



Protecting value in at-risk developments

THE CASE FOR PROPERTY FLOOD
RESILIENCE (PFR)

June 2026

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00 Executive Summary

Surface water flood risk is becoming a more important consideration for housing delivery across the country, particularly in areas where demand for new homes remains strongest. At the same time, developers are operating in an increasingly challenging environment shaped by higher build costs, tighter financing conditions and growing expectations around resilience and long-term place quality.

Much of the discussion around flooding has understandably focused on the impacts on households and government, where the wider economic and social benefits of resilience are well established. Less attention has been paid to the commercial exposure developers themselves can face where flooding occurs during construction and active sales periods.

This paper explores that evidence gap. Drawing on a series of hypothetical but realistic development scenarios in areas exposed to surface water flood risk, Public First modelled how flooding during construction could affect developers financially and whether relatively low-cost property-level flood resilience (PFR) measures could help reduce some of those impacts.

The analysis examined three different development types: a large-scale development in the East of England, a medium-scale development in the East Midlands and a smaller urban development in London. Across the scenarios, the modelling assumed that wider site mitigation and drainage measures were already in place and focused on the residual impacts that can still occur during severe rainfall events.

Overall, the paper finds that relatively modest investment in property-level flood resilience measures can generate positive commercial returns for developers. Across the development scenarios tested, the modelling consistently found resilience investment helped reduce larger downstream costs and disruption where flooding occurred during construction and active sales periods.

The key findings are:

- **Flooding during construction creates wider commercial disruption.** The modelling suggests that the impacts of flooding extend beyond physical damage alone and can include delays to construction and completions, remediation works, disruption to active sales periods, financing pressures and impacts on pricing for unsold homes.
- **Developers remain exposed while sites are still being built out and sold.** On phased developments in particular, flooding can occur while homes are under construction, being marketed or sold off-plan, leaving developers financially exposed before homes are fully occupied.
- **Recent developments demonstrate how these pressures can emerge in practice.** Flooding incidents at developments in Bridport and Bognor Regis occurred while construction and sales activity were ongoing, leading to additional remediation work, disruption during build-out and wider scrutiny around drainage and resilience arrangements.

- **PFR measures are relatively low-cost when installed during construction.** The modelling assumes a reasonable package of property-level resilience measures costs around £1,000 per dwelling, significantly lower than the costs associated with retrofitting homes after flooding has occurred.
- **The modelling suggests positive commercial returns across different development types.** Our mid-point scenario suggests that developers could save around £2.27 in avoided losses for every £1 invested in PFR measures.
- **Dense urban developments may face particularly strong commercial pressures from disruption.** The modelling found the highest relative returns in the Greater London scenario, where higher house prices magnify the impact of any reduction in the value of unsold homes. Construction delays and disruption also contributed to the commercial case.
- **Much of the commercial value identified in the modelling came from protecting sales values and buyer confidence.** The largest avoided costs across the scenarios were linked to preventing reductions in the value of unsold homes following flooding, alongside reducing remediation costs, delays and wider disruption during construction and sales periods.
- **Resilience measures may increasingly support development certainty.** The findings suggest that relatively modest resilience investments made during construction can help reduce wider disruption during build-out and active sales periods, particularly where developments remain exposed over longer delivery timelines.

The modelling is illustrative and does not represent a formal impact assessment. It demonstrates a positive cost-benefit for developers in all scenarios where the risk of surface water flooding is medium (above 1%) or high (above 3%). In particular, the modelled scenarios are in areas where the risk of surface water flooding is 2-2.5%. The modelling provides an indication of how flooding during construction can affect development economics in practice and how relatively modest resilience investments may help reduce some of the associated commercial risks over time.

01 State of play: The changing risk environment for development

Surface water flood risk is becoming a more important consideration for housing delivery, particularly in areas where demand for new homes remains strongest. This chapter explores how developers are exposed to flood-related disruption during construction and sales phases, how flood risk is currently managed through the planning system, and recent examples where flooding has affected developments during active build-out.

Flood risk is becoming a more material issue for housing delivery

Delivering new homes is becoming increasingly complex. Developers are operating in an environment shaped by rising build costs, tighter financing conditions, growing infrastructure pressures, and increasing expectations around resilience and long-term place quality. At the same time, many of the areas where housing demand is strongest are also locations where surface water flood risk is becoming a more important consideration, like London.

The Environment Agency's updated national assessment of flood risk found that the total number of properties facing surface water flood risk was up 43% since their previous assessment in 2017, and they expect it to increase a further 30% between 2040 and 2060. Currently over one million homes are in areas of high risk of surface water flooding in particular – three times their previous assessment.¹ New research shows that one in three new homes built in 2024 could face some level of flood risk by 2050.²

This does not mean that development should be avoided in these areas entirely – that is not in the public's interest. New housing delivery remains essential to economic growth and meeting long-term housing need. However, it does mean that managing flood risk effectively is becoming increasingly important to maintaining delivery certainty, protecting asset values, and supporting buyer confidence.

Much of the discussion around flooding has justifiably focused on the impacts of flooding on households and government. Flood damage costs homeowners between £45,000 and £75,000, totalling £1.2 billion a year for surface flooding alone.³ As well, homes built after 2008 are not eligible for FloodRe – a government-backed risk pooling scheme that ensures at-risk homeowners can access affordable home insurance. Without that protection, new homes in high-risk areas are harder to insure and mortgage, as highlighted in Public First's recent research report with the UK Sustainable Investment and Finance Association.⁴

Less attention has been paid to the commercial exposure developers themselves can face during construction and sales phases of development, which can be significant. Developers are financially exposed

¹ Environment Agency, *National assessment of flood and coastal erosion risk in England 2024*, January 2025.

² Aviva, *Proportion of new homes built in flood areas rises to one in nine*, February 2026.

³ Environment Agency, *Estimating potential economic costs of flooding*, April 2026.

⁴ Public First, *Flooding the Market: The Climate Mortgage Trap*, March 2026.

long before a site is fully built out and sold. A flood event during construction can create disruption that affects project timelines, sales, financing costs and market confidence.

To help fill this evidence gap, this paper explores the potential role that property-level flood resilience (PFR) measures can play in helping manage those risks, alongside and in addition to the current approach of raising floor thresholds, managing site run off and providing additional attenuation and storage capacity at site-level. Drawing on a series of hypothetical but realistic development scenarios, the analysis examines how flooding during construction can affect developers financially. It also considers whether relatively low-cost resilience measures integrated at build stage can help reduce commercial exposure.

The intention of this paper is to explore how resilience measures could support more commercially robust and future-resilient development outcomes in areas facing flood risk, while enabling continued housing delivery where it is most needed.

Site-level mitigation remains the primary approach

Managing flood risk is already an established part of the planning and development process. Developers operating in areas at risk of flooding are typically required to undertake flood risk assessments, work with Lead Local Flood Authorities and the Environment Agency as statutory consultees, and incorporate their advice on drainage and mitigation measures into site design.

In practice, the focus of this process is often on managing and reducing flood risk at the site level. This includes measures such as site layout and levels, drainage systems, attenuation and storage, sustainable drainage systems (SuDS), and managing runoff rates and exceedance pathways. These measures are important and remain an important first line of defence against flooding risk.

However, even well-designed systems cannot eliminate flood risk entirely, particularly during extreme rainfall events, where wider drainage infrastructure is under pressure. In places, some residual risk remains even after site-level mitigation has been incorporated. This means there can still be commercial exposure for developers where flooding occurs during construction or before developments are fully sold.

One way of addressing this residual risk is through PFR measures. These are measures integrated at dwelling level that help resist flooding and reduce the impact of flooding where water does enter homes or affect a development during construction. Examples can include raised electrics, additional waterproof membranes, resilient materials, self-closing air-bricks and non-return valves designed to reduce damage and speed up recovery following flooding. Such measures work by eliminating water ingress points into a home and using resilience materials that both resist water and recover from contact with water, and do not need to be replaced.

Importantly, these measures are generally low-cost when incorporated during construction, with evidence suggesting a reasonable package of measures costs around £1,000 per dwelling.⁵ By comparison,

⁵ The £1,000 package is being developed by a "DEFRA PFR working group involving cross-Government officials and industry experts set up in response to the "Flood Ready review" commissioned by Government and chaired by Professor Peter Bonfield that recommended Government consider the case for including a package of PFR measures in Building Regulations. The DEFRA PFR working group has established a package of "no-regrets" PFR measures costing c£1,000 that would comprise additional waterproof membrane to provide additional protection into the cavity wall insulation to a set height, non-return valve on waste pipes, self-closing air-bricks and the elimination of water ingress points below a set wall height.

retrofitting resilience measures after flooding has occurred is significantly more expensive and operationally disruptive once homes are completed and occupied.

For developments exposed to river and coastal flooding, planning advice from statutory consultees will often include recommendations for PFR where some flood risk remains after wider site mitigations are taken into account. Surface water flood risk, by contrast, is more commonly managed through site-wide drainage and water management measures alone, on the basis that flooding is expected to be more localised or manageable.

Many developments may also face overlapping sources of flood risk, including combinations of river, coastal and surface water flooding. While drainage and site mitigation measures remain the primary approach to managing these risks, heavy rainfall can still cause significant disruption and property-level damage where drainage systems are overwhelmed, particularly in dense urban areas or during more extreme weather events that occur more frequently due to climate change.

Recent examples demonstrate disruption during development

Across England, several recent housing developments have experienced flooding during construction or shortly after occupation. These incidents have drawn attention to the challenges that can emerge where severe rainfall occurs before sites are fully built out and sold. In a number of cases, flooding led to additional remediation works, scrutiny of drainage arrangements and wider concern about how developments would perform during future periods of heavy rainfall – as well as concerns from residents of existing adjoining housing estates worried about the impact for them.

In some instances, flooding occurred before homes had been fully completed or before resilience measures had been installed, meaning some level of damage may have been difficult to avoid entirely. However, there have also been cases where homes were structurally complete but not yet occupied, leaving developers exposed not only to the immediate costs of flood damage, but also to remediation, retrofit and sales-related impacts before properties had been sold.

The examples below illustrate just two of several sites where these issues have emerged in practice.

Foundry Lea, Bridport

Foundry Lea is a residential development in Bridport, Dorset, being delivered on the site of a former industrial foundry near the River Brit. In October 2024, parts of the development experienced flooding following heavy rainfall while construction and drainage works were still ongoing.

At the time of the flooding, the site was still being built out, with some homes already occupied and others under construction or being marketed for sale. The incident led to additional remediation works and prompted local discussion about how the development and wider drainage infrastructure would perform during future periods of intense rainfall.

Lidsey Road, Bognor Regis

At Lidsey Road in Bognor Regis, residential development works were affected by flooding following periods of heavy rainfall in late 2023 and early 2024. Prior to the flooding, drainage arrangements on the site had formed part of ongoing discussions during the planning and construction process.

The flooding occurred while the development was still under construction, creating additional disruption during delivery and contributing to wider local discussion about drainage capacity and resilience during extreme weather events.

02 New evidence on the case for flood protection

Flooding during construction can create significant commercial exposure for developers, extending beyond the direct costs of physical damage alone. This chapter sets out new modelling by Public First examining how flooding can affect development economics and whether relatively low-cost property-level flood resilience measures can help reduce those risks across different development types.

Understanding the commercial exposure from flooding during development

While the wider economic costs of flooding are well established, there has been relatively limited analysis of the commercial impacts flooding can create for developers during construction and sales phases. To help address this evidence gap, Public First modelled a series of hypothetical but realistic scenarios of developments in areas exposed to surface water flood risk. The analysis examined how flooding during construction could affect developers financially, including through remediation costs, delays to construction and sales, impacts on pricing and financing costs. It also assessed whether integrating relatively low-cost property-level flood resilience (PFR) measures during construction could help reduce those impacts across different development types.

The scenarios assessed included a large-scale development in the East of England, a medium-scale development in the East Midlands, and a smaller dense urban development in London. Together, these scenarios reflect a range of development types, delivery timelines and market conditions – as shown in Table 1 and 2. Our core assumption across the scenarios is that a flood event occurs mid-way through the development phase, when half the homes are built but just 30% are sold (largely off plan) or occupied and so much of the financial implications sit with the developer.⁶ This represents a single point within the development process and is intended as an illustrative example of the types of commercial exposure developers may face, rather than a representation of risk across the full development lifecycle.

The scenario parameters then assume knock-on effects and costs, including residual property flood damage, devaluation in sales price (as occurs in the existing home market), delays to construction, retrofitting homes, delays to sales, and potential litigation costs from current and future homeowners – these assumptions are fixed across the scenarios. The modelling assumes that wider site mitigation and drainage measures are already in place and provide some protection, but that residual flooding still causes some property damage, reflected in conservative cost estimates. Both the average selling price and annual probability of flooding vary in line with official estimates for the local area.

⁶ Hamptons, *Off-plan sales index*, May 2025.

The analysis compared these financial impacts against the upfront cost of installing PFR measures during construction. Rather than modelling a specific package of interventions, it assumes a £1,000 investment would reduce flood-related damage and wider costs by 50% – a relatively conservative assumption of PFR effectiveness. The modelling does not seek to estimate the total costs of flooding across all housing developments, nor is it intended to function as a formal impact assessment. Rather, it is intended to provide an indication of how residual flooding can affect development viability and delivery during construction and sales phases.

Table 1: Development scenarios – location, scale, duration, average selling price, and flood occurrence

	Case study 1	Case study 2	Case study 3
Location	Central Bedfordshire, East of England	Leicestershire, East Midlands	Lewisham, London
Development scale	500 units	200 units	50 units
Duration of construction	3 years	2 years	1.5 years
Average selling price	£541,300	£406,600	£602,800
Site completion upon flood event	50%	50%	50%
Number of homes sold on plan	30%	30%	30%

Source: Public First analysis. More details provided in the Annex.

Table 2: Additional scenario parameters – fixed and variable

Core impact parameters - Fixed	Input
Construction start	2026
Average cost of construction of a house unit	£249,034
PFR cost per dwelling	£1,000
Cost of PFR retrofit to a new build	£10,555
Average cost of flood damage per home	£32,000
Average devaluation in house value where flooded	25%
Delays in construction completion	12 months
Additional construction cost due to delays	20% of remaining construction cost
Delays to sales	30% of construction duration
Litigation costs per unit	£4,150
PFR effectiveness	50%
Risk adjustment factors - Variable	Input
Annual probability of flood	Weighted average of areas with probability of > 1%

Source: Public First analysis. More details provided in the Annex.

The modelling suggests positive commercial returns across different development types

Under central assumptions, the modelling found that relatively modest upfront investment in PFR measures could help avoid materially larger downstream costs associated with flooding during development. Across the scenarios assessed, developers could save around £2.27 in avoided losses for every £1 invested in PFR measures.

This benefit-cost ratio (BCR) is calculated by first estimating the potential commercial impacts on a development if a single flooding event were to occur during the construction and sales period. Across the scenarios assessed, estimated losses ranged from around £12 million to over £90 million. These losses are then adjusted to reflect the likelihood of a flooding event occurring, using local surface water flood risk data for each scenario as well as assumptions about the effectiveness of PFR measures in reducing flood-related impacts. The adjusted avoided losses are then compared against the upfront cost of installing PFR measures during construction.

The resulting benefit-cost ratio therefore represents the estimated commercial return developers could receive from resilience investment under different development conditions. Put simply, benefit-cost ratio above one indicates that the estimated avoided losses from PFR are greater than the cost of installing the measures.

The analysis examined three illustrative development scenarios across England, reflecting different scales of development, build-out periods and market conditions – as shown in Table 3.

Table 3: Costs and benefits of PFR, by case study

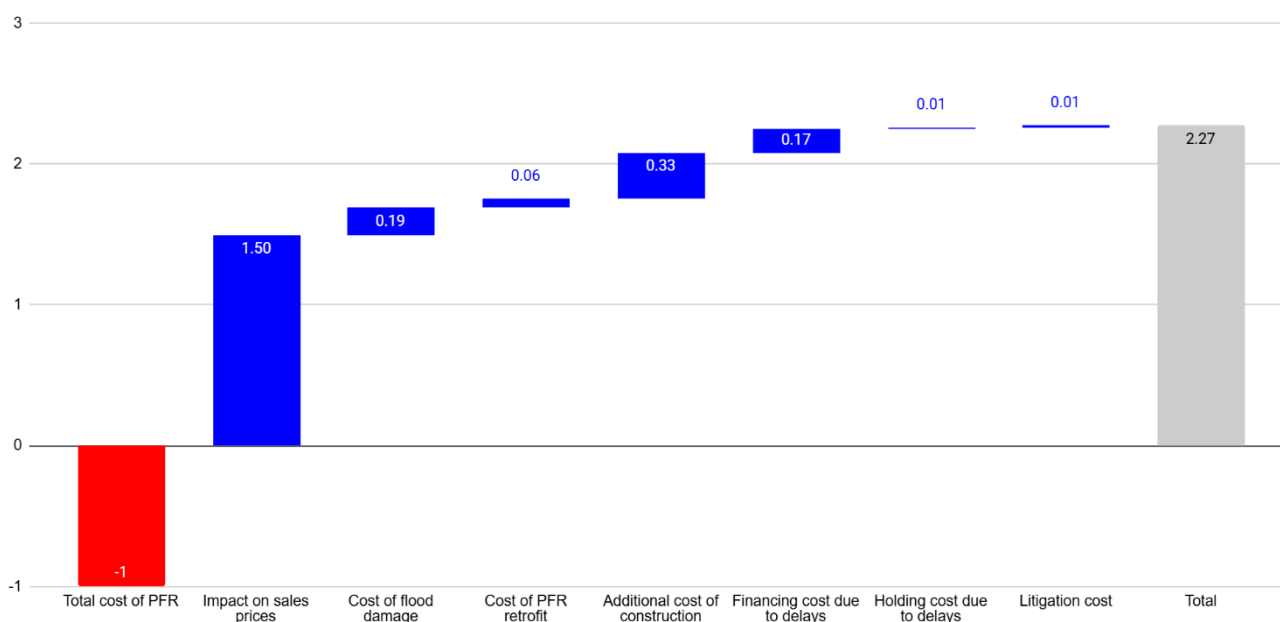
	Case study 1	Case study 2	Case study 3
Location	Central Bedfordshire, East of England	Leicestershire, East Midlands	Lewisham, London
Development scale	500 units	200 units	50 units
Weighted average local surface flood risk	2.40%	2.10%	2.10%
Estimated total cost of damages/avoided losses	£91.44m	£27.63m	£12.11m
Estimated adjusted cost of damages/avoided losses	£1.10m	£0.29m	£0.13m
Estimated cost of PFR*	£0.48	£0.20m	£0.05m
Benefit-cost ratio	2.27	1.48	2.57

Source: Public First analysis. More details provided in the Annex. *Cost of PFR assumes net present value.

The findings show that, across all scenarios, developers see a BCR of at least 1.5. This is largely driven by the avoided losses from the impact on sales prices (66%), the remediation cost of flood damage (8%), and additional construction costs from development delays (15%). Figure 1 illustrates the breakdown of the benefit-cost ratio in more detail for the Central Bedfordshire, East of England large development scenario.

This scenario models a 500-home development over a three-year construction period. Under central assumptions, the modelling estimated that total losses of a single event could amount to £92 million, with adjusted losses of around £1.10 million. PFR installation costs £0.48 million – accounting for the net present value – producing a benefit-cost ratio of 2.27.

Figure 1: Break down of benefit cost ratio of PFR for Central Bedfordshire development scenario



Source: Public First analysis. More details provided in the Annex.

The second scenario modelled a 200-home development in Leicestershire delivered over a two-year construction period. In this scenario, a single flood event occurring while the development was still under construction was estimated to create total commercial impacts of around £28 million before adjusting for the likelihood of flooding occurring.

Once adjusted for local flood risk and the assumed effectiveness of PFR measures, the modelling estimated avoided losses of around £0.20 million compared with installation costs of around £0.20 million, producing a benefit-cost ratio of 1.48.

Dense urban developments have higher PFR commercial returns

The third scenario modelled a 50-home development in Lewisham. Although smaller in scale, the modelling suggested that a single flood event during construction could still create commercial impacts of around £12 million before adjusting for the likelihood of flooding occurring.

In denser urban developments, delays and disruption can have significant implications for construction sequencing, contractor scheduling and active sales activity. Where homes are being marketed and sold

while construction is ongoing, even relatively localised flooding can create wider commercial pressures beyond the direct costs of physical damage itself.

After adjusting for local flood risk and the assumed effectiveness of PFR measures, the modelling estimated avoided losses of around £0.13 million compared with PFR installation costs of around £0.05 million, resulting in a benefit-cost ratio of 2.57. The analysis suggests that resilience measures may generate particularly strong relative returns in denser urban developments where programme disruption can quickly translate into additional commercial costs.

The findings suggest resilience investment could increasingly support development certainty

The analysis suggests that relatively modest resilience investments made during construction may help reduce some of the wider commercial disruption flooding can create during build-out and active sales periods, particularly in developments exposed to higher levels of surface water flood risk.

Across the scenarios modelled, much of the commercial exposure came not simply from the direct costs of flood damage itself, but from the knock-on effects flooding can create while developments are still under construction and homes remain on the market. Delays to construction and completions can increase financing and holding costs, while disruption during active sales periods can affect buyer confidence and pricing assumptions for unsold homes.

As surface water flood risk becomes more prominent across parts of the country, these issues are likely to become increasingly relevant to development certainty and long-term asset resilience. This may be particularly important for larger phased developments, urban regeneration schemes and developments in areas where drainage infrastructure is already under pressure during periods of heavy rainfall.

The role of resilience measures may also become more commercially important as greater attention is placed on flood risk information within housing transactions. The Government is currently consulting on proposals to increase the amount of upfront information provided to homebuyers, including around flood risk. Over time, this could increase the value of being able to demonstrate how developments have been designed to manage flood risk through drainage, wider site mitigation and property-level resilience measures.

The modelling does, however, have limitations. The scenarios are illustrative and rely on assumptions regarding flood probabilities, buyer responses, construction delays and the effectiveness of resilience measures. Some impacts, particularly reputational effects and future insurance market changes, are also difficult to quantify fully. Nevertheless, the findings provide an indication of how flooding during construction can affect development economics in practice, and how relatively low-cost resilience measures may help reduce some of the associated commercial risks over time.

Wider benefits of PFR investment

While this paper focuses on the commercial case for developers, the wider benefits of flood resilience for households, insurers and government are also substantial.

For households, flooding can create prolonged financial and personal disruption, including costly repairs, temporary displacement and difficulties securing affordable insurance. Surface water flooding alone is estimated to cause around £1.2 billion in annual damages across England, while average repair costs following flooding are estimated at between £45,000 and £75,000 per home. This may become increasingly important in areas where new homes are expected to face greater flood exposure over time, particularly as homes built after 2008 are not eligible for FloodRe.

There are also wider benefits for government and local authorities. More resilient housing may help reduce some of the downstream pressures associated with flooding, including emergency response costs, temporary accommodation needs, infrastructure disruption and recovery works. In areas expected to accommodate significant future housing growth, improving resilience may also help support longer-term confidence in development and insurability.

03 Implications for policy and industry

As surface water flood risk becomes more prominent across parts of England, the analysis in this paper suggests that property-level flood resilience (PFR) measures may have a more important role to play alongside wider drainage and site mitigation strategies in some new housing developments.

The analysis highlights the commercial impact of residual flood risk

The findings suggest that flooding during construction can still create meaningful commercial disruption for developers even where wider drainage and site mitigation measures are already in place. Across the scenarios modelled, much of the exposure came from the wider impacts flooding can have on construction timelines, active sales periods and pricing assumptions for unsold homes.

At present, property-level resilience measures are more commonly considered in developments exposed to river and coastal flooding than in developments exposed primarily to surface water flood risk. Surface water flooding is typically managed through wider drainage and water management measures intended to prevent flooding occurring in the first place.

However, the modelling suggests that residual impacts can still emerge during severe rainfall events, particularly where drainage systems come under pressure. This may become increasingly relevant in urban areas and larger phased developments where construction and sales activity continue over longer periods.

The findings may therefore have implications for how planning policy, Building Regulations and resilience guidance approach residual surface water flood risk in new developments over time.

Relatively modest resilience measures may help reduce wider disruption

For developers, the modelling suggests that relatively low-cost resilience measures integrated during construction may help reduce some of the wider disruption associated with flooding during build-out and sales periods. This is particularly relevant where developments remain financially exposed for extended periods while homes are still under construction, marketed or sold off-plan. In these circumstances, delays to construction, remediation works and disruption to sales activity can quickly translate into wider commercial pressures.

The analysis also suggests that resilience measures may become more relevant to long-term asset resilience and insurability as greater attention is placed on flood risk and resilience across housing markets.

The Government is currently consulting on proposals to increase the amount of upfront information provided to homebuyers, including around flood risk. Over time, this could increase the value of being able to demonstrate how developments have been designed to manage flood risk through drainage, wider site mitigation and property-level resilience measures.

Supporting resilient housing delivery

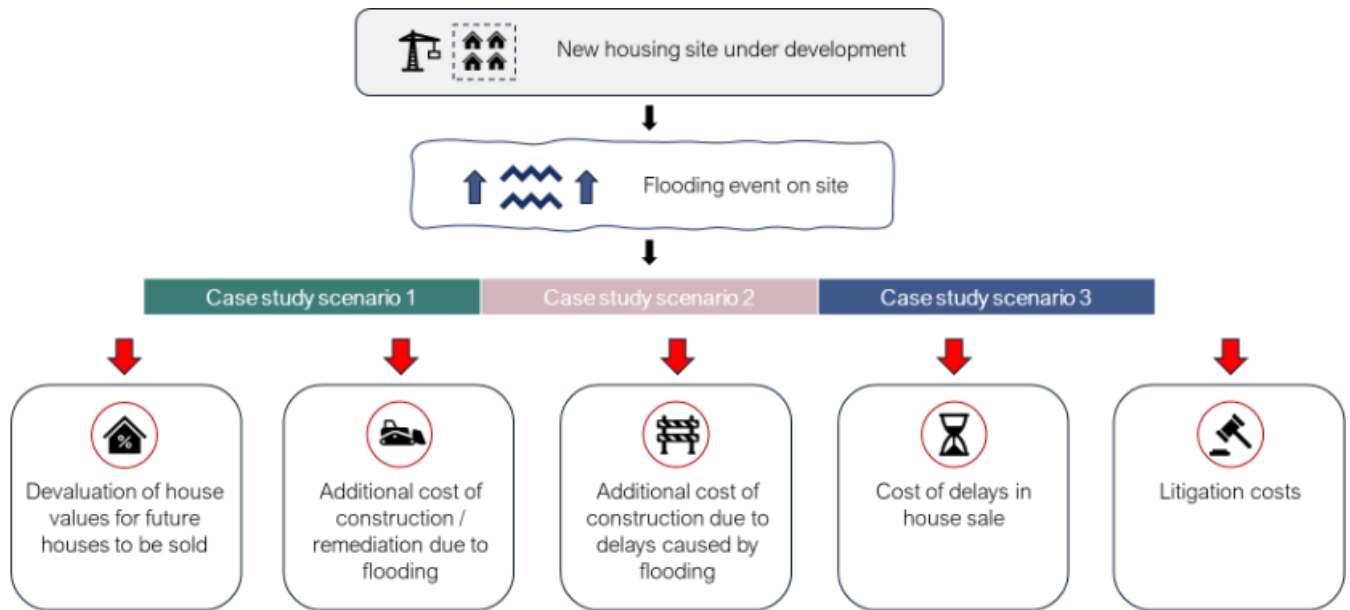
Continued housing delivery in areas exposed to surface water flood risk will remain necessary in many parts of England to support economic growth and meet long-term housing demand.

The findings in this paper suggest there may be an opportunity for industry and government to work together pragmatically to support resilient housing delivery in these areas. This is likely to require continued focus on effective drainage and site mitigation measures, alongside consideration of where property-level resilience measures may help reduce residual risks during extreme rainfall events.

04 Annex

The Annex sets out the methodology of the economic analysis in more detail, including the approach to quantifying economic impacts of PFR, the benefit-cost ratio calculation, the scenario parameters and findings, and evidence sources informing the assumptions.

Approach to quantifying economic impacts of PFR



Benefit-cost ratio calculation

$$\text{BCR} = \frac{\text{Total avoided losses} \times \text{Flood probability} \times \text{PFR effectiveness (50\%)} \times \text{Present value factor}}{\text{PFR cost per home (£1,000)} \times \text{Number of homes} \times \text{Present value factor}}$$

WHAT'S INCLUDED IN "TOTAL AVOIDED LOSSES"

A	B	C	D	E	F
Impact on sales prices	Cost of flood damage	PFR retrofit cost	Additional construction cost	Cost due to sales delays	Litigation cost
Flood probability Location-specific average likelihood of a flood event	PFR effectiveness Assumed at 50%: share of costs a PFR system prevents	Present value factor Using standard 3.5% discount rate over development and sales period	BCR > 1 The investment saves more than it costs		

Case Study 1: Central Bedfordshire, East of England parameters and findings

Main scenario parameters:

- Location: **Central Bedfordshire**
- Development scale: **500 units**
- Duration of construction: **3 years**
- Average new built selling house price: **£541,356**
- Flooding event occurrence as % of completion: **50%**
- Local likelihood of flooding event: **2.40%**

Category	IMPACTS <i>£m 2026, discounted prices</i>
Impact on sales prices	£60
Cost of flood damage	£7.7
Cost of PFR retrofit	£2.5
Additional cost of construction	£13.3
Financing cost due to delays	£6.8
Holding cost due to delays	£0.3
Litigation cost	£0.4
Total savings to developers	£91 million

	Central parameters	Flood risk 3%	Flood risk 1%
Total adjusted impact*	£1,097,287	£1,472,934	£457,203
Total cost of PFR	£482,704	£482,704	£482,704
Total NPV	£614,583	£888,905	-£25,501
BCR	2.27	2.84	0.95

*Adjusted for flooding likelihood and PFR effectiveness

Case Study 2: Leicestershire, East Midlands parameters and findings

Main scenario parameters:

- Location: **Leicestershire**
- Development scale: **200 units**
- Duration of construction: **2 years**
- Average new built selling house price: **£406,632**
- Flooding event occurrence as % of completion: **50%**
- Local likelihood of flooding event: **2.10%**

Category	IMPACTS <i>£2026, discounted prices</i>
Impact on sales prices	£17
Cost of flood damage	£3.1
Cost of PFR retrofit	£1.0
Additional cost of construction	£3.8
Financing cost due to delays	£2.2
Holding cost due to delays	£0.3
Litigation cost	£0.2
Total savings to developers	£28 million

	Central parameters	Flood risk 3%	Flood risk 1%
Total adjusted impact*	£290,089	£217,913	-£58,362
Total cost of PFR	£196,500	£196,500	£196,500
Total NPV	£93,589	£258,443	-£44,852
BCR	1.48	2.11	0.70

*Adjusted for flooding likelihood and PFR effectiveness

Case Study 3: Lewisham, London parameters and findings

Main scenario parameters:

- Location: **Lewisham**
- Development scale: **50 units**
- Duration of construction: **1.5 years**
- Average new built selling house price: **£602,835**
- Flooding event occurrence as % of completion: **50%**
- Local likelihood of flooding event: **2.10%**

Category	IMPACTS <i>£2026, discounted prices</i>
Impact on sales prices	£8
Cost of flood damage	£0.8
Cost of PFR retrofit	£0.26
Additional cost of construction	£2.2
Financing cost due to delays	£0.8
Holding cost due to delays	£0.04
Litigation cost	£0.05
Total savings to developers	£12 million

	Central parameters	Flood risk 3%	Flood risk 1%
Total adjusted impact*	£77,710	£181,610	£60,537
Total cost of PFR	£49,417	£49,417	£49,417
Total NPV	£85,060	£132,193	£11,120
BCR	2.57	3.68	1.23

*Adjusted for flooding likelihood and PFR effectiveness

Sources:

Average selling prices: [HM Land Registry, Price Paid dataset, 2025 data](#), using average selling prices of new build homes by local authority

Average cost of construction of a house unit: [The Housing Forum, The cost of building a house, 2024](#), using the central estimate of £242,000 for an average-sized three-bedroom semi-detached house in the easiest possible setting. Price uplifted to most recent available values using the [ONS Construction Inflation Index](#).

PFR cost per dwelling: The DEFRA PFR working group has established a package of “no-regrets” PFR measures costing c£1,000 that would comprise additional waterproof membrane to provide additional protection into the cavity wall insulation to a set height, non-return valve on waste pipes, self-closing air-bricks and the elimination of water ingress points below a set wall height.

Cost of PFR retrofit to a new build: based on internal data provided by Gleeson Homes for a range of case study applications

Average cost of flood damage per home: The Environment Agency’s Property Flood Resilience page sets out clear numerical evidence showing the scale of damage to non-resilient homes. In 2014, the average cost of repairing a flooded 3-bed semi-detached home was £30,000, and repair costs for water-damaged areas can range from £1,505 to £3,672 per square foot, depending on the level of saturation and material types. These figures show the financial burden when homes lack PFR. With resilience measures installed, the EA states that properties recover significantly faster, with reduced repair costs and reduced time out of the home. In 2025, the estimated average claims cost is up to £70,000.

Delays in construction completion: UK homeowner case studies show displacement reduced from 12–15 months to days/weeks ([National PFR E-Mag Case Studies](#)) for homes equipped with PFR, we assume a similar delay in being able to restart construction after flooding in the event of PFR.

Additional construction cost due to delays: based on a survey conducted by Cornerstone Projects on the [Costs & Reasons for Delays in Construction Industry Projects](#), suggesting that delays can cost the companies up to 20% more than the estimated cost.

Terraced house (Worcester)	
Year: 2020 Cost: £45,000	Without PFR
Year: 2022 Cost: £0	With PFR

Small, Victorian terrace (York)	
Year: 2000 Repair Cost: £80,000	Without PFR
Year: 2015 Repair Cost: £5,000	With PFR

For the study, Public First selected a conservative £32,000 average reduced cost damage thanks to PFR, in line with ongoing work on PFR in Building Regulations impact assessment and value for money assessment.

Average devaluation in house value where flooded: [Beltrán et al. \(2019\) Repeat-Sales Model, England](#). Context: England properties 1995–2014, repeat-sales analysis. Findings: Immediately after actual flooding, property prices were 21–25% lower compared with similar houses not inundated. This discount tends to diminish over time if no further flooding occurs. Suggests actual flooding events can have a much larger short-term effect than baseline risk mapping alone. This directly informs the avoided devaluation assumption of 25% in the model. This evidence is complemented by [Expected devaluation in property prices following a flood](#) - Skouralis, A. (2024) — “Does flood risk affect property prices? Evidence from a property-level flood score” (working paper / City, University of London / Journal of Housing Economics submission). Empirical evidence that properties at flood risk sell at an average discount of 8.1%, with much larger discounts (32%) for “very high risk” properties. Our analysis precisely focuses on very high risk properties (between 1%-3% flooding event likelihood)

Delays to sales: Empirical housing-market research in both the UK and internationally shows that properties affected by flooding or known flood risk experience reduced market liquidity, including longer selling periods, lower transaction volumes, and pricing discounts. These effects are amplified following highly visible flood events due to buyer stigma, financing friction, and concerns regarding future insurability and resaleability. In the case of a new development being flooded we estimate that to be 30% of the initial construction time.

Litigation costs per unit: limited evidence on litigation costs to developers related to post-sale flooding events, especially in the instance where they complied with planning rules. However, existing case of £4,150 compensation figure for flooding-related distress and household reports costs based on a case study by [New Homes Quality Board](#).

PFR effectiveness: Public First used 50% as a central, conservative mid-point assumption for PFR effectiveness based on the [Flood Re / University of the West of England \(UWE\) Evidence Review for Property Flood Resilience – Phase 2 Report](#) which identifies that:

62% of properties in one study avoided any floodwater ingress — implying near-zero damage for those events. If even a part of the “resilience-only” homes avoid water entry, average damage across the full portfolio drops dramatically.

For those homes that do get inundated, the research indicates substantial mitigation of damage (less structural harm, less contents damage, easier clean-up) — potentially reducing costs by 50–90% depending on water depth, velocity, and package quality. The review does not always give a single “% reduction” number but provides a range; 50% sits firmly in the middle of that range and is a defensible “central” value.

Considering both avoidance of water entry and reduced damage when inundation occurs, a 50% reduction in expected loss per event (averaged across all homes) is a reasonable, evidence-based working assumption.

Probability of flooding: estimates are based on selected location of case studies and corresponding residential properties at risk of flooding from surface water using DEFRA [Risk of Flooding from Surface Water](#) dataset. We estimated the weighted average flood risk for properties in medium risk (>1% flood risk) and high risk (>3% flood risk) areas to be used as our central assumption of the local flood risk.