May 2026

Well-Adapted UK Adaptation investment analysis

Climate Change Committee

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20 May 2026

This report is available online at: www.theccc.org.uk/publications.

Contents

Acknowledgements

The Committee would like to thank:

The team that prepared this report and its analysis, led by Emma Pinchbeck, James Richardson, Richard Millar, Olivia Shears, Ariana Jessa and Freddy Curtis; and included Owen Bellamy, Kim Dowsett, Ruth Gregg, Esther Harris, Rachel Hay, Gemma Holmes, Sarah Nelson, Andrew Romang, Karina Rodriguez Villafuerte, Rachael Steller, Indra Thillainathan, Emma Vause, and Hannah Williams.

Our advisors for this analysis: Professor Elizabeth Robinson and Paul Watkiss.

Organisations and individuals who carried out research to support this report, including the supplementary analysis from Paul Watkiss Associates.

Introduction

The Climate Change Committee's (CCC) Well-Adapted UK Report (2026) for the Independent Assessment of the Fourth Climate Change Risk Assessment (CCRA4-IA) sets out proposed targets and identifies key adaptation actions required to achieve a well-adapted UK across 14 systems. This includes an indicative estimate of the scale of investment required to deliver a number of actions identified in these systems. The analysis in this report builds on the Investment for a Well-Adapted UK Report (2023), which provided high-level investment estimates across five key areas: flooding, public water, housing retrofit, nature restoration, and infrastructure. This report provides an up-to-date assessment of the investment needs for climate change adaptation in the UK, based on evidence in the CCRA4-IA Well-Adapted UK Report.

The investment in adaptation across the UK would need to be around £11 billion per year (range £7–22 billion, 2025 prices), across the actions costed for this analysis. The key actions requiring this investment are cooling, flood protection, and water management. Analysis of the likely funding sources for this investment indicates roughly even contributions from the public and private sectors. This report sets out further details of how these estimates are derived.

Quantified investments cover key actions across seven systems (health, built environment and communities, public services, water and wastewater, transport, land, and economy and finance) where sufficient evidence is available to provide an estimate.* It draws on a mix of bespoke commissioned analysis and a wide range of external data sources and benchmarks. Key actions from the Well-Adapted UK Report were selected by assessing evidence on cost and effectiveness from literature, commissioned research projects, and stakeholder engagement.

The actions costed in this analysis are not exhaustive of all the adaptation actions required in a system to achieve the proposed objective and targets set out in the Well-Adapted UK Report. This covers actions with sufficient evidence available to make meaningful estimates on the scale of investment. There are likely to be further adaptation investment needs in other systems (cultural heritage, energy, waste, digital and telecoms, sea, food security, national security and international engagement) but currently there is insufficient evidence to quantify them meaningfully. There are also likely to be further investment needs to address difficult-to-quantify, systemic, and catastrophic risks. Some important adaptation actions will not require large investment, such as behavioural changes, and are not covered in this analysis of investment needs.

* Wastewater actions were not able to be assessed in this analysis

Chapter 1: Analytical approach

This chapter outlines the analytical approach to the Well-Adapted UK Adaptation investment analysis and the analysis of likely funding sources, including key assumptions, limitations, and evidence gaps for future research.

1.1 Approach to investment analysis

The investment analysis is conducted on seven systems in the Well-Adapted UK Report (2026), using a variety of evidence sources and key assumptions.[1] The analysis focuses on capturing known actions with the highest expected investment needs and is intended to provide a credible first step to assessing the total investment required for adaptation.

- **Evidence sources for the analysis:** the analysis covers key actions at a UK-scale where there is strong enough evidence to support an indicative assessment of the investment needed. For most systems, the analysis takes key actions from the Well-Adapted UK Report and scales investment from a unit cost to meet the proposed targets in the report. The analysis uses evidence from external literature and bespoke research commissioned for CCRA4-IA.
  - Sources include externally commissioned and third-party research, planned government investment, and academic literature. There is a level of uncertainty in these assumptions, including unit costs, the scale of deployment required, and the share of investment that can be attributed specifically to climate change adaptation. Future analysis could improve on this with bespoke damage and adaptation modelling which uses consistent approaches, sources, and underlying assumptions.
  - The Climate Change Committee (CCC) commissioned bespoke analysis looking at adaptation to heat in the built environment, healthcare system and farmed landscapes, flood risk, and to water scarcity in private water supply. The commissioned research projects modelled a cost-effective adaptation package at a UK-scale to manage risks over the present-day, 2030s, and 2050s. The cost-effective packages from these commissioned research projects were used to indicate the investment needs for the health, built environment and communities, and water and wastewater systems. Further details on these projects are set out in Annex 2 of the Well-Adapted UK Report.
  - The land and transport systems are analysed through external research. This research estimates the cost of adaptation through appraising existing policies and plans and applying climate-proofing uplifts from literature. Details of the approach, and findings are provided in a supplementary research report.[2]
- **Scope of adaptation investment:** this analysis aims to identify only the additional investment required to adapt assets to the climate hazards experienced in the UK under a 2°C warming by 2050 scenario. In this analysis, investment refers to operating and asset replacement costs as well as capital investment in new assets.
  - The maintenance expenditure required to keep systems performing at today's standard in the absence of climate change is not included. Non-climate-related maintenance and upgrades, such as addressing the existing backlog of pothole repairs, are not included.
  - This analysis focuses on domestic adaptation and excludes extraterritorial actions such as international climate finance (ICF), which are nonetheless critical for the UK's

contribution to tackling climate change around the world and improving global climate resilience.

  - Adaptation actions can be new investments (for example, cooling centres) or additional investment to make existing plans, processes, and assets resilient to climate change (for example, upgrading the standard of existing flood defences to account for future flood risk levels).

- **Format of the results:** the analysis evaluates adaptation investment over the appraisal period from the present-day to the 2050s. This aligns with the Committee's advice to the Government on using 2050 as a time horizon for adaptation objectives.[3]

  - Investments are presented at the UK-level – consistent with the UK-wide scope of the Well-Adapted UK Report. Where evidence sources are nation-specific, costs are scaled to derive UK-level estimates (see Chapter 3 for details).

  - All investments presented are undiscounted and are presented as an annual average over the period. All investments are real in 2025 prices, and do not account for future inflation.

  - In line with HM Treasury Green Book guidance, the analysis applies optimism bias uplifts to reflect the potential for underestimation in capital expenditure.[4]

  - The ranges provided demonstrate a plausible lower and upper bound investment for the systems and actions analysed. This range is established through a variety of sensitivities – including lower and upper estimates for optimism bias as appropriate. The central estimate reflects the most plausible assumptions rather than the mid-point of the upper and lower bound. Chapter 3 sets out the sensitivities used in each system.

  - This analysis does not estimate the level of investment in adaptation happening today. There are limited robust estimates of current adaptation spending in the UK, which prevents an understanding of the gap between current and required spending.

    - This analysis does include estimates of the investment to deliver existing plans where possible, for example, the adaptation actions set out in Ofwat's Fourth Climate Adaptation Report[5].

  - Actions are grouped by system, and the values represent the aggregated investment estimates of the actions included in the analysis. Not all actions required for a well-adapted system have been costed. The investment figures do not include a proxy for missing costs and should not be interpreted as comprehensive system-level estimates.

1.2 Approach to funding source analysis

The likely funding source of each action – public or private sector – is estimated through using historical data and assumptions on current industry spending norms and aggregated at the system-level. The analysis aims to be an indication of how this investment could be allocated across the economy. Actual choices on investment levels are for governments, businesses and households to make.

Actions are allocated as likely to require public funding (which includes all levels of government including local, devolved, and reserved actors), private funding (which includes businesses and households), or undetermined if there was insufficient evidence to determine funding source. The analysis does not cover likely sources of financing that may be used to enable an investment to proceed.

- The funding mix of planned investment in the UK infrastructure pipeline from 2021 to 2025 is used to allocate likely funding sources for flood defences and transport.[6]

- For actions outside of this coverage, the existing funding structures in the system are used to indicate the likely source of funding.

  - For the health system, most actions are assumed to be publicly funded. However, the analysis assumes that private hospitals and care homes (which make up approximately 19% of hospitals and 80% of care home beds) will privately fund their cooling adaptation.[7;8]

  - For the built environment and communities system, all residential and commercial cooling is assumed to be privately funded apart from the 16% of residential building stock that is social housing.[9]

  - Investment in the water system aligns to the privatisation of the industry by nation. Therefore, all investment in public water supply in England and Wales is assumed to be funded privately through water companies or billpayers. Public water supply actions are considered public expenditure in Scotland and Northern Ireland. Private water supply actions, in industry, energy and agriculture, are assumed to be privately funded across the UK.

  - Actions in the public services system are predominantly allocated to public funding, except for privately run hospitals, care homes and schools.

  - Investment in the economy and finance system is assumed to be funded by businesses and financial institutions, except for the costs of an information-provision programme to inform businesses of adaptation requirements, which are assumed to be government funded.

- Where there was insufficient historical evidence to split between public or private investment, actions are tagged as undetermined. For example, the land system has both significant private funding flows (such as through market goods like food sales), and public flows (such as public money for nature restoration). This makes the likely funding source for future adaptation investment unclear.

1.3 System coverage

Table 1.1 below summarises the coverage of investment costs that have been estimated in this analysis, across the 14 systems of the Well-Adapted UK Report, and the confidence level associated with each estimate.

Table 1.1
Systems in scope for the Well-Adapted UK Adaptation investment analysis

System	Confidence in approach	Details
Health	High	Almost all actions are included due to strong alignment between actions in the Well-Adapted UK Report and evidence from commissioned research.
Built environment and communities	High	Investment in almost all actions outlined in the Well-Adapted UK

		Report is estimated due to strong alignment between actions and evidence from commissioned work.
Public services	Low	Many actions are estimated with very high uncertainty due to limited data availability, particularly over the condition and uptake of adaptation in public buildings and services, and the difference in the investment required to adapt these buildings relative to residential or commercial buildings.
Cultural heritage	Not estimated	Insufficient evidence to obtain estimates of required investment across actions.
Water and wastewater	High (for water)	Strong alignment between actions set out in the Well-Adapted UK Report and evidence from commissioned work (for private water supply actions) and publicly available data from water regulators. Insufficient evidence on attribution of actions in the wastewater subsystem to adaptation.
Energy	Not estimated	Insufficient evidence to obtain estimates of required investment across actions.
Transport	Medium	Investment estimated through external analysis.[10] Some evidence of climate proofing uplifts are applied from literature to estimate investment needed across rail and road.
Waste	Not estimated	Insufficient evidence to obtain estimates of required investment across actions.
Digital and telecoms	Not estimated	Insufficient evidence to obtain estimates of required investment across actions.
Land	Medium	Investment estimated through external analysis.[11] Some actions are costed using literature and estimates of the cost required to deploy existing government targets on biodiversity.
Sea	Not estimated	Insufficient evidence to obtain estimates of required investment across actions.

Food security	Not estimated	Insufficient evidence to obtain estimates of required investment across actions.
Economy and finance	Medium	Primarily focuses on the investment required to put in place enabling conditions for businesses and financial institutions. This does not include the investment of businesses, financial or government institutions implementing adaptation actions within the scope of this system.
National security and international engagement	Not estimated	Insufficient evidence to obtain estimates of required investment across many actions. Investment in international climate finance (ICF) was excluded, as it was considered out of scope for domestic adaptation investment.

1.4 Limitations

This analysis provides an order of magnitude guide of the overall investment scale, which can be helpful to compare to other priorities and investment in the wider economy. It should be treated as a rough guide for relative needs for adaptation and the likely breakdown between public and private money required. There are some key limitations:

- **This analysis does not cover all investment needs.** As set out above, not all systems have sufficient evidence to allow estimates. Cross-cutting actions and enablers, such as climate data services, are also not included in this analysis.
  - The Well-Adapted UK Report primarily identified key actions to manage known and semi-quantifiable risks. Therefore, this analysis does not account for investment required to manage systemic, catastrophic risks and difficult-to-quantify risks, where clear evidence on effective action is limited.[12] These types of risk could make up a large share of the damages from climate change in the UK.[*;13]
- **The analysis focuses on actions that are most readily costed.** These actions are predominantly engineered or physical measures, or actions that manage well-understood future risks. Many adaptation actions are low-cost and low-regret and can be embedded within existing processes and plans.
- **In practice, the investment needs, scale of deployment, and benefits of adaptation will vary by place and context.** The cost and effectiveness of actions will likely evolve over time, which could lead to significant variations in estimates. Therefore, these results are not suitable for use in detailed analysis on specific actions or business cases.
- **There is insufficient evidence to estimate a robust annual investment profile**. Most of the estimates included in this analysis do not have robust delivery timelines or spending

[*] Rising, J. et al (2026) suggests missing and catastrophic risk could lead to economic damages of around 3% as a share of GDP in 2041-2060, under a low mitigation baseline scenario which is considered in our 'above 3°C by 2100' scenario range.

trajectories. However, rising climate risks and long lead times for many actions mean that early investment is essential to manage increasing risks and avoid higher costs in the future.

As an indicative analysis, this assessment is intended to provide a guide to the potential scale of investment needed across the economy to adapt to climate risks. There are some similar efforts to estimate the investment that would be needed to deliver national adaptation plans. For example, Germany has estimated current adaptation spending, and France conducted an assessment of adaptation investment needs in 2022.[14;15] Further evidence is needed to develop a more comprehensive estimate of the investment needed for adaptation across the UK.

1.5 Areas for future research

This analysis identified areas for future research to improve understanding of the required investment to adapt to climate change in the UK. Key gaps include those for whole systems (particularly energy and food security) and gaps within systems where partial costing has been possible (such as gaps covering wastewater, ports, and adaptation for businesses). The analysis has also not been able to cost the full extent of adaptation investment in some infrastructure systems (such as airports in the transport system) and the public estate (for example, other public buildings such as job centres). These are areas where required adaptation investment is relatively unknown but could be substantial. Areas for future analysis include an assessment of the current state of buildings and assets across the UK, current spending and uptake of adaptation measures, and projections of future demand for adaptation.

Chapter 3 provides further information on key evidence gaps for each system.

Chapter 2: Key findings

This chapter sets out the key findings from the investment and funding source analysis.

2.1 Overall investment

The investment analysis finds:

- **Across the costed actions in this analysis, the investment in adaptation across the UK would need to be around £11 billion per year (range £7–22 billion, 2025 prices).** This is equivalent to around £380 billion over 2025–2059. The annual level is roughly equivalent to 2% of the annual investment in the UK in 2025 (such as in residential housing development or construction of new factories).[*;16] Whilst this represents a significant mobilisation of investment, it remains feasible for an economy of the UK's size. The marginal costs of adaptation could decrease as adaptation scales, although there is currently limited evidence for this. Investment will vary significantly at the local scale, as climate change risks and adaptation are place specific.

- **The largest share of the investment evaluated for this analysis is likely to come from investment in cooling, flood protection, and water management.** As shown in Table 2.1, roughly two-thirds of these investments can be attributed to three broad categories of actions: passive and active cooling (35% of total investment), flood risk management (21% of total investment), and water storage, efficiency and demand-side measures (11% of total

[*] As measured by total Gross Fixed Capital Formation (GCFC), which was estimated at £547 billion in 2025 (seasonally adjusted chained volume measures, identifier NPQT).

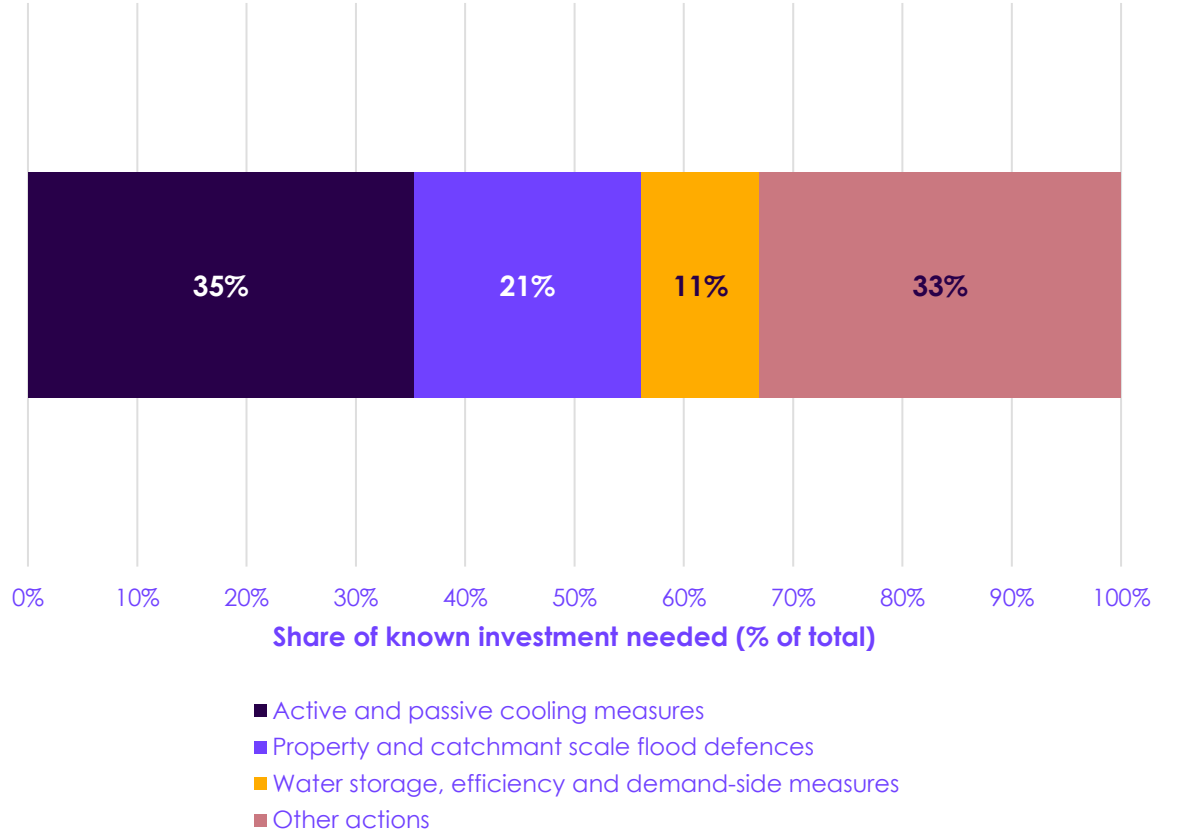
investment). Other key actions driving this estimate include climate-proofing rail infrastructure (9% of total investment) and the cost of meeting biodiversity targets (6% of total investment) (Figure 2.1).

Table 2.1
Known investment needs for a well-adapted UK for key actions by system

System	Central estimate	Lower bound estimate	Upper bound estimate
Built environment and communities	£5.4 bn	£3.4 bn	£10.7 bn
Transport	£1.8 bn	£0.9 bn	£3.7 bn
Water	£1.2 bn	£0.9 bn	£2.6 bn
Land	£1.0 bn	£0.7 bn	£1.7 bn
Health	£0.7 bn	£0.7 bn	£1.7 bn
Public services	£0.5 bn	£0.2 bn	£1.1 bn
Economy and finance	£0.4 bn	£0.4 bn	£0.5 bn
Total	**£11 bn**	**£7 bn**	**£22 bn**

Source: CCC analysis.
Notes: (1) This analysis includes the known actions included as a part of the investment analysis for a well-adapted UK. This compiles evidence from a range of literature estimates and bespoke analysis and is not comprehensive of all systems and actions referenced in the Well-Adapted UK Report (2026). (2) The central estimate reflects the most plausible assumptions and best available evidence for each component within the investment range and does not represent the mid-point of the upper and lower bound. (3) Values are presented in £ billions, as an undiscounted annual average over 2025-2059, in 2025 prices.

Figure 2.1 Known investment needs for adaptation



Description: Two-thirds of the known investment needed for key adaptation actions comes from three actions: cooling measures, flood risk management, and water storage and efficiency.
Source: CCC analysis.
Notes: (1) This analysis includes the known actions included as a part of the investment analysis for CCRA4-IA. This compiles evidence from a range of literature estimates and bespoke analysis and is not comprehensive of all systems and actions referenced in the Well-Adapted UK Report. (2) Property and catchment scale flood defences include both engineered and natural flood management. (3) The 'Other actions' category consists of the remainder of actions costed for this analysis, the largest share of which are: climate-proofing rail infrastructure (9%) and meeting biodiversity targets (6%).

2.2 Likely funding sources

The analysis on likely funding sources finds:

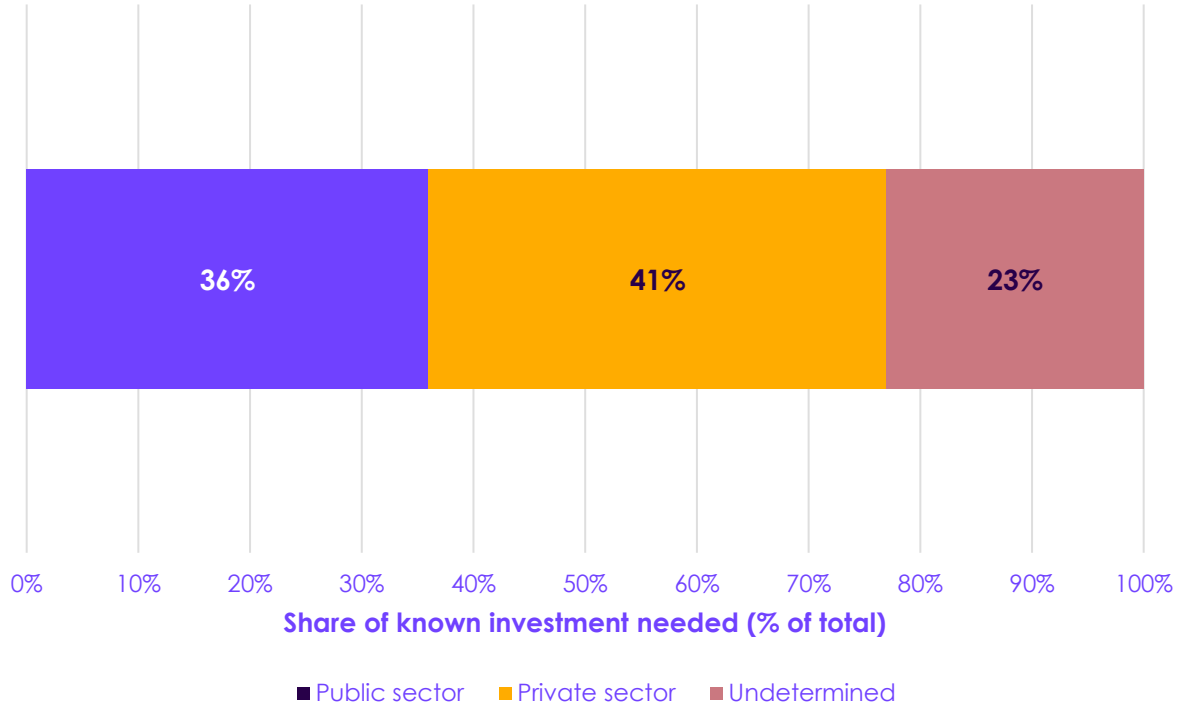
- **The allocation of these costs to public or private entities is ultimately a political choice.** This analysis uses the historical allocation of capital projects and industry structures to make assumptions about where this cost may be allocated. The indicative funding sources are not necessarily representative of how government or private actors (for example, businesses and households) may choose to invest in adaptation.

- **Current funding norms would lead to roughly even contributions from the public and private sector.** An assessment of the current funding norms of similar actions in each system shows that approximately 36% of this investment is in areas usually funded by the public sector, with 41% likely to fall within private sector delivery, and 23% undetermined.

- **The majority of private investment is expected to be in the water, economy and finance, and built environment and communities systems.** This analysis also estimates that the public services system and health system will require the largest shares of public adaptation

investment. Almost half (45%) of investment needed in areas with a clear government role already has some level of public commitment, such as for flood risk management. However, many of these commitments lack associated funding pipelines to deliver action.

Figure 2.2 Known investment needs for adaptation across likely funding sources



Description: The investment assessed for this report could require roughly even contribution from the public and private sector.
Source: CCC analysis.
Notes: (1) This analysis includes the known actions included as a part of the investment analysis for a well-adapted UK. This compiles evidence from a range of literature estimates and bespoke analysis and is not comprehensive of all systems and actions referenced in the Well-Adapted UK Report (2026). (2) Investment split is informed where possible, by the funding share for capital projects from 2021–2025 National Infrastructure and Construction Pipeline (2021) and otherwise by the privatisation structure of the industry.

Chapter 3: Estimates by system

The sections below include the method of estimating the investment for key actions, organised by system including a summary of the approach taken for each included system, key evidence gaps, and future research. The largest cost drivers in each system are highlighted below in Table 3.1.

Table 3.1
Largest cost actions by system

System	Actions with the biggest contribution to system level estimate
Health	Active and passive cooling of healthcare buildings, and preventative outreach.
Built environment and communities	Active and passive cooling for residential and commercial buildings, flood risk management.
Public services	Active and passive cooling of public buildings.
Water and wastewater	Supply and demand-side management in public water supply.
Transport	Climate proofing the UK's rail and roads network.
Land	Protecting land for biodiversity.
Economy and finance	Climate risk disclosure by businesses.

3.1 Health system

3.1.1 Summary

The analysis estimates that the investment required to deliver key actions set out in the Well-Adapted UK Report (2026) health system is £0.7 billion per year (2025 prices), with a range £0.7 billion–£1.7 billion.

3.1.2 Approach to analysis

Most actions are evaluated using evidence from the commissioned work estimating cost-effective adaptation to extreme heat on health and health services at a national scale. [17] The actions requiring the largest share of the investment include preventative outreach to vulnerable groups during heatwaves and active cooling in healthcare settings. Other measures include cooling public spaces, heat advice, and heat-health plans (information services to adapt behaviours and business continuity plans to deal with increased absences during periods of heat stress). The share of healthcare buildings with heat pumps that can be used for cooling is aligned to the CCC's Seventh Carbon Budget (2025) estimates for non-residential public buildings.[18]

Funding source analysis

Most of this investment (93%) is expected to come from the public sector, while the remaining 7% is assumed to be privately led. The share of the investment that is privately funded is apportioned

from the total investment to the 19% of private hospitals and around 80% of privately run care home beds. [19;20]

3.1.3 Evidence gaps

Limited evidence exists on the investment or the scale required to retrofit the NHS building stock for heat risk through active and passive cooling. There is currently no public data available on the physical condition and current cooling capacity of the NHS buildings estate at a UK-scale, given the range of sizes, ages, and varied conditions of buildings. As a result, estimates of the investment required to retrofit health and social care buildings for rising heat risk are uncertain.

There was also insufficient evidence to estimate the investment required to reduce the increased risk of vector-borne diseases due to climate change. This includes improving surveillance and supporting infrastructure for vector-borne diseases to prevent and detect endemic and future climate sensitive infectious diseases by enabling public bodies to react in real-time to detections.

3.1.4 Sensitivity tests

To test uncertainty within our estimates, a series of sensitivity analyses are conducted that generate a total annual investment range of £0.7 billion–£1.7 billion per year (2025 prices).

The range is produced through testing the differing investment levels for cooling identified by the commissioned research, the building-stock method, and demand-based method conducted for this analysis (Box 3.1).

3.2 Built environment and communities system

3.2.1 Summary

The analysis estimates that the investment required to deliver key actions set out in the Well-Adapted UK Report (2026) built environment and communities system at £5.4 billion per year (2025 prices), with a range of £3.4 billion–£10.7 billion.

3.2.2 Approach to analysis

The main actions in the built environment and communities system are passive and active cooling across residential and commercial buildings, and catchment and property-scale flood defences to reduce the impacts of coastal, fluvial, and surface water flooding.

Actions for cooling

The analysis estimates the investment required for residential passive cooling using the cost-effective package from our commissioned work on heat risk and adaptation in the urban built environment.[21] This research identifies a UK-scale adaptation package for reducing the impacts of heat on mortality and on productivity in the urban built environment. The adaptation package also seeks to reduce productivity losses at work through installing active cooling in indoor workplaces. This was modelled as rolled out to the 30% of urban areas that experienced the highest monetised heat-related mortality and productivity loss in the 2022 heatwave event. Passive cooling measures include loft insulation and internal blinds. The investment required to deploy this package across residential and office buildings is roughly £1 billion per year (2025 prices).[22]

Active cooling in all commercial settings was not in scope for the commissioned work on urban heat, as the project only analysed office settings. Therefore, a building stock-based approach was

used to estimate cooling in non-office commercial buildings, using the same unit cost assumptions (Box 3.1).

Box 3.1
Approach to active cooling investment estimate

The analysis deploys a level of rollout of active cooling in buildings (across residential, non-residential commercial, and non-residential public buildings). Evidence on the current and future uptake of active cooling and the distribution of different cooling technologies is limited. Therefore, the following assumptions are made:

For residential and office buildings: cooling rollout and investment is estimated using data from the commissioned work on heat risk and adaptation in the urban built environment for CCRA4-IA.[23] The total investment for deploying active and passive cooling in the 30% highest risk regions across the UK is estimated to be £1 billion per year.[24] The adaptation package contains predominantly active cooling interventions with low-cost and complementary passive measures.

For commercial buildings and non-residential public buildings (including hospitals): air-to-air and air-to-water heat pumps can provide cooling. This analysis aligns to the same technology mix projected in the CCC's advice on the UK's Seventh Carbon Budget by building type, assuming the remainder of the demand which is not served by these heat pump types will implement more conventional heating, ventilation, and air conditioning systems or units (HVACs).

Two approaches are used to account for the high degree of uncertainty in the data sources and existing cooling in current buildings:

- **Demand-based approach:** estimates on present-day and future cooling demand use the Cooling in the UK report's analysis on non-domestic cooling consumption in 2019, by sector and sub-sector, and project future cooling demand to 2100.[25] Office and residential buildings are excluded to avoid double counting and costs are scaled to the UK-level by building type.
- **Building-stock based approach**: estimates on the cost of rolling out cooling in schools, prisons, police stations, and other public buildings in the UK use typical building and room sizes at the same deployment as the commissioned research on heat risk and adaptation in the urban built environment.[26] This is then scaled to all building types, excluding residential and offices, to avoid double counting.

Actions for flooding

Investment for property and catchment scale flood defences, coastal change management, and adaptation to surface water flooding is estimated using the findings from the commissioned research on investment needed to manage future flood risk. [27] The research explored portfolios of adaptation actions to manage the changing risk of river, coastal, and surface water flooding in the UK resulting from climate change. The research focused on the relationship between investment and different outcomes of future flood risk, including keeping the risk to the same level as today. The portfolio of adaptation actions includes engineered and natural flood management solutions, and both catchment and property-scale measures. Examples of measures include flood defences, increased drainage, property-level measures and early warning systems. Relocation and actions for coastal erosion are not considered in the modelling. The Well-Adapted UK Adaptation investment analysis assumes that all flood adaptation investment falls to the built environment and communities system.

Some actions in the built environment and communities system of the Well-Adapted UK Report were excluded, such as insurance and flood reinsurance, actions for adaptation to coastal erosion, and urban scale green and blue infrastructure for cooling. Insurance actions were excluded as they transfer risk rather than reduce total risk. Urban-scale green and blue infrastructure for cooling was not included in this analysis because of the lack of consistent investment estimates for delivering them for adaptation – for example investment in parks and green space is often allocated to meet other objectives, such as recreation, health, biodiversity, and amenity.

Funding source analysis

Over half (56%) of this investment is estimated to be provided by the private sector, while approximately 25% is estimated to be publicly funded and 19% from undetermined sources using evidence from the funding mix of planned investment in flood defences in the UK infrastructure pipeline from 2021 to 2025.[28] Residential active and passive cooling is assumed to be publicly funded for the 16% of homes that are social housing, while all other residential and commercial cooling is assumed to be privately funded. [29] The analysis assumes that investment in flooding continues to be funded by the public sector. [30] In practice, some funding for surface water flooding adaptation may fall to the water and wastewater system.

3.2.3 Evidence gaps

The estimate of investment needs in this system could be improved significantly by more robust modelling on the level of existing cooling technologies (passive and active) in the current building stock, as well as more consistent costing of green and blue infrastructure for adaptation. Updated projections of demand which account for regional variation and multiple climate scenarios would also improve the estimate.

3.2.4 Sensitivity tests

To test uncertainty within our estimates, the analysis conducted a series of sensitivity tests to estimate a total investment range of £3.4 billion–£10.7 billion per year (2025 prices).

- **Rollout of passive and active cooling:** this analysis tested multiple sensitivities to establish the range for cooling.
  - **Extent of rollout**: the analysis examines a more ambitious rollout of passive and active cooling to residential and office buildings. In our commissioned project, this tests the cost-effectiveness of what may be required to manage more severe global warming. In the upper bound, modelled rollout is extended to the 70% of urban areas that experienced the highest monetised heat-related mortality and productivity loss in 2022, to align with the commissioned project's sensitivity tests. This sensitivity is also applied to commercial (non-office) buildings to establish the upper bound estimate.
  - **Methodology:** the analysis used two methods to estimate cooling uptake (Box 3.1) due to uncertainty and limited evidence on future demand for cooling, implementation costs by building type, and the current uptake of these measures in today's building stock.
- **Flooding adaptation:** the analysis incorporates a range of estimates from the commissioned research on future flood risk for the Well-Adapted UK Report. The research aims to understand the costs and benefits of three adaptation portfolios on future flood risk in the UK. [31] This analysis uses the range of levels of investment identified in this research to estimate the investment required for flooding adaptation in the UK.

3.3 Public services system

3.3.1 Summary

The analysis estimates that the required investment of the key actions in the Well-Adapted UK Report (2026) public services system is around £0.5 billion (2025 prices), with a range of £0.2 billion–£1.1 billion.

3.3.2 Approach to analysis

There is limited readily available evidence on investment required for public services adaptation. Our analysis uses proxies and benchmark in the absence of evidence that is specific to public buildings.

Active cooling was estimated in non-residential public buildings using the building-stock method, applying the methodology to schools, prisons, police and fire stations (Box 3.1). The share of non-residential public buildings with heat pumps which can be used for cooling is aligned to the CCC's Seventh Carbon Budget.

Due to the lack of evidence on the cost of adaptation actions specific to public services buildings, the analysis applies the unit costs of passive cooling measures obtained from the commissioned research on heat risk and adaptation in the urban built environment for CCRA4-IA (blinds and insulation). These are scaled to different public services buildings based on typical building sizes.[*] Cooling in public services is modelled for the 30% of buildings assumed to have the highest heat risk, aligning with the heat risk and adaptation in the urban built environment commissioned work. The analysis also includes modelling deployment of outdoor shading in all schools in England and Wales.

The investment required for additional staff rostering during extreme heat due to increased staff absences in schools, prisons, and emergency services is proxied using the absence rate during days above 28°C in healthcare settings. This absence rate is estimated through the commissioned work estimating cost-effective adaptation to extreme heat on health and health services. [32] To estimate the investment needed, an agency markup to have specialised on-call staff during hot days is applied to the absence rate identified in the commissioned study. [†;33]

This system primarily focused on schools, prisons, and emergency services (such as police and fire rescue services) as this is where the majority of actions in the Well-Adapted UK Report (2026) are targeted. This is not comprehensive of all public buildings and services that may require adaptation.

Elements of early warning systems are not considered a separate line item to avoid double counting, as they are included as a part of the flood risk management investment in the built environment and communities system and the heatwave plans in the health system. Climate data services required to enable an understanding of adaptation are not included in this analysis.

[*] The Heat Risk and Adaptation in the Urban Built Environment report for CCRA4-IA models the cooling adaptation package across the 30% of Lower Super Output Areas (LSOAs) that experienced the highest heat-related productivity and mortality impacts in 2022. In this assessment of the public system, adaptation measures are instead modelled for the 30% of buildings with the highest heat-related risk. Although LSOAs are defined primarily by population rather than building density, using buildings as the allocation basis provides a reasonable proxy for the scale of adaptation reflected in the commissioned report.

[†] Taken as an average of the 40-100% range provided by the source.

Funding source analysis

Investment for public service building is primarily provided by the public sector, except for privately funded schools, which are assumed to privately fund their adaptation.

3.3.3 Evidence gaps

There is no publicly available data on the condition of public buildings in the UK, including their current uptake of adaptation actions, and what adaptation actions are most cost-effective. This limits robust estimation of the investment required for passive and active cooling retrofits across schools, prisons and police and fire stations. This analysis assumes a standardised unit cost of cooling across building types.

3.3.4 Sensitivity tests

To test uncertainty within these estimates, a series of sensitivity tests are conducted to estimate a total investment range of £0.2 billion–£1.1 billion per year (2025 prices).

The analysis considers two sensitivities for cooling in public services. Firstly, by using the building-stock or the demand method (Box 3.1). Secondly, the upper bound includes a more ambitious rollout of cooling measures to 70% of public buildings (in alignment with assumptions used in the built environment and communities system).

3.4 Water and wastewater system

3.4.1 Summary

The analysis estimates that the investment required to deliver key actions set out in the Well-Adapted UK Report (2026) in the water subsystem is £1.2 billion per year (2025 prices), with a range of £0.9 billion–£2.6 billion. The cost of adaptation of the water subsystem can be split into actions for public and private water supply. This does not include actions in the wastewater subsystem.

3.4.2 Approach to analysis

Private water supply actions

Measures to reduce water scarcity impacts in private water supply are evaluated using the commissioned work on cost-effective adaptation in agriculture, power, and industry sectors to private water scarcity. [34] The largest investments in this package of actions include measures to increase private supply, such as building on-site reservoirs and intra-basin water transfers. It also includes actions such as installing roof rainwater collectors, swales, precision irrigation, and creating inland wetlands.

Public water supply actions

The estimated investment for adaptation of public water supply includes actions set out in Ofwat's 4th Climate Adaptation Report, which is an existing spending commitment. [35] The long-term investment of £50 billion in 30 new major water supply infrastructure projects aimed to increase drought resilience is included. Many of these solutions are expected to be delivered over the next 15–20 years. These projects comprise new reservoirs, new transfers, and interconnectors. Investment is scaled to the UK-level by population, and adjusted for differences in demand and leakage. [36] However, not all this investment can be attributed solely to climate adaptation because these projects also address non-climate drivers, such as population growth and ageing assets.

To estimate adaptation attribution, the analysis uses the National Framework for Water Resources 2025, which estimates the impact of nine drivers of the supply-demand balance for public water in 2055. They estimate around 8% of the deficit is attributable to climate change impacts on supply, and 14% is due to increasing drought resilience.[37] These figures are used to establish a range of the investment share of supply-side actions which can be attributed to adaptation. This leads to a range of 8% (considering only climate impacts) to 22% (considering both climate and resilience impacts). Estimates are scaled to the UK-level using population and adjusted for average daily consumption by nation.

To estimate the cost of actions to reduce demand for water, the cost of the behaviour change campaigns outlined in the Water Efficiency Fund, leakage reduction and smart metering, and resilience measures for power-related interruptions are included. [38;39;40] The analysis scales the figures from Ofwat's 2024 price review (PR24) to the UK-level using population and adjusts for consumption and leakage factors. The analysis assumes that future Ofwat price reviews are in line with PR24 after accounting for inflation, in lieu of better evidence. These demand-side measures are existing spending commitments agreed by Ofwat in the 4th Climate Adaptation Report – despite also accruing private benefits, the cost of these actions is fully included in this analysis, as they have a key adaptation role in reducing pressure on a resource-constrained system.[41]

Funding source analysis

To reflect the ownership structure of the industry across the UK, all investment in public water supply is assumed to be private expenditure in England and Wales, and public expenditure in Scotland and Northern Ireland.

3.4.3 Evidence gaps

This assessment did not include the investment required to adapt the wastewater subsystem. The wastewater subsystem covers the infrastructure needed for collecting, transporting, treating, and disposing of used water and stormwater to protect public health and the environment. The share of investment in reducing sewer overflow events that is specifically attributable to climate-change-related drivers is unclear and therefore excluded. Investment in the Storm Overflows Discharge Reduction Plan is expected to cost £60 billion over 25 years, announced in 2022.[42] Some of this investment is likely to be attributable to adaptation, but there is insufficient evidence to quantify.

However, some drainage adaptation for flooding is accounted for in the adaptation to surface water flooding in the built environment and communities system, and allocated in the actions for flooding (see Section 3.2.2).

3.4.4 Sensitivity tests

To test uncertainty within our water supply adaptation estimates, a series of sensitivity analyses are conducted that generate an annual investment range of £0.9 billion–£2.6 billion (2025 prices). These tests vary the proportion of water-supply investment that can be attributed to climate adaptation (as described above).

3.5 Transport system

3.5.1 Summary

The analysis estimates the investment required for the transport system to be around £1.8 billion per year, with a range of £0.9 billion–£3.7 billion (2025 prices).[43]

3.5.2 Approach to analysis

This is based on external analysis conducted for the Well-Adapted UK Adaptation investment analysis. Potential investment required is assessed for road (the strategic road network and local roads) and rail transport modes. The largest contributor to this investment is the adaptation of the UK's rail network, accounting for around half of the total (£0.5 billion–£1.5 billion per year, 2025 prices). [44] This estimate takes current adaptation spending across each nation and applies mark-ups to account for increased future climate risk, which are based on engineering literature on the incremental climate proofing investment needed from project design.

The analysis includes adaptation for the strategic, urban, and local road networks, making up the remaining £0.4 billion–£1.1 billion per year (2025 prices). [45] The full research report provides details on underlying actions, methods, and assumptions.

Funding source analysis

Approximately 75% of this investment is assumed to come from the public sector while the remaining 25% is assumed to come from undetermined sources. This follows the historical funding sources in this system.[46]

3.5.3 Evidence gaps

The research is primarily based on an estimate for the 2030s. That has been extrapolated for later periods to align across systems. However, this is likely an underestimate, as costs are expected to increase over the period.

The analysis did not estimate adaptation investment for aviation, ports, inland waterways, or metro and urban transit systems, nor for the full retrofit needs of existing road and rail assets under a high-climate-change scenario. This is because no published data separates climate-related spending from wider budgets or indicates planned adaptation investment in these sectors.

3.5.4 Sensitivity tests

To inform the overall investment range, the analysis uses the lower and upper bounds of transport system investment estimates provided by the external research.[47]

3.6 Land system

3.6.1 Summary

The analysis estimates the investment required for key actions in the Well-Adapted UK Report (2026) land system to be around £1 billion per year (2025 prices), with a range of £0.7 billion–£1.7 billion.

3.6.2 Approach to analysis

The estimate is based on analysis, undertaken by Paul Watkiss Associates, which estimates the potential adaptation investment required for the UK across biodiversity, peatland restoration, wildfire risk management, and agriculture soil management. [48]

The greatest contributor to adaptation investment in the land system is adaptation for biodiversity. This covers the additional investment required to meet the biodiversity 30 by 30 targets set out in the Environmental Improvement Plan in the period 2030–2042, which aim to preserve biodiversity by 2030 and protect 30% of land in England for Nature. [49] The investment attributed to adaptation is

estimated at £370 million–£560 million per year after being scaled to the UK-scale. This includes terrestrial and coastal biodiversity but excludes marine environments. See the report by Paul Watkiss Associates for a full breakdown of investment and methodology. [50]

Funding source analysis

The land system has both significant private funding flows (for example, through market goods such as food sales), and public flows (for example, public money for nature restoration). This makes the likely funding source for future adaptation unclear. Therefore, the funding is labelled as undetermined in this analysis.

3.6.3 Evidence gaps

The analysis could not estimate the adaptation investment required for adapting to several major risks in the land system. Freshwater ecosystems, pests, diseases, invasive species, existing woodland and wildfire management, and large parts of farmed landscapes were not included due to limited or inconsistent evidence. This analysis is primarily for costs in the 2030s but has been extrapolated to the 2050s to align across systems. As a result, current values are likely to significantly understate the true long-term investment needed to make the land system well-adapted. Relatedly, insufficient evidence on the action required to adapt the food system means that key actions are difficult to identify and require further research.

3.6.4 Sensitivity tests

To inform the overall investment range, the lower and upper bounds of the land system investment estimate provided by Paul Watkiss Associates are used.

3.7 Economy and finance system

3.7.1 Summary

The analysis estimates the investment required for the actions in the economy and finance system of the Well-Adapted UK Report (2026) to be £0.4 billion per year (2025 prices), with a range of £0.4 billion–£0.5 billion. This constitutes the investment associated with enabling businesses to adapt and importantly does not include the business adaptation investment itself. This is primarily because adaptation by businesses differs widely by the size, type and location of a business which limits estimation of adaptation costs. There is likely some business adaptation included in other systems, for example, through cooling and flood protection. These are not included in this system to avoid double counting.

3.7.2 Approach to analysis

The highest-investment action is assessing operational and supply chain risk by businesses, comprising nearly 90% of total system investment. Other actions included pricing climate risks and adaptation in financial institutions and information provision.

Operational and supply chain risk management investment by businesses was based on analysis by the Financial Conduct Authority (FCA). [51] The FCA estimated the spending per business of compliance with proposed climate-related disclosure requirements, which include disclosure of risk management. For this analysis, the spending associated with greenhouse gas emissions reporting is excluded, but the 19% uplift suggested by the FCA analysis in line with a reported increase in investment from companies with strengthened transition plans, is included. [52] This uplift reflects the additional challenges associated with adaptation-related disclosures and planning. These estimates are applied to all companies listed on the London Stock Exchange Main Market.

Investment associated with quantifying climate risks and adaptation by banks and insurers is estimated by the Prudential Regulatory Authority (PRA).[53] The PRA estimated the spending associated with adhering with new supervisory expectations, which updates previous guidance and includes requirements to quantify risks through scenario analysis. These expectations are applied to all PRA-regulated banks and insurers, and define the scope of what is included in this analysis.

Information provision investment is based on the investment associated with a similar information-provision programme run by the Department for Business and Trade (DBT), the 'Made Smarter' campaign. This campaign provides advice and information for digital transformation for UK companies, parallel to adaptation information provision.[54;55]

This analysis did not include the cost of increased capital buffers in our adaptation investment estimates. Capital buffers represent contingency funds held to absorb shocks when climate impacts exceed expected levels. Because drawing down these buffers reflects the cost of climate damages, not the cost of preparing for them, the cost of holding buffers is treated as part of residual risk rather than adaptation spending. Therefore, this analysis focuses on the additional investment needed to make assets resilient and excludes the cost of holding these buffers.

Funding source analysis

Almost all this investment (98%) is assumed to be funded privately. Information provision is the only action that is assumed to be publicly funded.

3.7.3 Evidence gaps

This investment analysis only includes the investment associated with enabling businesses to adapt and does not include the investment of businesses, their supply chains, or financial and government institutions implementing adaptation actions within the scope of this system.

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May 2026

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