Managing urban flood resilience through the English planning system: insights from the 'SuDS-face'

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Managing urban flood resilience through the English planning system: insights from the 'SuDS-face'

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Summary

In academic and professional circles, 'resilience thinking' has emerged as the dominant paradigm in flood risk management, which emphasises the need to plan and design cities that can absorb the water and replicate natural processes more closely. In this paper, we explore how planners in England are expected to respond to the resilience agenda against the realities in practice, zoning in on the delivery of sustainable (urban) drainage systems (SuDS). Our exploration highlights that while SuDS are being implemented, they are largely characterised by a 'bog standard' design. We found that there are three main institutional factors which are constraining the implementation of SuDS: the lack of legislative backing, the power afforded to private commercial interests in the neo-liberalised planning process, compounded by the severe lack of resources in local authorities. What is missing at the moment is SuDS process and design that is flexible, integrated, collaborative and innovative. There are clear implications that without the necessary institutional support, resilience thinking will remain largely aspirational, professionals will struggle to gain traction and translate the larger flood resilience policy agenda into England's future climate resilient places.

1. Introduction

Across the globe, cities are facing complex and uncertain challenges including increased urbanization, climate variability and growing vulnerability to impacts from natural or human induced shock events, including heatwaves, threats to water supply and heightened flood risk. 'Resilience thinking' has been gaining traction as an academic and policy discourse in acknowledgment of the increasingly dynamic nature of social and natural processes and as a response to a complex and unpredictable world (1). Resilience and a resilient city are defined by United Nations Habitat, as:

> "…the ability of any urban system to maintain continuity through all shocks and stresses while positively adapting and transforming towards sustainability. Therefore, a resilient city is one that assesses, plans and acts to prepare for and respond to all hazards, either sudden or slow-onset, expected or unexpected" (2).

Against the backdrop of climate change projections and repeated severe weather events, researchers, policy makers and practitioners in the technical urban water management field have been grappling with what an 'urban flood resilient' future might entail and how this might be realised. Typical features of an urban flood resilient future are seen to necessitate a move away from 'protect and react' large-scale engineering-based, cost-intensive technical measures and top-down approaches (which also exposes communities to any residual risk), towards a regime in which the changing nature of the risk is anticipated and managed proactively, allowing for uncertainty and favouring flexible and/or no-regret options (3, 4). Resilience thinking is also emerging more specifically as a key framework to examine the role of spatial planning within flood risk management (5). Inherent to this is an alternative and more progressive approach in which the system seeks to reduce exposure to future risks through developing alternative development trajectories (5, 6). In addition to making sensible

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decisions on land use to direct new development away from the areas most at risk, it is recognised that a resilient city can entail a number of innovations from a planning and urban design perspective. These include the raising of building or ground above flood levels, floodways to ensure a free flow of water, and water landscapes that incorporate or restore land and functional floodplains capable of safely storing or conveying floodwater and sediments (6, 7). Urban planning is thus charged with the delivery of a multifunctional built environment that is safe and resilient, and where possible also enhances the environment in accommodating the natural processes of flooding (8).

There have been considerable steps forward towards identifying what an urban flood resilient future would look like and how a transformed urban environment would be realised, these steps forward typically manifesting in academic research agendas, changing policy directions and active actor networks (9). Yet such visions for cities have emerged in a neo-liberal era, when public sectors are widely reported as being corporatized with profound implications for how professionals can respond against oft conflicting socio-politico-economic forces (4, 9). Planning ideals that are transforming long-term, strategic visions of cities in particular necessitate a sizeable shift from dominant economic considerations to those that are considered hydrologically sensitive (10). In terms of on the ground mainstream practice, resilience thinking can only be best described as translating into 'pockets of progress' observed and documented internationally (9). Much of the governance literature addressing the transitional challenge to resilience remains largely theoretical, and it is alleged that little attention has been paid to date to the ability of the state and non-state actors to respond to these theoretical prescriptions (11).

This paper takes a perspective on urban planning and development processes and decisions at the local government level in England, to respond to the calls in the literature and pay special attention to key state actors, the urban Local Authority ~~professional~~ practitioners on the front line of an urban flood resilient future. The paper focuses in on sustainable drainage systems (SuDS) to order to isolate and carry out a more detailed analysis on a relevant and well-known policy measure considered to be representative of resilience thinking, and if implemented should in theory enable the built environment to become more flood resilient and adaptable. In tandem, the scale and focus on local planning processes and SuDS delivery respectively has the aim of illustrating and crystallising the challenges encountered on the ground by professionals endeavouring to bring about global expectations of an urban flood resilient future. The paper proceeds as follows. First we set out the methodology, we then expand further on concepts of urban flood resilience, isolating the capacities associated with a transition to resilience thinking. The main empirical section of the paper sets out how key national flood and planning policy documents frame the resilience agenda, before focusing in on SuDS delivery through the planning process, which is explored through an analysis of the experiences and perspectives of expert professional interviewees on the ground, or at the coal or SuDS face. We end the paper by discussing and highlighting the challenges and issues to SuDS delivery and flood resilience from within the institutional context in which planners and their key collaborators are working in.

2. Methodology: the case of SuDS delivery

A qualitative research methodology was adopted, in which firstly, an analysis was undertaken of the applicable policy presently affecting SuDS implementation at a national level in England, and how this was framed in terms of resilience. Second, we undertook atotal of 15 semi-structured interviews and three focus groups (arranged between May 2017 and March 2019), recorded,transcribed verbatim and coded. Unstructured interviews and focus groups allow participants to talk about the subject from their own frames of reference, allowing for a greater understanding of the subject's own point of view, rather than fitting into categories pre-determined by the interviewee. The transcripts have been used to gain an insight into their ability to respond to SuDS policy prescriptions, rather than a claim to extend the opinions and experiences to the wider population. Following White and Howe (2005), the four broad phases of the planning management process have been adopted in order to aid the reader's understanding and assist in categorizing the challenges to SuDS use: the development control process has been deconstructed into four distinct phases, being: ***a***) Pre-Application, b) Planning negotiation and decision making on outline and detailed design, c) Final planning approval for construction, adoption and maintenance of SuDS, and d) Planning inspection and enforcement of SuDS construction and maintenance. The interviewees and focus group members were chosen as representing the key urban professionals involved in the implementation of SuDS in England, the majority being Lead Local Flood

Authority (LLFA) Engineers or Local Planning Authority Planners at different levels of seniority across several different authorities in England. These hold pivotal responsibilities in the planning process, reviewing and making decisions on planning applications that come in to their Local Authority with regard to drainage and flood risk.

To note, policy documents and professionals from 'England' have been selected for the purpose of analysis in this paper, rather than the 'United Kingdom', due to the complexities of devolved administrations and different policy prescriptions in England, Scotland, Northern Ireland, and Wales. Different government departments and agencies operate, and planning and flood risk management policies and strategies are set and implemented independently from the national (United Kingdom) level (4). All the interviewees have been fully anonymised in the ensuing text, the organisation and profession identified by a number in brackets, as recorded in Table 1: Interviewees.

Table 1: Interviewees Organisation and Profession

Interviewee/Focus Group (FG) Member No.	Interviewee's Organisation & Profession
I#1	LLFA Flood Risk Officer
I#2	LLFA Flood Risk Officer
I#3	LLFA Principal Engineer
I#4	LLFA Flood Risk Engineer
I#5	LLFA Flood Risk Engineer
I#6	LLFA Technical Consultant
I#7	LLFA Principal Engineer
I#8	LPA Planning Officer
I#9	LPA Planning Team Manager
I#10	LPA Planning Assistant Director
I#11	LLFA Head Engineer Sustainable Drainage
I#12	Planning Officer
I#13	Development Corporation Head of Design
I#14	NGO Team Leader Community Engagement
I#15	LLFA Principal Engineer
FG#1	Consultant Engineer
FG#2	Academic (SuDS specialist)
FG#3	LLFA Flood Risk Engineer working in LLFA

3. Transitions to urban flood resilience

Derived from the Latin, '*resilire*', meaning to spring back, resilience is the term initially used by physical scientists to characterise the stability of materials and resistance to external shocks *(12)*. When extended to a system, 'engineering resilience' was first defined as the ability of a system to return to an equilibrium or steady-state after a disturbance (e.g. flooding, earthquake, war). The quicker the system concerned bounced back, then the more resilient it was considered to be (12). More recently, concepts of evolutionary or socio-ecological resilience have challenged the idea of an equilibrium or a return to normality, instead defining resilience as the ability of socio-ecological systems to change, adapt, and more crucially transform in response to the uncertainties and dynamics of a complex and unpredictable world (1, 12). The creation of a resilient system, also seen as an adaptive system as Scott (2013) emphasizes is therefore also most appropriately thought of as a process of social learning, whereby human capacities and knowledge are also absolutely essential in reducing vulnerability and (flood) risk in the face of the unknown and unexpected (5).

The urban fabric in many of our towns and cities has been constructed with little consideration of flood risk management (10) or resilience, typically development has been coupled with hard, engineered solutions (8). Consequently, we see the location and design of past permitted developments interrupting natural flooding processes and removing natural water storage capacity, as vegetated soils are replaced with impermeable surfaces, overland flow is increased and infiltration reduced which bypasses the natural storage and attenuation of the land's subsurface (8, 13). The combination of increasing urbanization and climate change brings great

challenges to planning and managing urban areas for sustainability (14). Up until the first decade of this century, the majority of flooding research, policy and practice focused on fluvial or coastal flooding, however, pluvial flooding has more recently emerged as a critical issue (15). Pluvial flooding is precipitation-driven ponding or overland flow that results from the exceedance of natural or engineered drainage capacity (15). Urbanization aggravates pluvial flooding by increasing the amount of impermeable surfaces and modifying existing flow paths (14). Climate change is anticipated to both increase the occurrence and magnitude of urban pluvial flooding through alteration in patterns of precipitation, with a general consensus projecting more frequent, intense and short-duration precipitation events (15). Present stormwater drainage infrastructure is based on past climate trends and is considered neither adaptive nor sufficient enough to accommodate these more frequent and intense extreme storm events (15).

Flood resilience from a technical sense means creating or restoring the conditions to buffer, infiltrate and manage the flow of water rather than control against it. For example, a 'water sensitive city' or 'blue-green' infrastructure (BGI) approach would seek to use multifunctional green infrastructure aiming to restore the previous pre-urbanised hydrological function (15, 16). Rain gardens, bioretention basins, bioswales, green roofs and porous pavement build resilience to storm events, looking across the broader urban landscape to designate water storage areas to act in tandem with or supplant traditional stormwater conveyance infrastructure. 'Urban flood resilience' is set within visions not only for an integrated water system, but for much broader sustainability and liveability aspirations and transformational policy agendas, hence it is considered essential that these blue-green spaces are multifunctional, also providing ecological value as well as supporting broader urban regeneration goals (15). For example, playgrounds that can be inundated during extreme rain events, or blue-green corridors neighbouring roads that can convey floodwaters (15).

Move to resilience thinking in planning, or importance of planning for urban flood resilience

Yet flood resilience also raises much more fundamental questions concerning how cities and communities should or could prepare and transform in order to cope with increased exposure to flooding events (17). A resilient city is also seen to have knowledge systems in place, and that this should allow key stakeholders to learn from their prior experiences with extreme rain and flooding to bring about the required adaptation for the future (15). For example, with a focus on planning, planners have historically sought a distillation of data down to a probabilistic figure or clear spatial delineation between 'safe' areas and those 'at risk', typically reduced to a line on a map (18). Yet for example, the increase in urbanisation within a catchment can increase surface water runoff in ways that defy any accurate quantification. There has been a growing realization that the planning process incorporating probabilistic flood mapping and flood risk assessment for development cannot possibly capture the dynamism of changing precipitation regimes, the un-known effects of climate, urban water cycles and additional development (18). Planning for flood risk management instead should lead to a stronger engagement with uncertainty, detailing collaborative approaches rather than a reliance on data that may be subject to false precision (18).

The concept of resilience in planning has been gaining salience over the past decade. Paralleling the thinking in urban flood resilience, resilience in planning promotes a shift in understanding from places as static units of analysis to "complex, interconnected socio-spatial systems with extensive and unpredictable feedback processes which operate at multiple scales and timeframes" (12). Inherent in the involvement of urban planning, is the notion that any transformational change needs to go beyond innovative technologies and tools, towards new management practices and governance arrangements. Tyler and Moench (2012) note how institutions that are capable of fostering evolutionary change, and of adapting to new information, lend themselves to building resilience. Institutions determine the standards, such as planning policy, and thus have a strong influence on whether the systems can reliably meet the needs of their actors. Institutions condition the manner in which their actors can respond to climate stress and institutional thinking, they enable or constrain individuals in decision making and determine whose interests are considered in political decision making (19). We sense that there is further value in exploring in detail the interface between the theoretical and somewhat aspirational level where flood resilience approaches are postulated and how the day-to-day institutional realities impact practical implementation – we turn our attentions to SuDS delivery through the planning process in the following section.

4. Urban Flood Resilience in an Empirical Context, Planning and SuDS Delivery

A brief history of the recognition of surface water flooding and the shift to resilience thinking in England

The actual impacts of, and potential for extreme weather related flood events have been at the forefront of policy, politics and media coverage in England for more than two decades. Initially a series of high-profile flood events at the turn of the century drove a policy shift seen as from flood 'defence' to flood 'risk management', in which society should live with and 'make space for water', and the English public was explicitly told to expect to experience periodic flooding (20). Interest intensified in surface water flooding following extensive pluvial flooding across the country in the summer of 2007 (21). The summer floods of 2007 were seen by some commentators to further undermine the effectiveness of an evidence and risk-based approach (18), the ensuing Pitt Review noted the complete failure to realise serious national flooding could come from multiple sources, in particular from surface water and inadequate drainage (18, 21). The Environment Agency (EA) calculates that 1 in 6 households and businesses are presently (in 2019) calculated to be at risk in England, representing 2.4 million properties from river or coastal flooding and 3 million from surface water (22). Until 2009 properties considered to be at risk from surface water had not been calculated, with the rapid escalation to the belief that surface water currently represents the main threat of flooding in England (18). 'Resilience' as a concept was also mooted through DEFRA's national strategy 'Making Space for Water' in 2005, the 2007 flood events led to a strengthening of the policy response on flood resilience led from the Cabinet Office, seen as a precautionary managerial approach addressing the ability to cope with and recover from events, particularly where risks are uncertain (18). Sustainable Drainage Systems were increasingly promoted in the quest for flood resilience in urbanised areas. SuDS were formally introduced into the English planning domain following the severe floods at the end of the 1990s and turn of the century (DTLR, 2001), their importance again stressed by Pitt (2008) following the floods of 2007 (Pitt, 2008). They have the potential to provide cities with 'buffer ability' during flood event, in the first stage by infiltrating and storing water away and in the second stage by desynchronizing peak flows. They also ease the pressure put on sewer systems, decreasing the risk of sewer flooding. The Pitt Review assessed that the way in which surface water was managed in the UK was a major contributor to the 2007 floods. The Pitt Review (2008) had led to proposed new legislation (Schedule 3 of the Flood and Water Management Act 2010), which would have created a distinct body within local authorities, 'a SuDS Adoption Body (SAB)', to deal with SuDS applications. The implementation of Schedule 3 was controversially dropped in 2014, instead it was announced that planning policy would be strengthened in order to secure the implementation of SuDS (23). Specific figures of properties at risk are still quoted, that as White (2013) has earlier noted still feign "a degree of scientific authority that inevitably inspires confidence within decision-makers"(18). White (2013) also questioned how critical and uncertain the approach to resilience was from the English FRM authorities, as would be warranted from the experience of flooding over the previous decade (18).

The potential for a critical approach to resilience in England is explored within the following sections. First a description of current (2019) national policy, in flood risk management and spatial planning, pulling out the key framings and implications for urban flood resilience and SuDS delivery. The challenges and issues are then surfaced through the analysis of the opinions of the expert interviewees regarding their everyday practices, their roles in and connected to planning. This is structured by the key phases of the development management process (mapped to the construction design process): a) pre-application; b) planning negotiation and decision making on outline and detailed design; c) final planning approval for construction, adoption and maintenance of SuDS and d) planning inspection and enforcement of SuDS construction and maintenance.

Current policy arrangements for urban flood resilience, SuDS delivery and the role of planning

Policy direction for flood risk management and land-use planning governance remains centralised in England, decisions and priorities set by the Ministerial Departments for Environment, Food and Rural Affairs (DEFRA) and Housing, Communities and Local Government (DHCLG) respectively, under financial rules set by HM Treasury. A state level regulatory body, the Environment Agency (EA), is operationally responsible for managing risks from main rivers and the sea, including advising local authorities on planning decisions. At the local government level, 'lead local flood authorities' are responsible for managing local flood risk, working in partnership with local planning authorities to take flood risk into account through the land-use planning system. From 2010, coupled with an increasing move to governance beyond the State, there has been increasing reliance on partnership with private and voluntary sector actors (1), for the public to be risk aware and consider their individual role in flood resilience (4). In their 2019 draft strategy, the EA has set out a proposal to extend their

national strategic overview role, to include leading on flooding as part of broader climate resilience contributing to integrated solutions to the environmental and societal challenges the nation faces (24).

'Resilience' as a concept has continued to rise to the forefront of the Government's thinking, more fully articulated in the EA's Draft National Flood and Coastal Erosion Risk Management Strategy for England (2019). In this, the EA has again set out the need to move from the concept of flood protection and responding to previous floods, and has begun the process of exploring new philosophies around flood (and coast) management, to ensure that the nation takes urgent and immediate action to create 'climate resilient places' that are able to manage and adapt to flooding. The framing of resilience within the plan includes being dynamic, promoting an adaptive approach, taking many no-regrets and low-regrets activities to improve resilience in a place, with resilience as a concept also accepting that in some places all flooding cannot be eliminated and that the nation needs to be better at adapting to living with the consequences. Flood protection infrastructure remains one part of the nation's toolkit where it makes economic sense to invest heavily in engineered solutions to improve resilience (e.g. the Thames Estuary), but England's 'proposed national suite of resilience tools' is designed to help places to avoid, prevent, protect, respond and recover from the future threat of flooding. Sustainable drainage systems infrastructure filter through the Agency's proposed tool box, to be used in combination with flood walls and embankments, creating multi-functional green infrastructure, managing the flow of water through the environment, to reduce the risks in upstream and downstream areas, alongside natural flood management, good land management practices and temporary flood storage areas (24).

One of the longer-term strategic objectives for the EA is that all new development will contribute to achieving place based resilience to flooding, a 'robust spatial planning process' is seen as essential to creating and maintaining places resilient to flooding, spatial plans and policy providing clarity on the appropriate resilience and requiring that developments are designed to be resilient to flooding. At the national level, the National Planning Policy Framework (NPPF, updated February 2019) sets out the general framework for planning. Responsibility for development plans and decision making is delegated to the local government level, for which the NPPF must be taken into account. Planning law requires that applications for planning permission be determined in accordance with the development plan, unless material considerations indicate otherwise. In meeting the challenge of climate change and flooding, the NPPF charges the planning system with taking full account of flood risk, translating national guidance into local policies that help shape places to minimise vulnerability and improve resilience through appropriate measures. New development should be planned for in ways that avoids increased vulnerability to the range of impacts arising from climate change, when new development is brought forward in areas which are vulnerable, planners are to take care to ensure risks can be managed through suitable adaptation measures: through the planning of green infrastructure; safeguarding land from development that is required for current or future flood management; using opportunities provided by new development to reduce the causes and impacts of flooding. When determining any planning applications, local planning authorities should also ensure that flood risk is not increased elsewhere (25).

NPPF (2019) details the strengthened policy, that Sustainable drainage systems should be used in all areas at risk of flooding and in any major development, 'unless there is clear evidence that this would be inappropriate'. SuDS are generally assessed and approved as an integral element of the development management process; the planning system, in theory, offers the opportunity to bring knowledge and expertise from various stakeholders involved with SuDS delivery to bear, whereby crucial decisions are steered and taken on the design of new development and other changes in land use. Any advice provided should be taken into account by planning officers, together with all other material considerations, in the determination of individual planning applications. In addition to the EA, engineers in 'Lead Local Flood Authorities' (LLFA) provide advice on the drainage aspects of new developments, including an assessment of any SuDS element of a development scheme. This is a statutory duty on LPA's to consult with the LLFA for proposals involving 'major development with surface water drainage' prior to any granting of planning permission. Planners and developers are instructed to take account of advice from the lead local flood authority; have appropriate proposed minimum operational standards, maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and 'where possible', provide multifunctional benefits (26). Other professional bodies and non-profit organisations, such as the Institution of Civil Engineers (ICE) and the Construction Industry Research and Information Association (CIRIA), provide additional advice in the design and implementation of SuDS. CIRIA's 'SuDS Manual C753 (2015)' provides guidance on the technical standards for various forms of SuDS, the manual establishes four pillars of SuDS design: water quantity, quality, amenity and biodiversity (27).

Experiences and perspectives of expert professional interviewees 'on the ground' in SuDS delivery

a) Pre-Application

It is the intention that applications incorporating SuDS should be discussed and assessed in collaboration with stakeholders, to agree on the SuDS scheme for the development. 'Pre-ap' discussions have been recognised for several years as the crucial stage in SuDS implementation, for example, ICE (2018) advice envisions 'iterative design processes' to enable opportunities to be exploited and constraints overcome, to refine the design to make the best possible use of available space within a development in order to deliver a high quality integrated water management solution (28). Pre-application discussions are arranged at the discretion of LPA's, they are not mandatory. The incentive for developers to hold pre-application discussions is an increased expectation that the application will be approved. LPAs can charge a fee for providing a pre-application 'service', the fee justified by the level of expertise and resources required. However, the interviewees fundamentally believe the fee system is a strong deterrent for many developers. If the pre-ap process does go ahead, interviewees reveal that prior dealings between developers and landowners at the land acquisition phase forego any 'pre-application front-loading' advice and put the LLFA immediately on the back foot. Local planning policies should identify a supply of deliverable sites for years one to five of the plan period (25), each parcel of land is then attributed a prescribed number of units (commercial or residential). Interviewees detailed how developers compete for the land, with the promise of higher receipts to the landowner, for example:

> "We will allocate a site for a certain number of houses that we think is realistic on that site. And nearly 100% of the time what will happen is that we will get an applicant who comes in, and they will, because they've told the landowner that, all right, the council's allocated for 1,000 houses, and this is worth X to you; we think we can get 1,200 houses on there, and that's worth Y to you; and they will be getting that uplift from X to Y. So, you know, that is who the landowner tends to have gone with" (I#2).

ICE (2018) note that in order to gain all the benefits that SuDS provide, SuDS design must be considered at the very start of the feasibility stages of a development project, that there needs to be agreement on the layout of the proposed SuDS scheme at the 'conceptual masterplanning stage' (28); good outcomes being underpinned by due consideration to the layout, function and land-take from the outset, which then avoids designers having to squeeze and retrofit lesser quality measures into the drainage design. The implication is that the natural hydrology of the land will inform all the other planning decisions, including the number of units and the layout of the site. In practice, the (uplifted) number of units drives the design process:

> "A developer buys a piece of land, they pass it to an architect, who gets all the units they want on the land. Then they pass it to a drainage engineer that tries to squeeze in the drainage network and then they consider the pre-application. Oh, what should we do with this design, with this drainage network that we have already put on? So, we are already on the backfoot if we were consulted, potentially…" (I#6).

The need for effective local planning policy is stressed, to be strengthened by supplementary planning documents. Interviewees report developers are aware they are required to include SuDS in their application, but: "whether those SuDS would meet policy requirements or the expectations that local authorities and LLFAs have, in terms of what they should be providing, is another thing' (I#2). Interviewees explained, local authorities are perceived to have a lot of power, yet "there's no real bite to that power" and interviewees are "just bound by what policy is in place" (I#5). The lack of a stronger legislative spine for SuDS affects the engineer's ability to push the developer for a higher design quality: ''you don't have the power to tell people what they have to use. They only have to meet the minimum requirements that legislation dictates […..] but you think to yourself, well, it could be done better if you'd done this but […..] we don't really have any more comeback to them" (I#5). If LLFAs do provide advice it is generally not acted upon by the developers:

> 'We can't be prescriptive, but we can give advice in that respect. And I would say, almost every single time, we would see that is not what's followed […] even though it's not what we would like to see, we approve it, if it can be demonstrated that it works and it's in line with policy' (I#1).

There is a general feeling that: "Developers have that expectation that they will be able to chip away at any restrictions that are put in place unless they're totally legally enforceable" (FG2). This particular sequence of events in pre-ap discussions typically causes issues for the entire application process going forward:

> "So, it is hard to reverse a design that they've already invested, in terms of the architect's design, they've invested in terms of the drainage engineer's [design]. And we are trying to make the best of that, to some degree. If it does not work, then I think we are well within our rights and we do say, it doesn't work, no, go back and start again. But at that point, Highways is looking at the same design, so is ecology, so is the tree guy. So, everybody puts their comments in, and it takes a significant argument to reverse that degree of work that's gone into it" (I#6).

b) Planning negotiation and decision making on outline and detailed design

Local planning authorities are encouraged to "approach decisions on proposed developments in a positive and creative way", to "work proactively with applicants to secure developments that will improve the economic, social and environmental conditions of the area" (25). There is a responsibility to promote and further the multiple benefits of SuDS, including their biodiversity, water quality and amenity benefits. The interviewees consistently detailed a gap between the SuDS they want to see and the quality that is implemented in practice:

> "There will be some really hard commercial pressures on the developers to maximise their income from a site and we will be looking to get something that people can be proud of as a development, that'd be a nice place to live. I think it is something that, it has occurred to me over the last two or three years, there is a lot of tension mixed up in all that. It is a very argumentative atmosphere at times" (I#3).

The interviewees attribute many of the issues to an asymmetrical relation of power between the developers (and their private, commercial interests) and local authority (representing public interest), two interviewees noting that the imbalance of power is rooted in the current structure of the English development process, which relies on private money coming forward to develop sites: "Because we want to engage the developer and we want sites developed, we transfer our power to them at times. And it is difficult to recoup that power, and it does become a struggle" (I#8). We also see a more nuanced and nefarious aspect to this transfer of power, as the developers attempt to hijack the planning process by going over the heads of planning officers:

> "So most developers also go higher than the planners. So [Name 1] is my manager. Then we have [Name 2], who is our Assistant Director. And then we have [Name 3], who is our Director. Many schemes, if the developer is not hearing what they want to hear from my voice, they normally go to [Name 1], or sometimes they just go straight to [Name 3], because they don't want to hear what we're saying […] They want that rubberstamp to say their scheme's fine. But our colleagues in Drainage might not be happy; my colleagues in Transport might not be happy; you know, Conservation… So my honest opinion is that higher management give developers more power, more control, than they are entitled to. It is the officer, my level, where the struggles always go. It is always a game of tug-and-war […] Always. And it should not be. It constantly grinds you down, because we want a good scheme onsite, they want a scheme onsite. It's hard" (I#8).

As well as having to consider and make use of an extended range of resilience measures as responses to flood risk, planners have another of equally complex and uncertain issues, potentially competing demands to be balanced from within the planning system:

> "So Flood Management want sustainable drainage, okay; Transport want the bin wagon to come in, be able to turn in site; the developer wants lots of numbers of units, which means car parking; my colleagues in Landscape want trees and shrubs; and I want it all. And I want to get everyone happy and everything in and keep the developer happy. And it's very frustrating, because once you push, it bulges here, and a site boundary can't bulge. So you've got to try and squeeze everything in and layer it all up and understand what comes first" (I#8).

As noted with the 'pre-ap' stage, there are issues related to the perceived weak legislative backdrop to SuDS, planners failing to gain any traction on 'aspirational' policy objectives, LLFA engineers stating that they have to settle to achieve the minimum approval standards according to current guidance, national and local policy, "and then anything beyond that is sort of a battle" (I#6). The overwhelming response from interviewees was a frustration with a lack of innovation, between approvable SuDS and a high quality scheme:

> "No. In a nutshell. There is nothing in there to promote innovation. I mean, one of the ways that you can promote innovation is through multifunctionality, the multi-use of SuDS areas. That can be innovative. I am not finding that it is. I am finding that we are just getting SuDS basins, and that's all that they really are. But there's so much more that you can do with that, there's so much more thought that could be given to getting public open space that incorporates those SuDS, but uses it all as public open space. And I think that's a real problem" (I#7).

As with the different planning elements of an application, the various SuDS features are viewed in terms of a compromise: "sometimes, we really push for a low discharge rate, and if we get a nice SuDS scheme out of it, then we compromise on a higher discharge rate, or the other way around" (I#1). The diagnosis of the current system for implementing SuDS suggests a reliance on the willingness of the development sector to trade the number of units for SuDS on a site. According to one interviewee this is a "naïve proposition", mainly because developers are "profit-making companies [which] will always try and make as much money as they possibly can off a housing development whilst, obviously, lauding their green credentials" (I#7). The problem is further confounded by not only what is 'approvable', but the aspirational nature of multifunctional benefits such as amenity and biodiversity, versus the 'quantifiable':

> "The features don't necessarily accommodate the four pillars that you require for a system […] the SuDS system, it should accommodate the four, the attenuation, the water quality, the bio-diversity and amenity. Sometimes we only get two. Sometimes the two quantifiable ones that are purely measurable are the water quality, because we can measure that directly again the SuDS manual, in terms of the mitigation methods for the area or the usage of the land. And the attenuation, we can use greenfield rates and all that and establish discharge rate and establish the level of site protection up to one in a hundred plus 40% and all that. The other two, are of opinions, so your perspective" (I#6).

Interviewees considered the developers producing their "bog-standard designs" (I#7) as a key reason stemming innovation and quality. However, the interviewees drew out other issues with delivery of SuDS through the planning process, including the liability incurred by the LAs. Innovation was seen to be about "risk taking, and naturally local authorities aren't really the right place for risk taking" (I#3). Interviewees explained that in the event of the malfunction of a design, the responsibility will be incurred by the LA in accepting the design, and not by the developers who proposed and implemented it: ''ultimately, it's an engineered drainage network and it needs to be proven, and if it can't be proven, if it's going to be too cost-prohibitive to prove it, then it's going to cause delays in the planning process" (I#6). Furthermore, the engineers who work in the LLFA require of themselves to 'cross all the Ts and dot the Is':

> "I have to admit that we have to be satisfied at the end of the day, because we can't say we are happy with something to come forward if we have concerns that it's not going to work or it's going to increase flood risk, both to the site or elsewhere, or it's not providing water quality, and our planners are not willing to take something to planning committee if we're saying, this is not going to work, I would say, 90% of the time, if not more" (I#1).

Hence the assumption should not be made that all stakeholders (see multi-functional SuDS as the preferred option, LLFAs preferring solutions known for their reliability, have issues relating to liability and it would appear that it is not only developers that have a fundamentally uneasy relationship with the greener elements of SuDS design: "how much bio-diversity can you bring to an urban region or if you put frogs in a pond, are they just going to cross the road and get splattered" (I#6). One interviewee reflected that this is due to "engineers have been brought up with you've got to click, click, click on a computer and come up with a drainage design" (I#3). The interviewee argued that a change of culture is still required within the authority, as:

> "it's easy to put pipes in and stick it into a manhole, put that into the sewer network with a throttle on it, whereas 'SUDS designs are a bit more involved [as] you have talk to landscape people and work out volumes" (I#3).

Interviewees also noted that collaboration with other departments was essential, particularly landscape architects for which it was intimated links were not currently close enough to allow for greater integration and 'multi-functionality' of SuDS with public open space. A lack of collaboration within the LA again relates to the scaling back of resources and the performance pressures of the development management process:

> "We might have scheme where there's 20 documents, we might have schemes where there's 300 documents. So there'll be some documents I wouldn't look at and some I would. And so we don't specifically see within the Drainage Strategies or the Flood Risk Assessments specific mention to use of amenity and biodiversity. But that doesn't mean that it hasn't been put somewhere else which I might be missing […] Or through Landscaping maybe" (I#2).

c) Final planning approval for construction, adoption and maintenance of SuDS

Planning officers are required to assess the long term management and maintenance of SuDS schemes, reaching an agreement with the developer as to the future and on-going responsibilities of SuDS maintenance and seeking guarantees that they will function effectively as proposed for the life time of the development proposed, prior to the granting of any planning permission. Following the climb down from the original intentions of the *FWMA 2010*, in which newly created SABs were to approve, adopt and maintain SuDS schemes in England, LPAs still need to ensure developers have firm plans in place for maintenance of SuDS, although it is now considered best left 'open to the developer to maintain the sustainable drainage systems themselves (such as a private maintenance company, the local authority, local residents or another) (23). This is considered by the Government to be the best arrangement along democratic and participatory lines, encouraging the participation of all interested parties in flood risk management (23). Only a minority of LA's allow for the adoption of SuDS, this being an infrequent arrangement as LA's lack the resources to take on the maintenance. The resulting patch work of maintenance arrangements, the effort and costs involved in maintenance is often quoted as the reason for favouring conventional drainage approaches. However, one interviewee highlighted that: "SuDS maintenance can get blown up out of proportion. But actually, the maintenance cost and effort for well-designed SuDS doesn't need to be large at all. In many ways it's easier to maintain something on the surface than it is something that's buried underground" (FG2).

The attachment of planning conditions and planning obligations (e.g. Section 106 agreements) are promoted by policy as the main tool through which planners can secure the delivery of SuDS, in detailing drainage design and maintenance, compliance with the technical standards and in ensuring authorities can enforce against any subsequent breach in the planning permission (23). A breach of condition notice may be served on any person who is carrying out or has carried out the development or any person having control of the land. However, interviewees report S106's are used sparingly and mostly on major applications, whereby maintenance is bundled up with other contributions, be that financial or physical contributions to open space requirements. Interviewees do however report that almost all applications are accompanied by a maintenance plan (or schedule), and this enables the LLFA, and consequently the LPA, to be satisfied that the developer has nominated the third party (predominantly a management company) to undertake the maintenance of the asset. The maintenance plan also contains a legal agreement, in addition to the logistical details associated with the practical undertaking of the maintenance.

d) Planning inspection and enforcement of SuDS construction and maintenance

Interviewees reported on the lack of resources impacting on any monitoring and enforcement strategy. For example, not having an officer available and resorting to train in part Highways Inspectors to look after SuDS, which was not considered as effective an arrangement as having not a dedicated person. Another interviewee (I#7) reported only having a single officer to monitor all the sites. In reality, any investigation into the future status and condition of SuDS is reactive, after the occurrence of a problem, and typically following a complaint (23). If the LLFA is subsequently concerned regarding the functioning of the SuDS feature, they can request sight of the maintenance record. However, the interviewees have stated that this step has not been taken by

their authorities to date. Any enforceability of a breach in SuDS developments will depend on how well the planning permission was originally conditioned or agreed through a planning agreement or obligation, but any enforcement procedures are regarded as a grey area:

> "If there isn't a Section 106 agreement, then there will be a maintenance schedule. We would have registered the asset as a SuDS asset, but it's not necessarily legally enforceable. So it's a bit of a grey area as to how that can be enforced. Most developments should have a Section 106 agreement, but it is certainly not all of them. So there are gaps there in that sense" (I#7).

SuDS maintenance enforcement places huge strain on LA resources, even if there is a S106 agreement, the amount of money put in considered in no way adequate to deal with issues over the lifetime of developments:

> "We've spent the last three years trying to enforce the maintenance schedules as they were set out. The maintenance schedules themselves are fine, but there's always been a perception that they're not actually doing them. They're filling them out and they're ticking all of the boxes, they say they're doing them, but they've never really done any of the work that they're supposed to be doing, yet they're still charging the residents for the maintenance of those SuDS. Now, they are grass-cutting and litter-picking, mostly, but the specialist stuff, like desiltation, reedbed rotation, in the sense of cutting it back and ensuring that the integrity of the SuDS basins is maintained, the volumes are maintained, for the amount of surface water that's anticipated, none of that is really being carried out. It's taken us about maybe 18 months of continual pressure to try and get them to actually carry out the maintenance schedules as they are set out" (I#7).

Ultimately, maintenance and adoption issues can affect the overall perception of multi-functional SuDS from within the local authority: "it's all very well and good we have this nice green infrastructure type things, but if they take a lot more maintenance, then in the long run that doesn't say to me that that is sustainable" (I#5).

5. Discussion

This paper has examined the reality of the urban flood resilience remit of present national planning and flood risk management policies, and in taking SuDS implementation as a form of litmus test or barometer as regard to flood resilience, has explored how planners are expected to respond to the resilience agenda against the realities in practice. If we take 'resilience' as entailing an explicit effort at 'sensemaking' following an unexpected event that exceed existing institutionalized capacities and resources (29), then extreme flood events in England have clearly triggered academics, policy makers and practitioners to seek to make sense of urban flood resilience. From the Pitt Review (2008) to the latest draft of the Environment Agency's national plan, the flood risk management authorities are seeking to improve England's resilience to the increasing risk of flooding. We can see the legacy of resilience for security issues in planning policy, whereby policy rhetoric on resilience is less extensive regarding flood and climate change.

From the planning professional's perspective, attaining resilience requires an enhancement of existing planning and techniques in order to make cities and critical infrastructure more resistant to the exogenous shocks of flooding (30). From the EA's plan (24), the capacities required to bring about resilience are understood to include adaptability, dynamism and flexibility. We have noted a striking difference between the behaviours and attitudes of the professionals working in local authorities (LLFAs and LPAs), versus the capacity of their institutions to foster evolutionary change. Whilst the actors clearly display aspirations for resilience and can be characterised as knowledgeable, driven, and savvy to the ins and outs of the SuDS delivery process, the wider institution appears hard pressed to perform to the same standard and can only be characterised by inertia.

All interviewees reported that current planning policy does not afford them the best chance in terms of quality SuDS outcomes. Responsibility for SuDS has been decentralised to local planning authorities, yet National Government has retained power to shape the local agenda through National Planning Guidance (30). The Government's overhaul of planning (in 2011) released the perceived brakes on development (31), and retained SuDS policy within the weakened planning system. The remit of planning professionals extends beyond flooding and climate change, to a myriad of other policy priorities and risks for which a resilient response is required, including energy security and counter-terrorism (30). Although planning is increasingly seen as a remedy to an ever-increasing array of socio-economic and environmental problems, more responsibility has

come with fewer resources and under increasing pressure to meet Central Government's performance targets (30), including the speed with which applications are dealt with and the 'quality of decisions' (quality as measured by the proportion of decisions on applications that are subsequently overturned at appeal). It has been alleged in the literature that little if any direct attention is given to the planning of the wider benefits to SuDS, for example, according to Fenner (2017), any systematic procedure for pro-actively developing drainage infrastructure to deliver a specified range of predetermined desirable multiple benefits are rare and instead if any multiple benefits emerge, this is at best sporadic, coincidental or at worst accidental. Interviewees report that multifunctional benefits are only purposively designed into 'big schemes', where there is availability of land. Any multifunctional benefits of SuDS, above and beyond water quantity and water quality are indeed reported as a "fortunate by-product of [SuDS] design" (I#2).

The planner's ability to act and be resourceful must be facilitated by adequate resources, including financial, and/or the ability to access shared resources through collaboration (19). Our explorations into the implementation of SuDS have revealed that a chronic lack of resources hurt the process of implementation at every step of the planning process. Examples include local authorities being reluctant to adopt SuDS; the monitoring of SuDS being inadequate due to absence or suboptimal training of 'substitute' engineers; collaboration with other departments is not as extensive as needed or desired; general understanding of SuDS design deficient in places due to lack of capacity building (which was promised by the Government in 2014 but not delivered). The serious lack of resourcing, coupled with weak legislative backing results in many authorities only being able to perform to minimum standards. The planning system is particularly hamstrung by the inability of relevant stakeholders to come together and produce larger-scale, integrated and water sensitive flood resilient designs at the authority level to inform individual site proposals. The local authorities have few issues securing the minimum dictated by legislation, but in many cases this means SuDS features that only deal with water quantity and quality (such as attenuation tanks and permeable paving). The challenge going forward, for both SuDS and flood resilience, relates specifically to how to move beyond 'box ticking exercises' and towards tailored, involved and collaborative designs through iterative processes with developers.

Concepts of urban resilience mean that planners cannot function in isolation, and in pursuit of greater integration must form strong relationships with other key actors including LLFA engineers, landscape architects, this being "most effective when it involves a mutual and accountable network of civic institutions, agencies and individual citizens working in partnership towards common goals within a common strategy" (30). We have observed a number of issues related again to lack of resources and the conventional outlook of some of the engineers working in local authorities, in terms of resilience thinking.However, planners appear increasingly more informed about the importance of SuDS and resilient design, wanting to work in partnership to deliver 'a good scheme on site', LLFAs have identified that they need to forge closer links with landscape architects to integrate SuDS with open space and provide increased multi-functionality. The actors in local government are starting to lay down the foundation for more involved and collaborative design, which is essential for future flood resilience. However, we do not see developers working towards common goals on resilience.

As institutions determine whose interests are considered in political decision making, as is more widely recognised in the planning literature, we have seen strong power relations from developers come into play. A planner's role, in the neoliberal era, has been acknowledged to be a relatively passive one of creating the right conditions or environments for expansion and to send 'signals' through the market to the private sector about what type of development is wanted and where. As White and Howe (2005) noted over a decade ago, current policy prescription leaves planning officers with an 'evangelical role', having to persuade developers to use (per se) or improve the quality of SuDS in their planning applications. 'Business as usual' traditional drainage approaches essentially do not require such time-consuming, collaborative discussions. This means that for the developer time is money, whilst for the planner driven by housing targets, the 'evangelical role' results in an increased workload; 'Planners don't have the time or the skills to play what is in effect a preaching role' (32). We do see planners taking on more of a preaching role for SuDS, hence we witness some progress. However, as Porter (2011) highlights, "the neoliberalisation of planning has been so successful that it is now entirely unchallenged in the world of practice" and "in focusing on 'getting to yes' and the process that entails, we miss the question of what alternatives might be possible, of how the decision could be otherwise (p478). As one of our interviewees stated, "I attended a conference recently where they talked about Sweden's national planned

policy, which, in terms of SuDS, is unbelievable compared to this country. [It is] about having SuDS that work for the public, in the public interest, that were innovative, they had to make a statement… I mean, those things are just way, way, way beyond where we'll ever get to" (I#2), Porter (2011) also sees planning in a depressing TINA ('there is no alternative'), as practitioners seem unable to challenge TINA from within the system, and neither are they able to imagine alternatives (31). Porter (2011) calls for a taking-to-task for the "collective negligence of the political" in the planning domain. For planners to see the principles at stake in various dissenting positions, to recognise there are always alternatives and that it is perfectly possible to conceive of a different decision and instead embark on different courses of action and a just outcome (31).

6. Conclusion

This paper has set out to investigate the process of delivering an urban flood resilient future by attending to the experience and actions of actors and practitioners involved in urban planning and development processes in local government. It has focused on the implementation of SuDS, which is an important part of a flood resilience paradigm that is focussed on adaptive, integrated, multifunctional design based on no or low regret solutions This paper has illustrated the emergence of resilience as a commonplace concept in flood risk management, yet in planning practice is subject to many conflicts and tensions. Our findings have painted a suboptimal situation on the ground, characterised by a discrepancy between the before-mentioned required parameters of the flood resilience paradigm and the reality of delivery through the planning system. Whilst the concept of resilience in the flood risk management academic literature might be seen to hold transformative potential, these expectations are not met in the socio-economic realities of planning. We found that there are three main compounding institutional factors which are constraining the implementation of SuDS: the lack of legislative backing, the power awarded to private commercial interests and the severe lack of resources in local authorities. The effect of these issues, combined with other secondary issues such as institutional inertia and old fashioned engineering design, is that that the SuDS solutions being implemented are 'bog standard'. The design most attuned to the flood resilient paradigm (i.e. flexible, collaborative, innovative, integrated) is currently lacking.

Using the implementation of SuDS as a barometer indicative of the state of flood resilient design, we are forced to draw relatively negative conclusions. We are seeing positive developments in that practitioners at the coal or 'SuDS face' are dedicated and driven, and they are starting to find ways to enable the collaboration that will form the basis for flood resilient design. But local government's efforts are undermined from the national level. If England is failing to implement high-quality SuDS schemes on new developments, English practitioners will continue to stare enviously across to Sweden's city wide urban-blue grids, as per our interviewee (I#2). As with previous researchers, we see both planning policies and practices struggle to reconcile the applicability of the wider urban flood resilience concepts with the realities of place-based planning (33). If planning for 'resilience' remains divorced or abstracted from the realities of practice, then obstacles to achieving the desired outcomes of urban flood resilience we feel will remain an inevitability. Porter (2011) has previously highlighted that "the neoliberalisation of planning has been so successful that it is now entirely unchallenged in the world of practice" (p477). She sees this as materialising in an inability to see this situation for what it is, nor be able to think of credible alternatives to deliver on improved social and environmental outcomes. Whilst Porter sees the grip of neoliberalism as "suffocating the imagination of praxis" (478), we consider an unchallenged neo-liberalised planning system the most insidious drain on SuDS implementation. Whilst the EA has plans to invest in planning skills and capabilities to advise local planning authorities on how adaptive approaches should inform strategic local plans and ensure they can advise planners and developers effectively to enable climate resilient places, unless recognised, made explicit and addressed, power relations will continue to constrain decision making processes and options, stymieing resilience

The academic and professional contributions towards the flood resilience paradigm and its associated concepts needs to provide more than further tools and technologies. First, considerations need to be geared towards how such tools are going to be implemented and how they will make a difference with a greater understanding of the institutional context. Second, at a more fundamental level, a different set of considerations need to address how they contribute towards changing management practices and governance arrangements. It is here where the battle for a resilient future has to be fought.

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