilst some [local authorities] would look at [permeable paving] ... we've not had much enthusiasm. Because for them there's a large ongoing maintenance risk of the fact that the road is permeable... I've previously had discussions... about permeable roads, but it's still very much in its infancy, and I think there's concerns about long-term maintenance of the roads."

Unlike the constraints discussed elsewhere in this section, maintenance constraints were considered by housebuilders as relatively insignificant, largely because issues were dealt with through conversations with maintenance companies or local authorities adopting the SuDS. Nonetheless, housebuilders did raise a couple of issues that added friction and frustration to this process of SuDS adoption.

Housebuilders expressed frustration over the late timing of SuDS adoption in the construction process, and the attendant cost implications. Prior to adoption, housebuilders remain responsible for the maintenance and upkeep of their SuDS assets, but without the income flow from residents that management companies enjoy. The issue is exacerbated by the fact that, as previously mentioned, housebuilders are keen to build SuDS early in the construction process to establish a positive image of their development. Detention basins are often built as part of the first phase of road and sewer construction, at the beginning of development.

One housebuilder explained that the late timing of adoption at one site meant they had to arrange frequent maintenance visits to clean trash-screen grills or mow grassed areas, as well as arranging frequent inspections to ensure the system was performing as it should. To address this issue, which is a cost and administrative constraint, the builder commented:

“We are exploring whether there can be an earlier sort of adoption or takeover of such features but, again, that’s probably subject to the size of the site. So, if you can imagine that all the residents obviously have a management fee to pay, it’s not until we get towards the end of a development where that can come into full effect.”

Whilst this is a less onerous constraint when compared to land and regulatory constraints, it is still an interesting issue, since it may influence some housebuilders to delay putting SuDS on site as a means of securing a better cashflow (refer to Appendix 1). Other housebuilders may simply accommodate this cost of maintenance and continue to install SuDS early, however.

Another issue raised by the housebuilders was the changing willingness of local authorities to adopt SuDS. One housebuilder explained:

“Some councils will take them on, but a lot of them have shied away from it recently. They don’t want the hassle; they don’t want the maintenance nightmare. So, we asked the question of how ... because we’ve got a particularly large site where ponds were shown as the option to go down, but we asked [the local authority] and they didn’t want any involvement in it... Because they’re all strapped for cash, they don’t want the hassle.”

When asked what would happen in that instance, the housebuilder clarified that in the past, the local authority used to insist it had to be either a water company or a local authority looking after the asset. Nowadays,

the builder stated that the local authority has “... relented a little bit now. So, they will accept... that over one in 30 are to be managed privately now”. However, this still means that the majority of SuDS would remain the responsibility of major water companies or local authorities. In cases of adoption by smaller private management companies, a situation could arise where maintenance responsibilities were fragmented across a site:

“... we did a pond thinking, easy ... you’ve got a big depression and then you’ve got a little fence halfway up it. And one person cuts the grass up to that fence and the other person cuts the grass down. So, this is where legislation ... I’m sure someone’s written it with the right intentions, but this is kind of the reality of what’s happened. And we end up kind of stuck because you can’t argue it, you haven’t got the time to kind of try and change anything, you’ve just got to work with, I guess, the hand that you’ve been dealt. So, you do end up with some silly situations...”

The practical realities of two parties being responsible for maintaining a SuDS asset led the housebuilder to comment on the differences in approach between them, implicitly favouring the private management company:

“So yeah, and with a management company the basin’s likely to be maintained as well, and with the best will in the world, strapped for cash or not, councils and [water company] they’re going to visit probably once or twice a year at the absolute most, and they won’t maintain it in the same way... you’re just going to get those little robot mowers aren’t you that just kind of go round the basin.”

A final point worth noting is the reluctance perceived by housebuilders of some local authorities and highways authorities to adopt permeable paving. Housebuilders perceived they had concerns about the long-term maintenance costs of the roads, meaning some councils were moving away from such drainage solutions.

Turning to the time after adoption, when the builder had completed their development and moved on to their next location, housebuilders did raise some concerns about the conduct of management companies and the efficacy of their maintenance practices. Though the SuDS was no longer the responsibility of the housebuilder, many expressed concerns that poor maintenance practices could cause reputational problems for them, as the public would associate the site with their housebuilding brand. As the first wave of SuDS installations are relatively new, housebuilders' anxiety over ongoing maintenance into the medium and longer term is understandable.

Section Summary

Overall, this section has revealed a series of constraints that either inhibit housebuilders' routine use of SuDS on new developments, or frustrate their efforts in seeking to balance commercial pressures with making the 'right choices' about surface water management. The wider development context is an important consideration in understanding these constraints, and it challenges the simplistic narrative that enhanced SuDS uptake can be achieved by overcoming engineering issues and skills deficits within housebuilding companies.

The report now turns to potential solutions that could increase the range, quality, and quantity of SuDS on new developments.



Solutions – what needs to change?

Discussions with housebuilders about how to increase the quantity, quality, and range of SuDS on new developments coalesced around a series of legislative, regulatory, and strategic factors. Notably, housebuilders did not consider engineering-related aspects as significantly affecting their ability to deliver SuDS (perhaps because they are able to access appropriate expertise via external consultants), so technical matters are largely absent from their suggestions for change.

Space as the issue, legislation as the solution

“... if you’ve got something like [the local authority’s] Water Quality Directive... the [landowners] have said they want to make sure that everyone is compliant with [the local authority’s] Water Quality Directive... if everyone’s working to that, then it levels the playing field, and everyone will be delivering that. And all that happens is that, you know, the land price comes down.”

Housebuilders were clear that intense competition in the land market will reduce surface water management interventions to basic policy compliance and, in some cases, to below ground interventions. The solution they proposed was to level the playing field by introducing clear regulatory requirements for SuDS in new developments. One housebuilder noted the commercial pressure to maximise developable space in what has become a very competitive land market:

“... with the land market how it is at the moment you can’t... we’re not in the situation where you can offer differently, you know... [it’s] now gone from kind of five, or six, housebuilders looking at a site that’s 400 units, to twenty housebuilders looking at a site of that [size]. And it’s just so competitive now that that change needs to be driven by, I suppose, legislation from local authorities. And then it keeps the playing field level.”

Another housebuilder made the point that SuDS need to be planned in from the very beginning, to ensure the right amount of space was available:

“... it needs to be planned in from the off. And if it’s not planned in from the off, it’s so hard to retrospectively put it in... if people that start the process allow the right amount of space, you’d get better solutions... And even on a steep site, if you’ve got the space you can deal with it.”

The same housebuilder pointed out that, if the landowners understood that SuDS needed to be ‘planned in from the off’, it would afford their technical team with more opportunity to achieve hydrological compliance through SuDS:

“It’s the people bringing the land to us accepting that, in order for this to pass through, we can’t just stick 100 houses on here, you might have to only fit 75 and have 25 area space to accommodate a suitably sized attenuation basin.”

However, the housebuilder was less convinced about whether this would find its way to the land market unless regulations very clearly required it:

“... But then you’ve got to ask the question, is it realistic for a landowner to commit that amount of resource and expertise to something that they don’t necessarily need? You can’t mandate that.”

Their solution to this issue was to look to the planning and land allocation process to ensure sufficient space was set out as a requirement for development:

“... If there was a bit more work that had to go in to that flood risk assessment when you’re allocating the site, what is the blue/green infrastructure strategy for the site?... if someone had to do that and it worked, then it’s a doddle. And I think you’d get far better schemes... I’m not going to allocate all your land; however, if you give me an area where I want my SuDS to go and you can prove to me it’ll work, then I’ll give you your allocation.”



This is an important point, since landowner expectations and land market dynamics were not the only sources of space pressure on allocated housing sites. The housebuilder goes on to pass very interesting comment on how local authority requirements around housing numbers were acting to further pressurise space:

“... a site gets allocated, so the local authority go “Great, we’ve got this greenfield site. It’s going to deliver, well, how many houses is it going to deliver?” So they draw a red edge round it, quick calculation, it’s going to deliver 400 houses. They might have a little assessment about how much land is needed for open space, but they’re not thinking “I’m going to lose three acres to put this pond in”. So, actually, it should only yield 200 houses. So, then you get into planning and the council say we want 400 houses, and we’re like we can’t fit 400 houses on because I’ve got to have this blue/green infrastructure strategy.”

The housebuilder provided a recent example of where this had caused some significant conflict:

“At [local authority] we’re having massive arguments because they don’t want to release more land, they want to sweat those [allocated] sites as much as they can... But we can’t squeeze that pond in there because you want us to build a ridiculous density... they don’t consider the gross to net, how much land is needed for the infrastructure...”

Housebuilders suggested that a blue/green infrastructure plan, that ticks all of biodiversity net gain, SuDS, and open space strategy as part of that allocation, could be a solution to address this issue.

In further discussions with housebuilders it became clear that, because different local authorities and water companies have different regulatory approaches, obtaining clarity, certainty, and consistency is difficult. Some housebuilders expressed frustration about a wide variety of local authority approaches to SuDS. One commented that interventions that they had used from the CIRIA SuDS manual in one jurisdiction could not be repeated in other areas, because of differences in policy processes, a lack of commitment in the planning application process, and resistance to adoption of the final assets.

The net result of the current situation is that the added costs to housebuilders of incorporating what are effectively non-mandatory interventions would likely make them uncompetitive in the land market. For some interviewees, this was a significant dissuading factor:

“We have got some sites that drift down into [local authority A’s] areas... and their approach to SuDS and, you know, talking about the CIRIA manual, they work much more in line with that. Whereas [local authority B] are much more, not really a nice way of saying it, but difficult, when it comes to sustainable urban drainage systems... [they] need us to do twelve months of monitoring on the footprint of the basin, to show that it’s suitable to be a basin, or whether it needs to be lined, or whether it needs, you know, fill. So as a developer, having not been able to fix the design for twelve months is difficult, and obviously it’s something we have to take a risk on... that [local authority B] won’t commit to these things earlier... But looking at the other sites we have, you know, down in [local authority A] we have swales, ponds, wet ponds, online ponds, all sorts of different systems on a site. And I look at that, and

I think [local authority B] would never go anywhere near that. And then as a developer we wouldn't want to proceed with somebody where we knew we were going to have difficulties in getting it adopted."

Thus, housebuilders all agreed on the need for clear and consistent legislation if nature-based solutions were to become standard interventions on new developments, and the commercial pressures to maximise developable space addressed. All housebuilders stated that basins, for example, were cheaper than concrete tanks, offering some financial motivation to use them. On the other hand, basins are land hungry, driving a commercial resistance to using them. One housebuilder illustrated the important role of water companies in helping to address this issue:

"... if we had the option between a basin and a concrete attenuation tank, if we can use a basin, we will use a basin. So, it's very much a preferred solution that we look at, at feasibility stage... if that legislation is in place... then that's what we work to. So, you know, if [water company] and the planning authorities would accept and push swales and stuff, like [local authority] are starting to do, which is great to see, then that would just follow through. And it would just become standard on new developments."

Another housebuilder explained how a clearer and more consistent commitment by regulatory authorities towards SuDS would potentially also enhance landowners' understanding of what was required to achieve planning consent:

"... if a landowner can get that right first time, then all the bidding developers are on an even playing field. And then the land value will be the true land value. If they get it wrong, that's where you end up in these compromised situations where you're not cutting corners, but you're going for the commercial solution rather than the 'This is what should happen' solution."

Housebuilders are often assumed as being against greater policy intervention in new housing development, yet interviewees called for clear and consistent formal regulation. Housebuilders were unlikely to follow non-statutory standards that are not market-drivable (i.e., where the additional costs of such standards cannot be recouped by higher house prices) due to commercial pressures in the land market. As one housebuilder explained:

"... for a number of years, every time I've looked at a flat site, I've always thought that if we drained across the surface of the ground in shallow swales completely, rather than underground drainage, then you could have a completely sustainable system that would drain by gravity to a watercourse. [But] It could be quite land-hungry... Which then gets you into the financial constraints about being competitive. So, I think you could only do that through legislation. It'd have to be imposed on the industry, but then there'd have to be a rethink about how it's maintained and who maintains it."

Another housebuilder explained the point in relation to a new water quality directive introduced in one LLFA they operated in:

"I know we've moaned about it because it's extra work when it first came out, but, you know, I think what they've done is right, you know. And it can only be minor things, but... they've asked us for things like tree runoff pits. So, road runoff will go into tree pits. Permeable drives, even if that drive still goes into a pipe drainage system, and so it's not draining to ground, the permeable drive obviously helps filter out at a ground level, so helps with that kind of water quality."

However, the same housebuilder went on to state the additional need to remedy the disconnect between the requirements of the planning system, and the (often more restrictive) standards required of SuDS by the water companies, as a ground for their adoption:



“So, I think those systems, obviously like, that aren’t adopted by [LLFA]... but it doesn’t ... work hand-in-hand with what [the water company] want. But I’d say, you know, definitely they are more restrictive at the moment to getting adoptable systems in place.”

Ultimately, housebuilders suggested that clear and consistent regulation could produce an even playing field, enabling them to communicate to landowners their precise needs for surface water management using SuDS on proposed development sites. This would potentially open up space on sites for greater levels of infiltration interventions, and lead to greater transparency in the cost implications of SuDS during the land bidding process. In this regard, one housebuilder called for **“More education or more understanding from landowners who then understand the importance of on-surface SuDS and therefore their expectation of land value is more realistic.”**

Biodiversity and placemaking as drivers of change

“I think it is becoming more understood, and it’s commented on at planning applications. It’s something that, you know, if for example constraints-wise we can’t offer a basin, or we can’t offer a SuDS system, it is something that’s becoming more and more challenged, not just by consultees of planning but also by residents.”

It was clear from the interviews that housebuilders perceived potential homeowners as largely uninterested in SuDS, insofar that the presence of such water management features did not add value to the developed homes. However, some interviewees discussed SuDS as a conduit to enhancing the biodiversity and placemaking provision on their sites in highly visible ways. Some reported that customers were asking more questions about biodiversity and placemaking, perhaps a result of such issues being “... much more in the press”. For one housebuilder, the visible biodiversity benefits of SuDs could be used to make sites more marketable:

“... we’re able to better showcase what we’re doing for biodiversity. We can show that we’ve increased the woodland. We can show that part of the open space is meadow grass. But actually, when you can point to a pond that’s got a reedbed that you can see that hive of activity around it, I think it’s more powerful.”

The changing legislative context around biodiversity is an increasingly important driver, which could potentially lead to enhanced SuDS provision on new developments in future. One housebuilder explained:

“I think that’s going to become more important over the next five years or so, also in achieving planning permission. So when the law comes in that says we’ve got to have a 10% net gain, it’ll be easier to deliver that.”



Hopefully with the ponds, rather than the restricted landscaping that you can do over the attenuation tank.”

Placemaking was equally important in the discussions with housebuilders around how to drive SuDS delivery, particularly in a post-COVID context, where access to outdoor space and nature are highly valued. Some had thought about how they might capitalise on the added value that SuDS features could bring in this regard:

“... it’s a more interesting place for a customer to go, and what we found post-COVID or through COVID, is that there’s been a huge uptake in sales of people wanting developments that have got good access to nature. And when you get that half an hour a day to go for your walk, you want to be able to go somewhere on your development where you can sit ... on the bench in front of ... the SuDS is quite a nice place to sit. So that gives us added value as well.”

If SuDS are seen as a conduit to biodiversity and placemaking, as well as surface water management, they potentially provide housebuilders with the opportunity to address three core regulatory requirements within the same parcel of land on a given new development. The land efficiency benefits of this are obvious, and there may be additional reputational benefits to the housebuilder. However, interviewees cautioned that water companies were a potential constraint in achieving this, due to their inflexible adoptable standards:

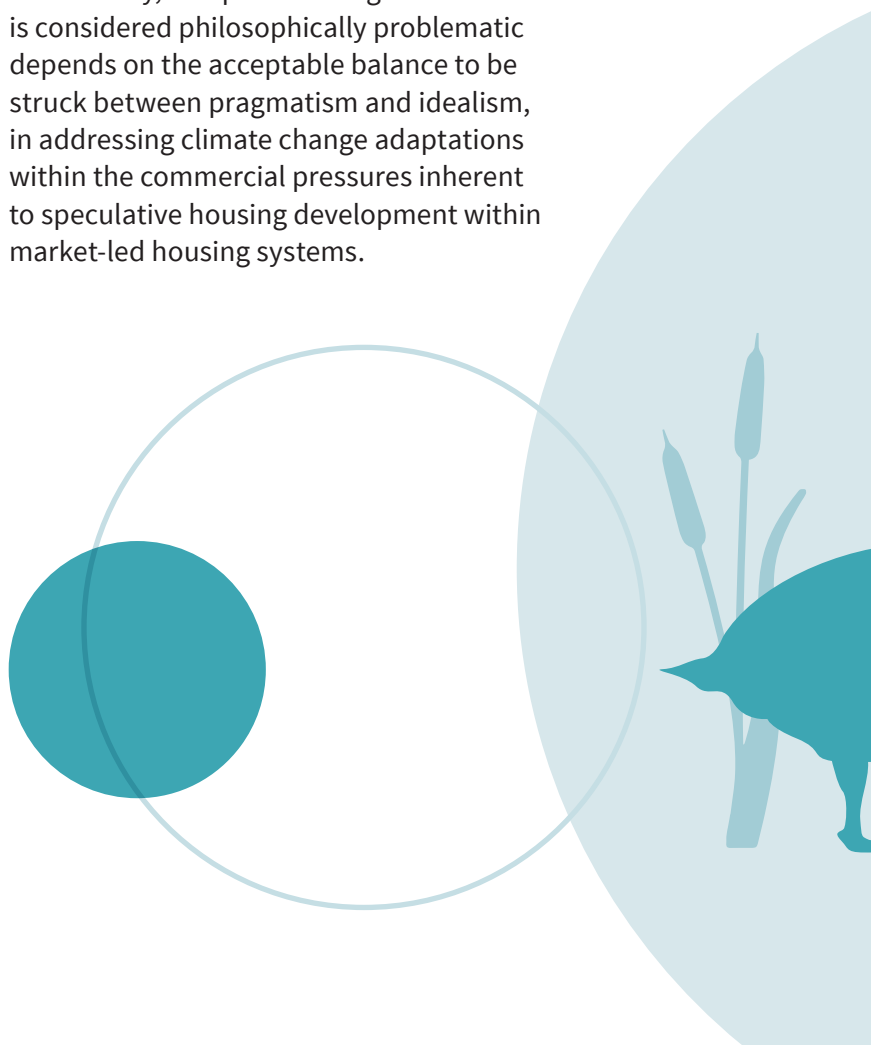
“... it comes back to that big point, that really at the moment, until [water company] have an attitude to, you know, change the way that they look at adoptable basins, it’s hard to ... we tend to have to have this kind of sterilised [approach] ... because this site I mentioned about where we’re doing the 12-months’ monitoring, something the ecologists came back for, in the pre-planning pack was saying what can we plant and what can we do around the basin? And it was a case of well [water company] won’t

accept anything on it... so the remainder of the public open spaces and the open spaces on-site have wildflower meadow mixes and various things like that, but the basin is the only part of the open space really that is standard grass mix that’s mowed. So, at the moment, we can’t offer it because of that. You know, we need them to be adopted.”

Another housebuilder concurred, and recounted an experience that eventually led them to put a wetland on site, in place of an originally planned basin. Due, in part, to the water company’s stringent technical requirements and their lack of willingness to adopt anything other than:

“... a sterile mown lawn basin that wouldn’t have offered any kind of benefit to the people on the site. It wouldn’t have looked as nice. And it wouldn’t have created that kind of habitat area that that wetland created, which we could offer because of changing the strategy.”

Housebuilders therefore see SuDS as a land-efficient means of achieving a trio of policy goals: surface water management, biodiversity, and placemaking. Whether this is considered philosophically problematic depends on the acceptable balance to be struck between pragmatism and idealism, in addressing climate change adaptations within the commercial pressures inherent to speculative housing development within market-led housing systems.



The drive towards water quality

“... the days of just releasing a certain amount of water into the system and that being alright are kind of going. It’s what kind of water, what kind of quality of water is going into that system? What’s going into the drains? ... I mean we’re quite conscious, I’d like to think we’re probably one of the better builders to be honest with you.”

The housebuilders we interviewed are confident that they understand their options when it comes to the technical or engineering solutions that they can draw on in holding back water on development sites. However, the pressures leading to the selection of one solution over another are changing, as one interviewee reflected:

“... we’re at a point now where we’re moving to a new kind of era of SuDS. Before, it was kind of given lip-service to a certain extent by the planners and the water companies. But now, they have been forced effectively from policy to go down this route more and more. So, we’re in this field now where before we just put a tank in because we know it’s easy, we can fit it in. Whereas now, we will be pushed to look at it and consider it more and work it more. And our competitors will also push it and consider it more and bid on that fact. So commercially we’re being pushed, we’ve got to make sure... if we put a tank in and everybody else puts a pond in, we lose the site.”

A new era of water quality looks set to push housebuilders further when thinking about water management on their sites, which will undoubtedly have implications for their approach to SuDS. The effect may be positive or negative, but either way, it is likely to position SuDS more centrally in decision making processes on new developments. The same housebuilder continued:

“... water quality is probably going to be the biggest one we’ve got to achieve. Holding back the water, we’ve done it ... how we hold back the water might change slightly, but it’s common practice now. The water quality is the new one.”

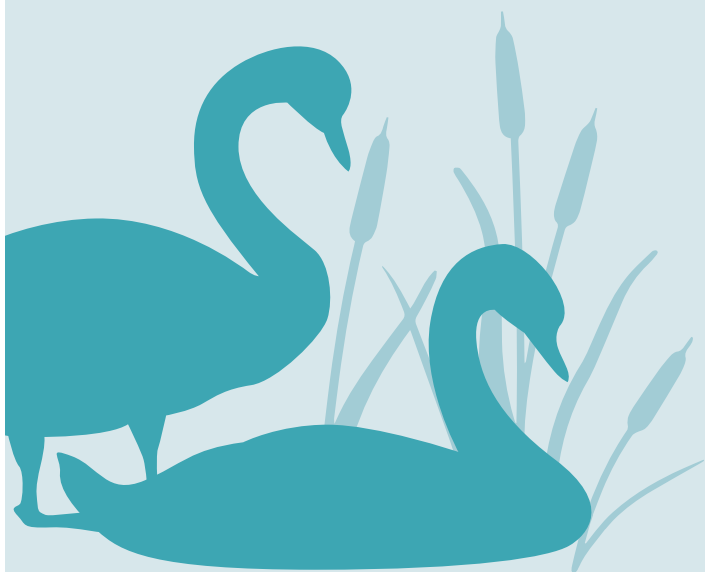
Housebuilders were keen to point out that regulatory control is also required around water quality because of the space pressures it exerts on sites. One builder, in reference to using swales for water quality, hinted that attenuation and water quality might not be addressable through the same SuDS intervention alone:

“If it’s legislation-led, yes. And the swales, wherever we’ve got them, they’re not really adding to the volume of attenuation. And swales don’t really, they are more about water quality and having that filtration, because it’s going over grass, or especially if you’ve got reedbeds. They add more to water quality than they do to attenuation.”

For sites where infiltration is not possible and tanks need to be used,¹⁶ housebuilders raised concerns about whether water quality goals would even be achievable. One housebuilder commented:

“... they want plant life in the ponds. They want to put oxygen into the ponds. They want it to go into a stream and it’s not effectively dead water... the aquatic life can thrive; the pond life can thrive. And so that’s going to be the toughest thing, because with the best will in the world with a concrete tank you can’t do that.”

¹⁶ For the authors of Section 2, the fact you cannot infiltrate requires attenuation. But attenuation can take many forms and does not usually require a tank.





One interviewee noted that water quality initiatives posed challenges to their existing skills sets, despite technical guidance being available:

“You can only do that by... having landscapers planting the right planting into the attenuation. Having the right depth, because I think they’ll want shallow bits, they’ll want deep bits for the various different animals living in the attenuation as well, to live and succeed. And this is all CIRIA guidance, and this is all what they’re all deferring to, but again the practicalities of trying to achieve that is going to be very hard.”

Beyond skills, the same housebuilder pointed out that customer perceptions of these changing spaces might represent a marketing challenge:

“[It’s about] how you plant around it as well. There’s a way to go with customer perception as well, because sometimes these nature-based solutions don’t quite look like ... I always have the cliché that a customer kind of thinks a housing development looks like a spa hotel with a golf club. They want the planting to look like that and be very well-manicured. Whereas the nature-based solutions tend to be a bit rougher. So, we’ve got a bit of a way to go. I mean most customers are getting it now but ... It’s just unkempt. I think, that’s the word ... And it’s not got the colours. So yeah, that’s a challenge for us. But it’s about marketing rather than technical.”

Some housebuilders already had experience of meeting higher water quality standards, as certain local authorities have introduced water quality directives in recent years. Their experiences of teething problems are therefore worthy of note. One housebuilder reflected on a lack of detailed technical guidance:

“I think people are still finding their way around it and... understanding exactly what [local authority] are asking for... there’s not been much built during 2020... So, we’re still feeling it out. And I think they probably are from their side as well, exactly how they want people to meet it... But I would say that when it did come out, people weren’t 100% sure what it was [local authority] were looking for in terms of water quality improvement. They weren’t quite sure what it meant. And I think we’re still trying to 100% get our heads around exactly how they want to see it offered. I don’t think there’s much guidance, they just needed to offer an improvement in water quality that they discharged. And it was more of a statement as opposed to technical guidance on how to do it.”

However, this interviewee was generally positive about the progress that the local authority had made in offering advice as the Directive had become more established. They noted a transition from an initial period, where the local authority was “... **hoping people [would] come to them with ideas**”, to the current moment when they are ... starting to get a feel for what can and can’t be done and what they’ll accept”. However, the housebuilder reiterated the need for more technical guidance, particularly around the definition and evidencing of measurable gain in water quality:

“... we’ve tested the water; they’ve tested the water, and it’s kind of drafted into what they mean. There’s still ... I suppose the difficulty with it is there’s still no measurable kind of statistical ‘what it is they’re looking for’, which makes it slightly difficult. So, it is a bit of, I suppose, a soft policy in that way, in that they’re looking for features but there is no measurable gain that those features need to offer.”

While there is at present a climate of experimentation, as regulators and housebuilders find the right balance in their approach, there are also risks attendant on the lack of clear regulation, which again impacts on the market value and bidding process for land:

“... water quality is a bit of a dipping your toe in the water, you know... without that kind of prescriptive ‘what we’re looking for’. If you either assume [local authority] are going to want more, then you put in extra cost for it and then that’s a risk on your bid... Or you assume they’re not going to want as much, and then you come to a point where it’s cost you money and... you’re going back with chips, or whatever it is because you actually need to offer more than you thought you did because there’s not that definition of quite what it is they’re looking for.”

The housebuilder suggested that this commercial risk could be mitigated using a similar approach to biodiversity: A prescriptive 10% improvement on net gain calculation accompanied by a digital spreadsheet, which can be used to calculate scores for hedgerows and other features. The builder suggested:

“... if local authorities found a way to measure whatever they were looking for... where they offer that, you know, it’s a green field and it runs off to a watercourse, and this gives it an X score. You know, you’re going to develop it, which obviously has a negative impact by removing the green ... the land, they’ve obviously created natural land, created a certain level of water quality. But then if you use swales, it could give you X points back towards that score. So, you can calculate your solution, you know, square footage, say, based on square meterage across the site that you’re using for these features. You can calculate on your score, whether you’re going to fall within that metric, and then that can give you a way of understanding exactly where you need to be with it.”

The drive towards water quality appears to have made housebuilders consider the multifunctionality of SuDS interventions in greater depth. Some builders have begun consulting with a greater range of specialists for advice on how a basin or a pond may be rethought to offer wider biodiversity and water quality benefits. One housebuilder summed up this new normal in terms of the introduction of different types of expertise:

“Ponds-wise, we would design the shape. We would say this is the water we need. And so we’re entering this new era where it’s not ... this is the shape of what we need to hold that water, we probably have to pass that on to our landscaping consultants to say this is the shape we need. We also now need the plants to enhance the water that’s contained here... we’ve now got this situation where I need an ecologist, a landscaper, and a hydrologist all talking to each other. With the architect as well, to make it work. And with biodiversity, again, sometimes we use a landscaper but actually we need an ecologist, because they need to set the baseline. So, your pond, your SuDS feature, needs three experts to design it.”

Section summary

This section has outlined how the drive towards water attenuation and quality presents both a new challenge and a new opportunity for housebuilders. Whilst water quality issues might add further complexity to decision making around SuDS interventions, it also offers the opportunity to rethink the types of intervention that they have hitherto relied on, moving beyond a narrow reliance on detention basins. Emerging legislation requiring higher standards of biodiversity net gain and water quality might help to level the playing field in terms of land values, and to enhance the range, quality, and quantity of SuDS provision on new developments.

Conclusions and recommendations

This report has provided an insight into the attitudes, behaviours, and perceived challenges for speculative volume housebuilders operating within the Yorkshire region towards nature-based solutions on new developments. It has revealed a set of complex drivers and constraints that include both housebuilder strategy and the wider development context within which housebuilders operate. The role of landowners and regulatory authorities are particularly important influences on housebuilders' current approaches to surface water management.



These findings indicate that efforts to increase SuDS provision on new developments that focus solely on the housebuilders themselves, and their perceived ability to refine and enhance the quantity and quality of engineering-based solutions, may be unsuccessful. Instead, systemic change is required to address constraints within the wider development process. While housebuilders bear some responsibility for surface water management, a suite of changes is likely to be required to achieve a more diverse and complementary range of nature-based solutions, beyond detention basins, in new developments.

The distinction between 'on-plot' and 'off-plot' provision adds further complexity. Where 'on-plot' solutions (green roofs, rain gardens, permeable paving, water butts) are not recognised in regulation, policy, or by fellow actors in the process, then there may be limited motivation for housebuilders to pursue them. However, 'off-plot' interventions are subject to wider commercial pressure emanating from the development process and influenced, to a large extent, by landowner attitudes and behaviours. 'Land hungry' interventions may affect a housebuilder's ability to compete in the land market, and the space devoted to them can be subject to viability pressures where regulation is unclear or non-binding.

The issue of commercial pressure for return on investment and profit is par for the course in any speculative housing development within a market-led housing system. Different types of housebuilders will face different commercial pressures, and some may be more able and willing to seek solutions that allow them to maximise, or at least prioritise SuDS provision than others, but this will not be the case across the board; and it may be naive to expect housebuilders to increase construction cost and/or reduce developable space voluntarily, in the absence of regulation.

Public policy and regulation may therefore be appropriate tools to enhance SuDS provision on new developments. When considering legislative interventions in residential development processes to achieve wider sustainability policy ambitions, previous research by Payne and Barker (2018) indicates that three factors are necessary:

- Clarity to avoid regulatory uncertainty and offer a level playing field to housebuilders operating in a competitive setting.
- Consistency to encourage a commitment by housebuilders to longer term investment, innovation, and change.
- An awareness of systemic constraints, recognising the wider market dynamics within which housebuilding takes place, so that a single pathway-based approach locked onto ‘pushing’ housebuilders can be avoided, and additional ‘pull’ mechanisms can be considered.

With this in mind, the report concludes with the following recommendations for enhancing the uptake of SuDS for surface water management in new developments:

- Consider opportunities for incorporating ‘on-plot’ SuDS into regulations to support the delivery of additional and complementary surface water management measures, whilst ensuring clarity, consistency, and certainty across the housebuilding industry and the wider development context.



- Explore measures that require space on site for SuDS provision, in particular the land allocation process operated by local authorities. Where the allocation of a housing site requires a flood risk assessment, this should identify a suitable amount of space on site for SuDS.
- Provide technical guidance relating to water quality to offer greater direction in terms of what is and is not acceptable, and to provide clear advice as to how measurable gain is defined and evidenced.

It is hoped the findings and recommendations in this report go some way to enhance our knowledge of the challenges and opportunities that SuDS present in new developments, and to further a wider conversation around the technical and commercial deliverability of nature-based solutions within the context of future policy developments around biodiversity and water quality.



SECTION 2:

A response from Sustainable Drainage Practitioners

Authors: Dr Louise Walker, Senior Research Manager BSc (Hons) PhD CSci CEnv CWEM, CIRIA
Sue Illman, Managing Director, Illman Young Landscape Design Ltd, and CIC Champion for Flood Mitigation and Resilience

Introduction

The report in Section 1 offers a welcome illustration of how housing developers work, but its content also needs to be interpreted with care.

As practitioners, each with over ten years' experience sharing practices and knowledge about surface water management with local authorities and water companies, we recognize many of the comments made by developers, but we also feel that some points require explanation and contextualization.

It is also important to acknowledge the critical timing of this publication, with the potential to inform how the government's proposed revision of regulations in 2023 might be implemented.

The aim of our response, as provided in Section 2, is therefore to highlight how we understand the report as throwing light on future good practice.

The structure of our detailed response parallels that of the report and is written as a commentary with direct reference to points made. Quotations from the report are presented in italics, while our comments are in plain text, and conclusions are highlighted in bold.

To summarise, many of the challenges that the housebuilders reported in Section 1 can be overcome by the use of good practice SuDS and supportive legislation:

→ Multiple SuDS features are more flexible, easier to integrate into sites, and provide more benefits than 'pipe to pond' designs. They can also more easily comply with both water company requirements for attenuation and local authority requirements for improved water quality and place making.

- Steeply sloping sites, those with complex topography, or those with a clay soil require context-specific SuDS design, for which guidance is available.
- Permeable paving can be very useful for infiltration of rainfall and will last for many years if properly installed. Reputable manufacturers will advise on which type of paving can be used in which locations.
- 'On-plot' SuDS devices can be a valuable part of surface water management, and homeowners could be encouraged to manage these for the benefit of the environment.
- Water butts are only effective SuDS if they have an automatic discharge for 50% of their volume.
- Housing developers want clearer legislation to create a 'level playing field' with their competitors and to reduce ambiguity in their negotiations with the authorities and landowners. We fully agree that 'fit for purpose', mandatory, SuDS standards, requiring multi-beneficial outcomes, and the withdrawal of the automatic right to connect to sewer systems will be key to providing this consistency, and hence we welcome the Government's recent announcement.

Detailed response to Section 1

Introduction

The research for Section 1 was undertaken in winter 2021. Since that time, policy, practice, and attitudes towards SuDS have generally improved and continue to do so. The research illustrates myths and misunderstanding around SuDS design and construction, some of which continue to be perpetuated.

The trade-off between water company requirements for runoff, and the requirements of the local authority for flood risk management and place-making, as well as different potential adoption arrangements make the implementation of good SuDS difficult for developers. Their expressed wish to foster early and good relations with local authorities is testament to their will to comply with regulatory and planning requirements, which seems to be constrained by the land market. A lack of understanding of the quantity and distribution of land required for good surface water management within that market has constrained a more imaginative approach.

SuDS do take up land on a development site but, where well integrated from the outset, following the topography of existing land, this need not be excessive. SuDS will also add biodiversity and variety to spaces, as well as improving water quality. Installing a pond at the end of a pipe misses the opportunity to set SuDS at the heart of a rich and vibrant area of open space, or as an intrinsic part of the street scene. Where a train of SuDS components are implemented appropriately around a site, they reduce the need to occupy large single areas for attenuation.

Fortunately, attitudes to SuDS are changing, but there is still much education required for land agents, designers, and developers to truly understand the value of SuDS; and how well designed and integrated SuDS can make housing developments more attractive, and houses easier to sell – a point that was clearly articulated by the developers who participated in the research shown in Section 1.



The decision-making process

As Section 1 makes clear, the housebuilder has a complex path to negotiate when designing a development; and the lack of mandatory SuDS standards, as well as the automatic right to connect to sewer, adds to this complexity. Many of the issues are summarised by Chisholm (2022).

“... housebuilders seek to achieve a balance between the requirements of regulatory authorities, the recommendations of non-statutory bodies, and the practical delivery of construction on the ground.”

In this respect, Section 1 highlights the need for fit for purpose, mandatory SuDS standards, requiring multi-beneficial outcomes. Withdrawal of the automatic right to connect to sewer systems would remove some of this complexity. Such standards would:

- better align different stakeholder requirements and provide a consistent understanding of what needs to be achieved to receive planning permission, greatly reducing negotiations on drainage design.
- level out land pricing for all competing developers regarding water management issues.
- provide an understanding that SuDS can be used to deliver a high-quality streetscape, public open space, biodiversity net gain, and improved water quality, and that these things do not need to be delivered separately.
- deliver the above through an integrated design approach that is not only cost effective, but also provides a more natural, healthy, and attractive landscape setting for any development.

Section 1 confirmed our understanding that most developers deliver SuDS via ponds or detention basins placed in one specific area of the layout. The stated reasons for this choice were:

- Attenuation could be focused on a specific area on site, and the layout of the remaining areas then designed around that space.
- Topographical issues could be accounted for (some areas of a site may be more suitable for drainage and storage than others).
- Land market pressures discouraged housebuilders from routinely considering ‘on-plot’ interventions, since maximising developable space (i.e. the number of homes achievable on a site) was a commercial priority.
- Concerns over placing responsibility on homeowners for the maintenance and upkeep of ‘on-plot’ interventions created additional costs and risks.

This focus on ponds is narrow and limits the multiple benefits that can be delivered by a well-designed SuDS scheme. With some thought, existing features such as roadside grass strips can be used as swales for infiltration and conveyance of water. The more elements used, the slower the flow and the better the water quality. Increasing the number of SuDS features around a site will also significantly reduce the size of any final water feature, enabling the public open space to be more useable, and not completely dominated by a large pond. Working with the topography of the site to identify maximum infiltration opportunities should be of primary consideration.

The report also revealed that housebuilders preferred to avoid ‘on-plot’ SuDS. But this bias may be based on current norms rather than genuine practical constraints. Contrary to the understandings shown by the developers, ‘on-plot’ interventions do not need to reduce developable space. In fact, they can be small and distributed, such as disconnected downspouts emptying into raingardens, and the use of permeable driveways. Any excess water not managed ‘on-plot’ can be infiltrated ‘off-plot’ or conveyed by swales to further SuDS devices.

Section 1 of this report reflects a complete misunderstanding around the maintenance needs of permeable paving. It does not need to be ‘lifted, cleaned out and re-laid’ every five years, but merely requires sweeping a few times a year. Obviously, substantial misuse and abuse must also be avoided. There is plenty of permeable paving that has been laid for fifteen to twenty-plus years that is still functioning adequately. Such ‘on-plot’ interventions should be recognised by water companies as contributing to runoff reductions in their calculations.

In addition, increased awareness of climate change is likely to shift the views of homeowners towards a desire to take responsibility for water resources, and to ensure their own and others’ property is protected from flooding. Awareness-raising, and information given to new occupants on how to manage ‘on-plot’ features should help to promote this transition. Literature is provided for all new homes around household appliances, so the inclusion of similar information explaining ‘on-plot’ SuDS features, their function, and maintenance, is becoming increasingly common in some areas.



Do nature-based solutions add value to new developments?

We understand that the interviewed developers do not perceive SuDS on a site as increasing the market value of homes, though some did acknowledge that SuDS did enhance marketability. We believe that the enhancement to marketability is likely to become more important during the coming decade, and that once we have recovered from the cost-of-living crisis, these features may even impact on price. Our reasons are:

- increased recognition of the impacts of climate change, loss of biodiversity, and the general population’s need to improve water quality is likely to bring favour to those developers who are seen to be addressing these issues. Access to green space, rainwater irrigation, and a cooler environment due to greater use of planting are obvious benefits to the homeowner, particularly in more densely developed areas.
- developments including such features are award-winning, and it has been shown that the value of property close to SuDS features can increase:
- the Land Trust argues “high quality SuDS incorporating well maintained open space such as ponds, swales and basins can add significant value to the properties you are selling.” (The Land Trust, undated).
- the lack of attention paid to landscaping from a marketing point of view (as mentioned by one respondent) represents a missed opportunity to improve the aesthetics of a site, to improve corporate social responsibility, to hit environmental and social governance targets, and to accelerate sales (Susdrain, 2023).
- arguments regarding the risk of open water in developments have been addressed through well-designed SuDS in consultation with RoSPA (see RoSPA, 2023), as outlined in the SuDS Manual (Woods-Ballard et al., 2015).

Constraints inhibiting the routine use of SuDS

The site

Constraints listed included type of subsoil, quantity of underlying clay, and site topography. SuDS can be implemented on any site, and the design should be context-specific. Clay soil does not prevent the use of SuDS, as SuDS do not require soil to infiltrate. Clay soil is also excellent for attenuation storage. Similarly, where SuDS are integrated throughout a site, then perceived problems of steep topography are much easier to resolve.

The preference for large attenuation devices in restricted areas of the development site causes constraint, rather than the site itself causing constraint. The use of multiple smaller SuDS throughout a site is therefore more flexible in application and easier to integrate.

Requirements

Alongside lack of SuDS knowledge within the local planning authority, conflicts between LLFAs and planners and urban designers were cited in the report as constraints. Lack of SuDS understanding is acknowledged as being a problem in some LPAs, and awareness raising or training is required. The 'pipe to pond' approach is common; however, planners argue for a more integrated approach. These points demonstrate how both planners and developers would benefit from a faster route through the planning system, enabled by a consistent and mandatory approach to SuDS. It also shows how the introduction of such a system would require widespread awareness raising.

Adoption, management, and maintenance

The adoption of SuDS features has long posed a problem. Some water companies will not adopt SuDS if surface water from housing is mixed with highways water within a roadside swale or bioretention planter. Many local authorities also purport to adopt

highways SuDS, but, in reality, do not; and lack the capacity to undertake maintenance. Meanwhile, management companies do not take a consistent approach to ensure continued functionality and multiple benefits. These issues, coupled with associated costs and responsibilities, are problematic but not insurmountable through consultation and negotiation. The requirement for effective management plans would also assist in clarifying the works required. They highlight how clear regulations on SuDS adoption could speed up the planning process.

Land market

Section 1 indicates that landowners are excluding space for SuDS in their assumptions about the number of houses that can be accommodated on a plot. Their calculations are generally not realistic, because they are based on a lack of understanding of SuDS' requirements, resulting in over-estimations of land value. A more joined-up approach to land allocation is required, based on mandatory standards and awareness raising among landowners, land agents, water company developer services, and planners.

Maintenance

Interviewees complained about the late adoption of SuDS, and the associated costs of maintaining these schemes prior to sale of the development. A requirement for all developers to maintain these features until point of sale would reduce competition between housebuilders. Other concerns over adoption will be reduced as SuDS are mainstreamed.

Conclusion

The strong need for a mandatory and consistent approach to SuDS expressed in this response is upheld by the findings of the report:

“...housebuilders all agreed on the need for clear and consistent legislation if SuDS were to become standard interventions on new developments, and the commercial pressures to maximise developable space addressed.”

“...a clearer and more consistent commitment by regulatory authorities towards SuDS would potentially also enhance landowners’ understanding of what was required to achieve planning consent...”

“If SuDS are to successfully become a conduit to biodiversity and placemaking, housebuilders have the potential to possibly address three core regulatory requirements within the same parcel of land on a given new development.”





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The Speculative Residential Development Process

Figure 1: Schematic of the Speculative Residential Development Process



The dotted red line is the point of site acquisition, after satisfactory planning permission has been granted and satisfactory site investigations have been carried out. It is the point at which the legal transfer of ownership of land takes place between the landowner and the housebuilder. Prior to this point, the site is still owned and controlled by the landowner, with the work to achieve planning consent being undertaken by the housebuilder at their own 'sunken' cost with the landowner's permission. This permission is often formalised through what is known as an option agreement.

SuDS policy impacts initially on the construction process, which is shown in the schematic to be the place on the production line of maximum risk exposure. Conventionally, housebuilders have sought to negate such risk by minimising construction costs, using standardised approaches to site layout, house type design, and site design more broadly. This effectively means that risk is mitigated in the site design process. It is during this process that surface water management is considered. Further, it is worth noting that construction-spend influences land prices – the less a housebuilder pays for construction, the more capital is available to support a higher land bid, with everything else being equal. This is particularly important in a competitive land market, where multiple housebuilders are producing land bids. While it cannot be assumed that landowners will always take the highest bid, they will be seeking to maximise the highest and best use of their asset, which includes successfully gaining planning consent.

In summary, speculative housebuilders compete primarily in the land market, seeking to maximise land value by reducing construction-spend, and accurately forecasting future sales values.

Policy interventions that target site design and house design will potentially disrupt housebuilders' conventional techniques for minimising risk and cost during the construction process. This may have unintended consequences in the land market.

Policy interventions that only target the land market may affect the amount of raw material coming onto the production line, since they may dissuade landowners from putting privately owned sites up for sale. This may affect outcomes further downstream, such as housing supply numbers (and council tax receipts).

Policy and regulatory interventions that target changes to site design and house-type design (such as SuDS, water quality, biodiversity, and net zero, whether through planning legislation or building regulations) in a way that offers clarity, consistency, and certainty, are more likely to be successful in the long term, particularly if designed with an understanding of their consequences on land market activity and accompanying mechanisms to negate any unintended commercial pressures arising.







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