ARUP

Building Climate-Resilient Schools

Insights from Arup's Global Education Portfolio

Education Estates

October 2025

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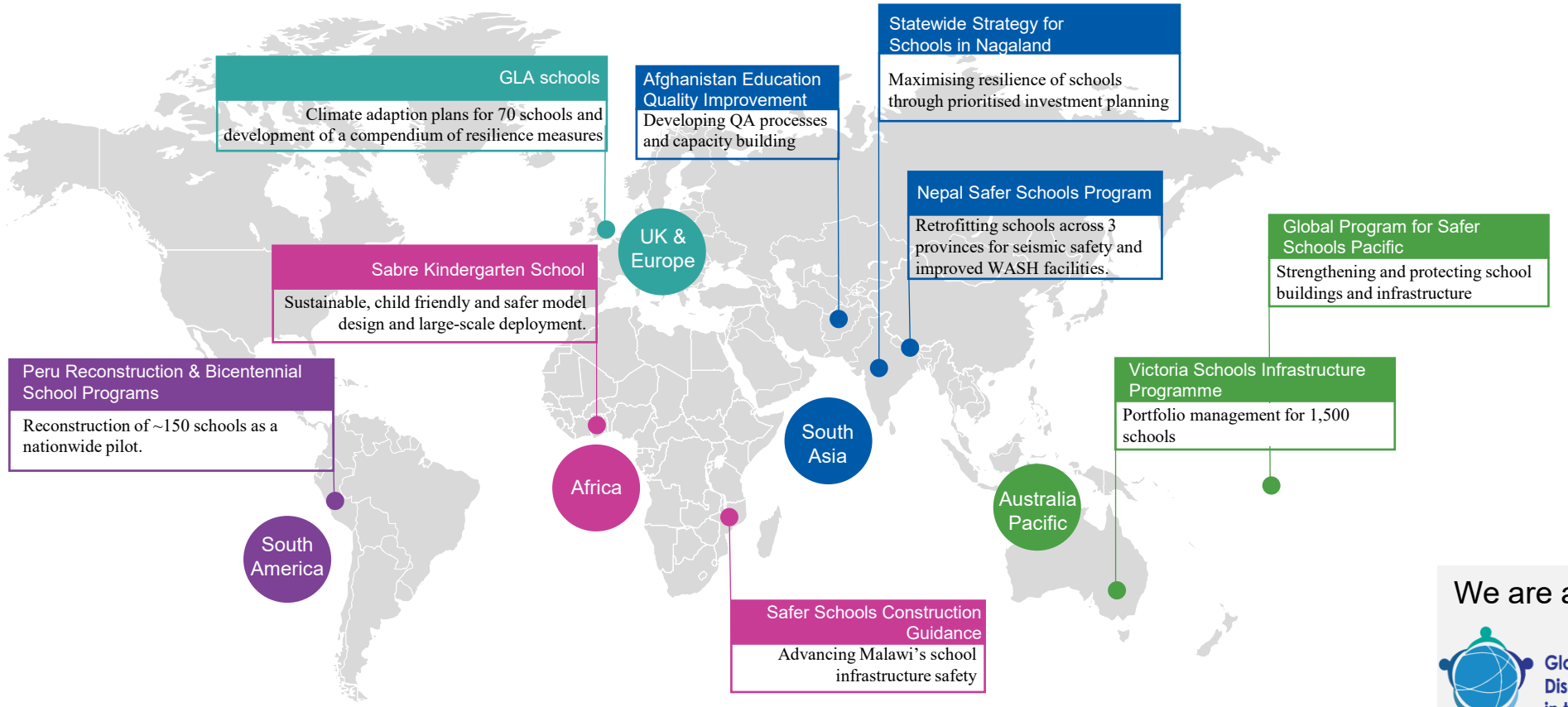
Arup & Education

A brief snapshot of some of our schools at scale projects around the world



75yrs
Experience

6,000+
Schools

128
Countries

We are a member of the:

Global Alliance for Disaster Risk Reduction & Resilience in the Education Sector

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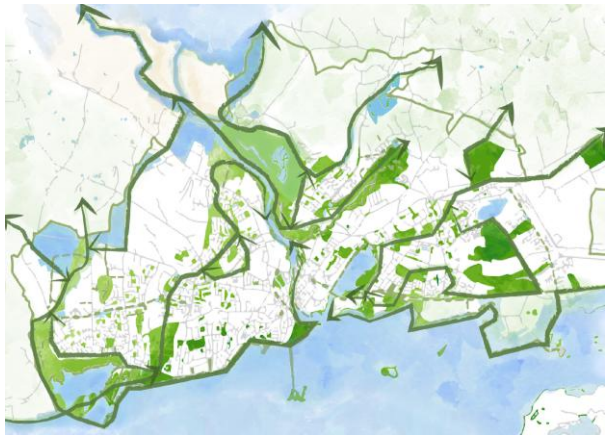
Arup & Climate Services

End-to-end resilience services



Climate Change Risk Assessment

Adaptation and Resilience Strategies

Climate Adaptation Planning

Global Strategic Partnerships

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World Business Council for Sustainable Development

World Green Building Council

World Economic Forum

The Earthshot Prize

UN Global Compact

UN Climate Change High-Level Champions

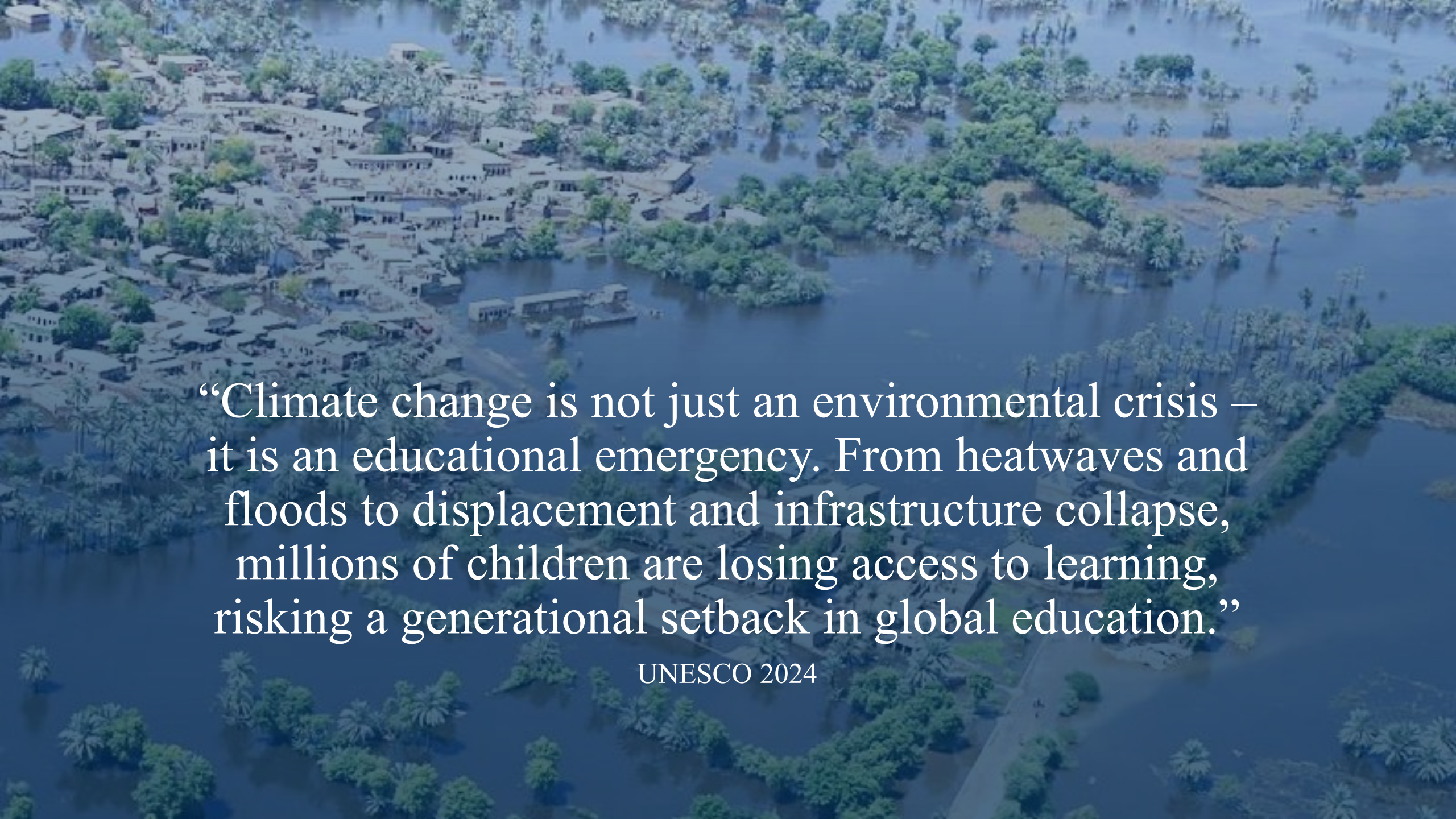
Resilient Cities Network

SIWI

Ellen MacArthur Foundation

Energy Transitions Commission

C40 Cities


“Climate change is not just an environmental crisis – it is an educational emergency. From heatwaves and floods to displacement and infrastructure collapse, millions of children are losing access to learning, risking a generational setback in global education.”
UNESCO 2024

Climate Change in the UK

Heat

Summer 2025 confirmed as UK's hottest on record

Heat deaths in England and Wales could surge 50-fold by 2070s, study warns

Experts say more thought must be given to adapting homes and cities to mitigate against rising temperatures and minimise excess deaths.

Thursday 10 July 2025 22:13, UK

File pic: iStock

Flooding

Schools to close ahead of amber weather warning

Storm Éowyn is expected to bring 90mph winds to parts of the UK

Charlie Buckland
BBC News

22 January 2025
Updated 23 January 2025

Major incidents declared as UK grapples with floods, snow and ice

Anna Lamche
BBC News

6 January 2025

Storms

Extreme weather is the UK's new normal, says Met Office

Many parts of the UK are in the throes of their third heatwave

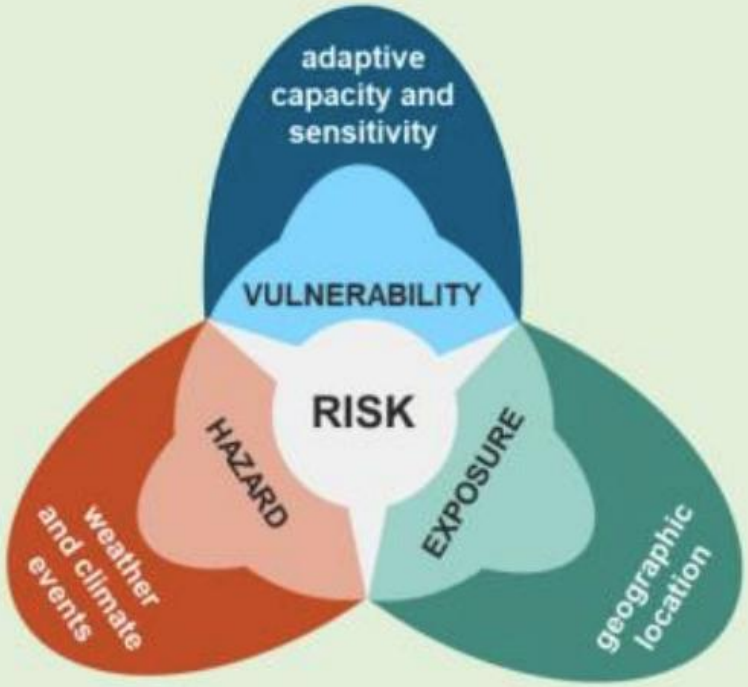
One in four properties at flood risk by 2050 - report

Mark Poynting
Climate and environment researcher

Climate Risk & Resilience

Climate risk
The potential for adverse consequences for human or economical systems, recognizing the diversity of values and objectives associated with such systems…[Climate] risks result from dynamic interactions between climate-related hazards with exposure and vulnerability. (IPCC, 2022)

Climate resilience
Capacity of social, economic and ecosystems to cope with a hazardous event or trend or disturbance. (IPCC, 2022)



In the context of Estates:
Climate Risk = Impacts on Estate (*vulnerability*) x Estate's location (*exposure*) x Climate Hazards

Source: Met Office Local Authority Report

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Climate Adaptation

The changes in processes, practices and assets to mitigate potential risk or to benefit from opportunities associated with climate change. (UNFCCC)

© CAUE de Paris

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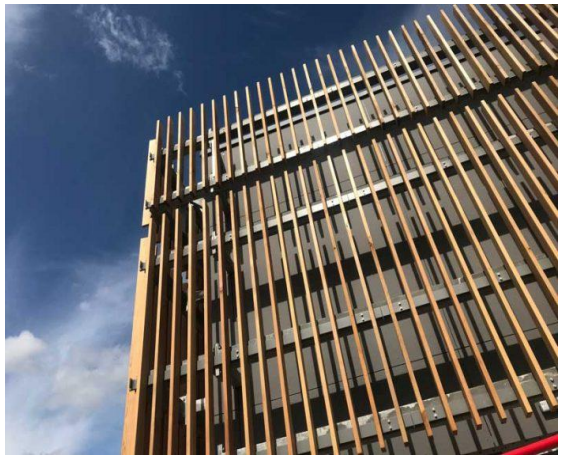
Resilience, Nature and Decarbonisation

Adaptation and resilience measures are required

To respond to climate impacts, schools need a full stack approach:

- Resilience – preparing for and adapting to climate hazards like heat and flooding
- Nature-based solutions – using green infrastructure to cool, absorb water, and support wellbeing
- Decarbonisation – reducing emissions from buildings and operations to mitigate future risks



Climate Resilience & Schools

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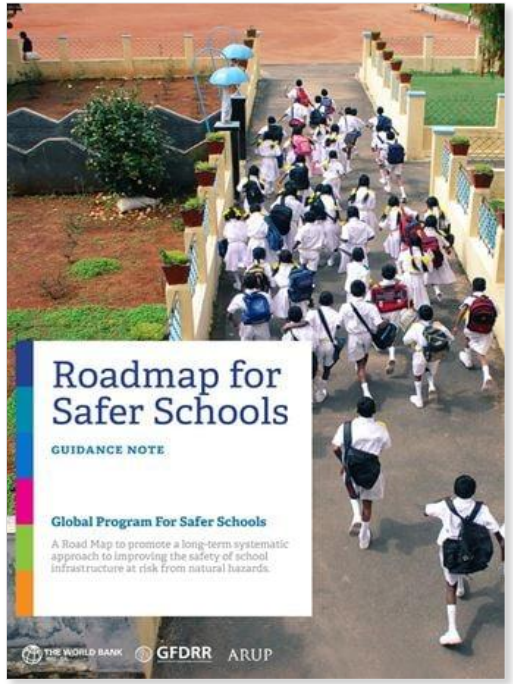
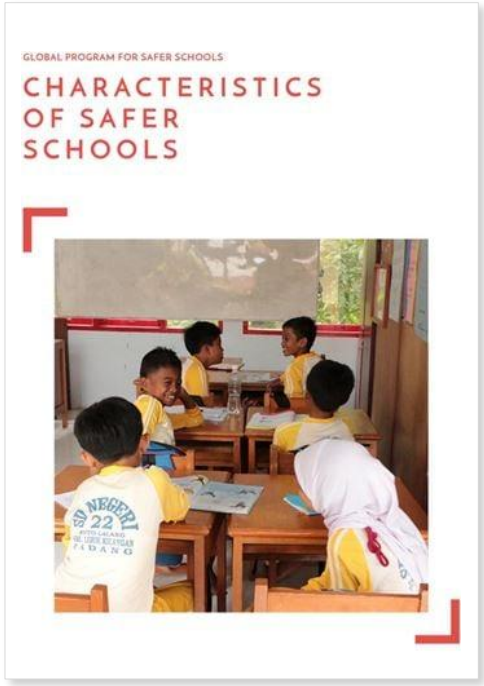
Resilience in Education

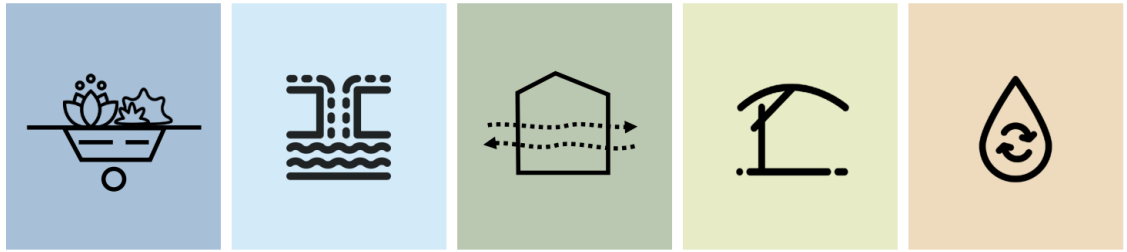
Publications





Library of measures

Compendium of adaptation and resilience measures for schools



Section A
Sustainable Drainage Systems (SuDS) measures

Section B
Hard flood resilience measures

Section C
Ventilation and cooling measures

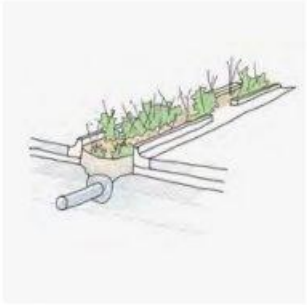
Section D
Solar shading measures

Section E
Water efficiency measures

SCAN ME
ARUP - COMPENDIUM OF MEASURES

Library of measures

Compendium of adaptation and resilience measures for schools



A.1
Rain garden: linear

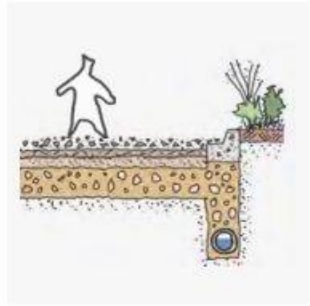
A.2
Rain garden: non-linear

A.3
Swale

A.4
Filter drain

A.7
Wetland

A.8
Permeable surface: grass



A.9
Permeable surface: woodchip

A.10
SuDS rain planters

A.5
Detention basin

A.6
Pond

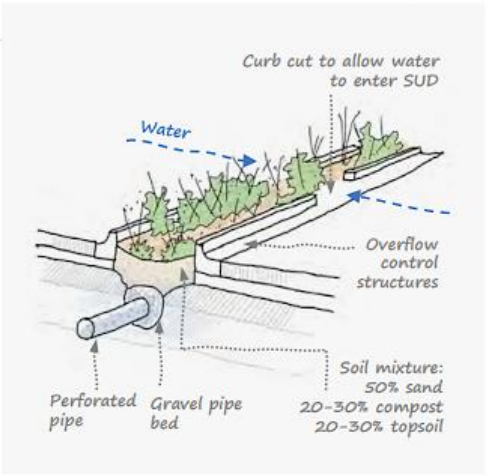
Library of measures

Compendium of adaptation and resilience measures for schools

A.1

Rain garden: linear

Illustrative sketch of measure



Note: Sketches and reference images for illustrative purposes only

Description of measure

Planted linear areas in shallow depressions, with well-draining and engineered soil to encourage infiltration. They help remove pollution as well as reduce surface runoff to reduce the risk of exceeding drainage capacities and causing flooding.

Note: Generic description of measure

Indicative cost of measure

Climate risks addressed
Flood, heat risk

Maintenance requirements
Regular, annual and annual maintenance required - please refer to CIRIA SuDS Manual (C753F)

Co-benefits
Biodiversity, carbon savings and educational opportunities

Indicative capital cost range
£60/m² - £120/m²

Cost assumptions
Costs include for breaking out hard surfaces and making good edging, forming a depression circa 1m deep with an area of circa 25m²: 3m wide by 8m long. Includes all excavation and materials to form new surfaces. Costs include sand layer and filter media layer, as well as soil, seeding and planting and all associated labour. Excludes drainage connections. Costs include for contractor preliminaries, overheads and profit, and risk.

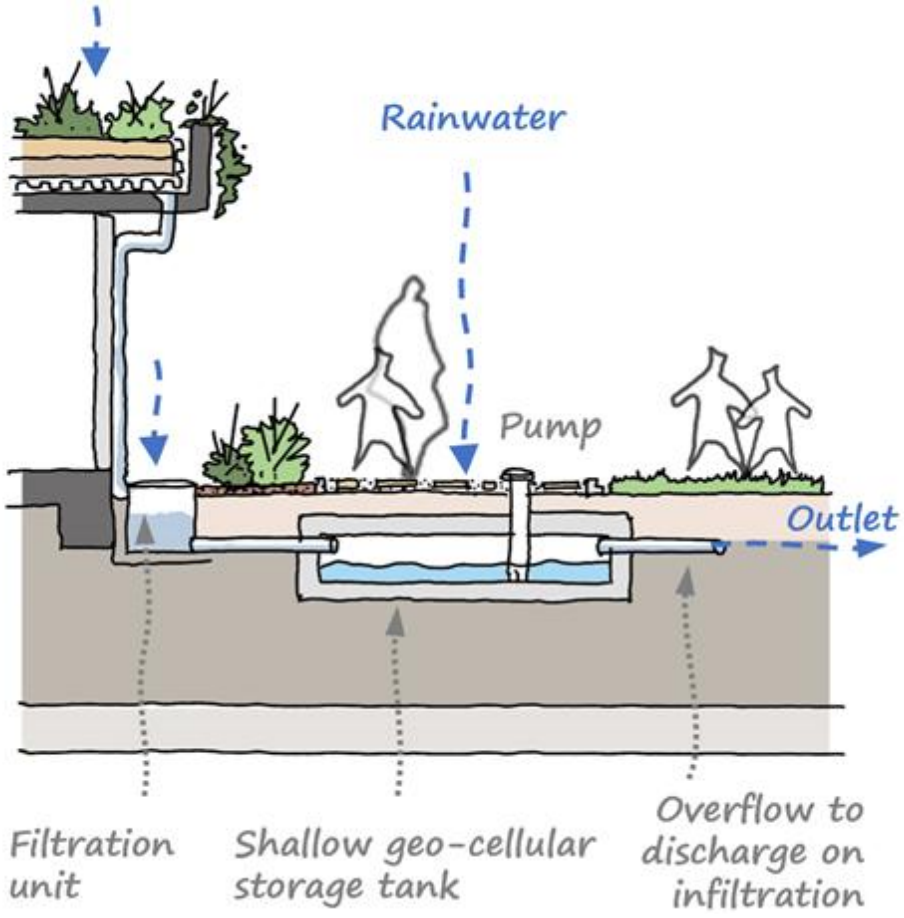
Note: Cost reference for indicative purposes only

SCAN ME

ARUP - COMPENDIUM OF MEASURES

Library of measures

Arup Adapt – Internal library of adaptation measures (live)



Attenuation tanks: below ground

An example of a sketch of a climate adaptation measure, from project tag 007 in the tracker – BAM Climate Adaptation Solutions

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Case studies

Peru Reconstruction with Changes

Camden Schools

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Global Application

Reconstructing Education in Peru

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Peru Reconstruction with Changes Programme

Department for International Trade

UKDT ⟵ G2G ⟶ ARCC

UKDT

ukdeliveryteam

mace ARUP gleeds

International best practice

Knowledge transfer

Supreme decree

ARCC

RECONSTRUCCIÓN CON CAMBIOS

Education

74 schools that will provide education to 47,000 students countrywide annually

Healthcare

15 healthcare facilities that will provide services to nearly 1.5million residents of Peru

Integration Solutions

Flood defence improvements to 17 river basins, 5 gullies and 7 city drainages supported by a national Early Warning System

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Climate Challenge

El Niño's Impact

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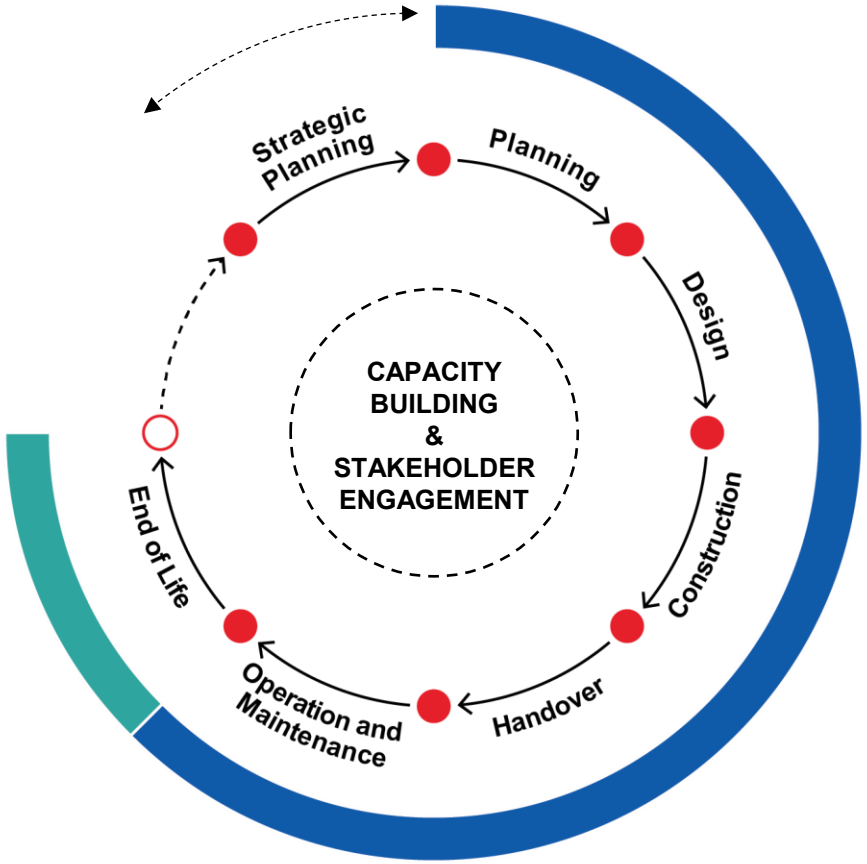
Aging, unfit, vulnerable and exposed schools

Quality Principles



Developing a new standard for schools

Safer and resilient

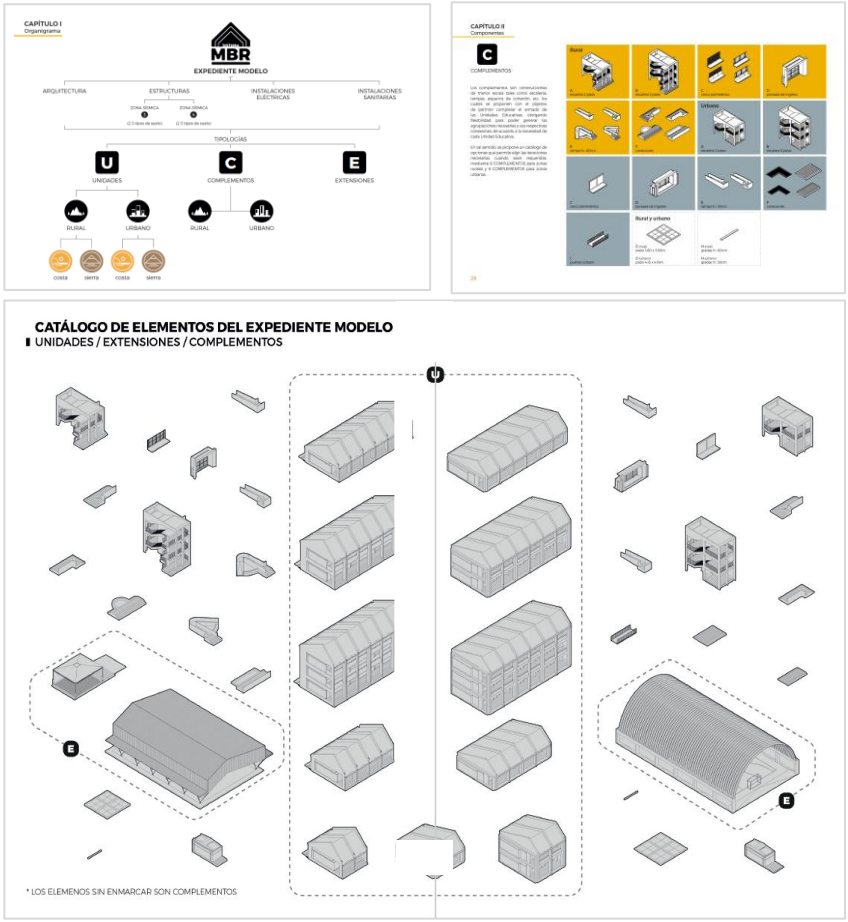
Sustainable

Cultural & social appropriateness

Inclusive, accessible and child-friendly

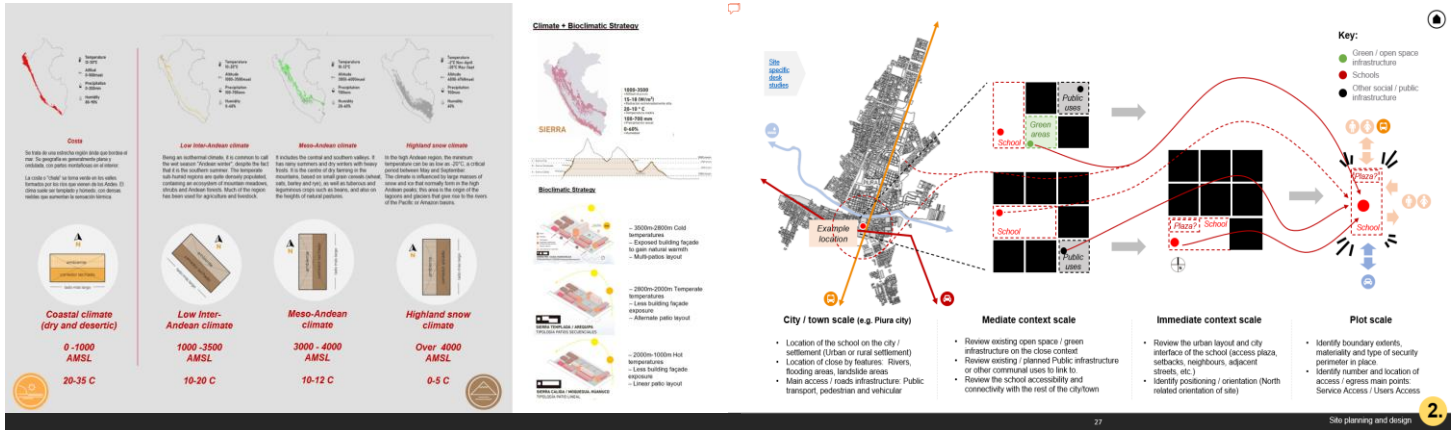
Innovative and compliant

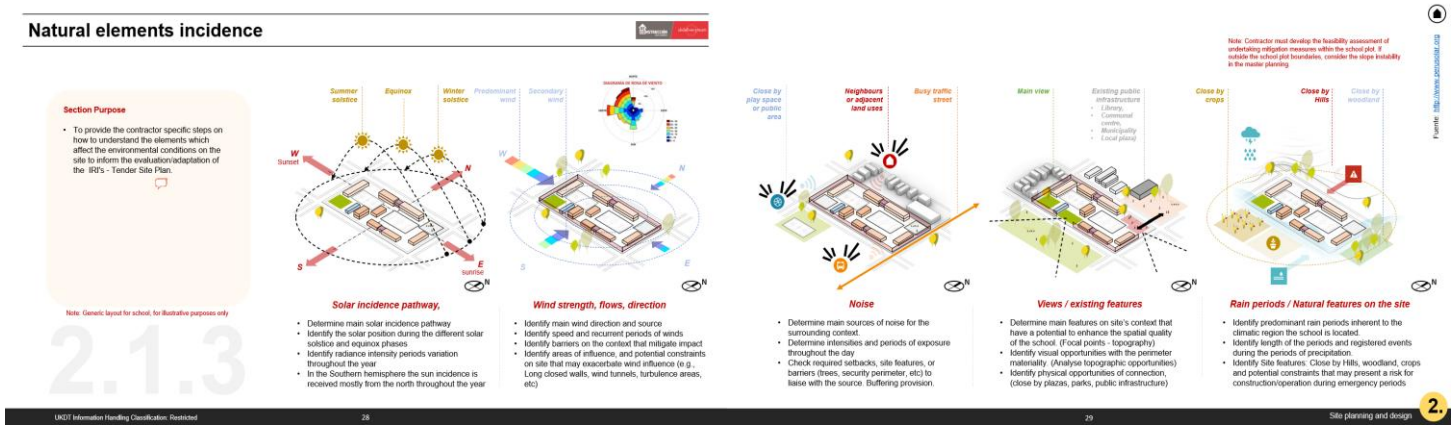
Scalable and replicable



Creating the canvas for success

Clear guidelines and design standards





Context Assessment - Guidelines

From: Planning and Design Guidelines + BoD's

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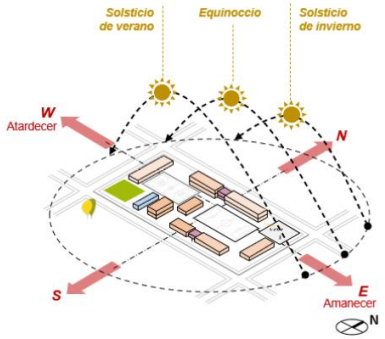
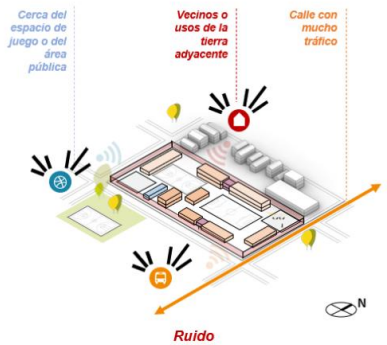
Improved master planning

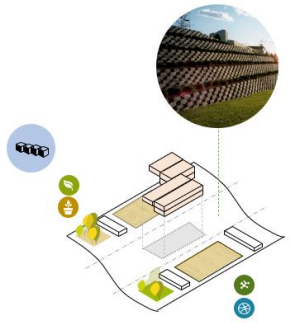


Vía de incidencia solar



Ruido

Vistas / características existentes




Sustainable


Cultural & social appropriateness

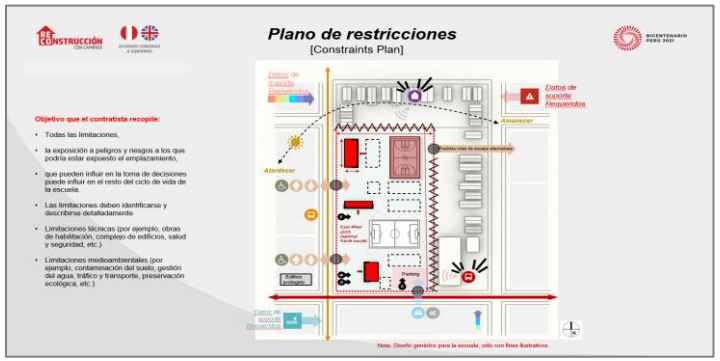

Safer and resilient


Inclusive, accessible and child-friendly

Standard Process to Deliver Better

Guidelines for constraints and opportunity assessment

UKDT Generic Constraints identification guidelines

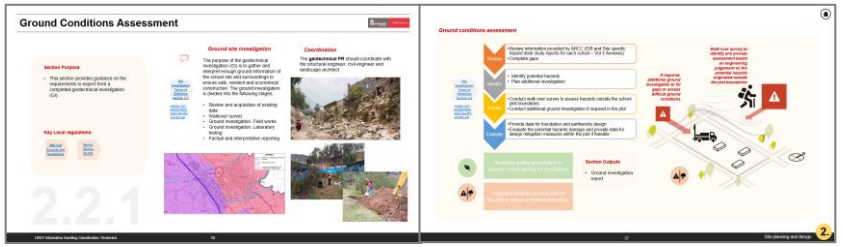


UKDT Generic Opportunities identification guidelines

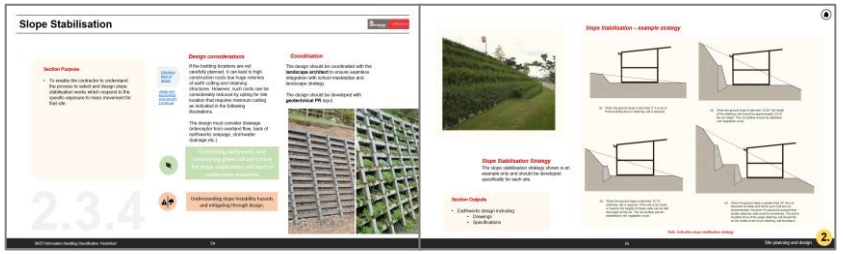
+

Toolkit for mitigation + design principles

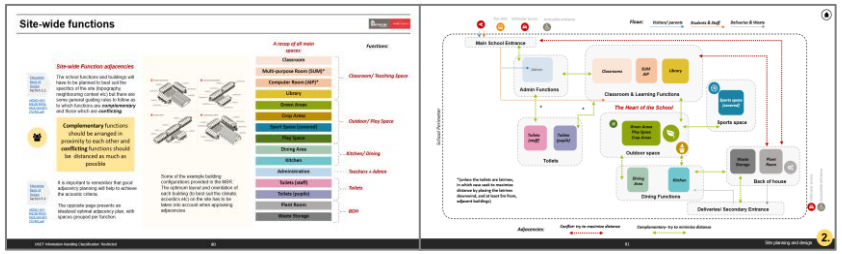
Grounds conditions assessments



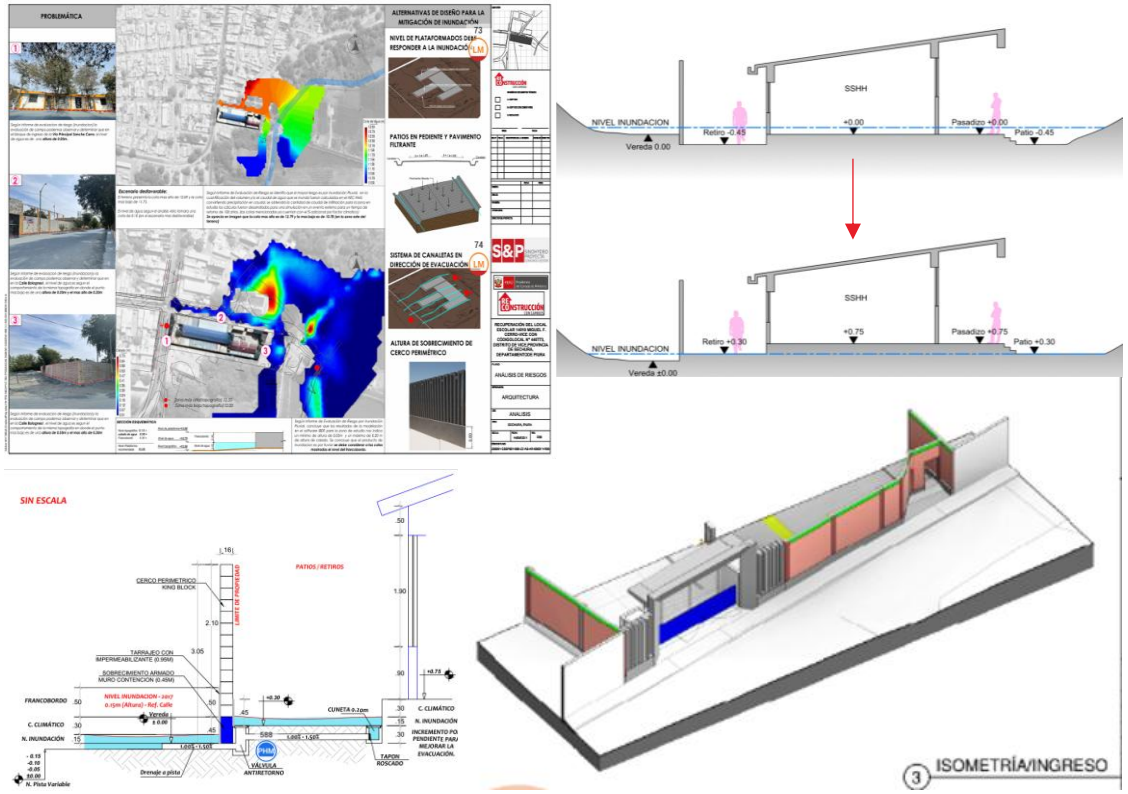
Slope stabilisation and drainage systems



Adjacencies and compatible areas for school designs



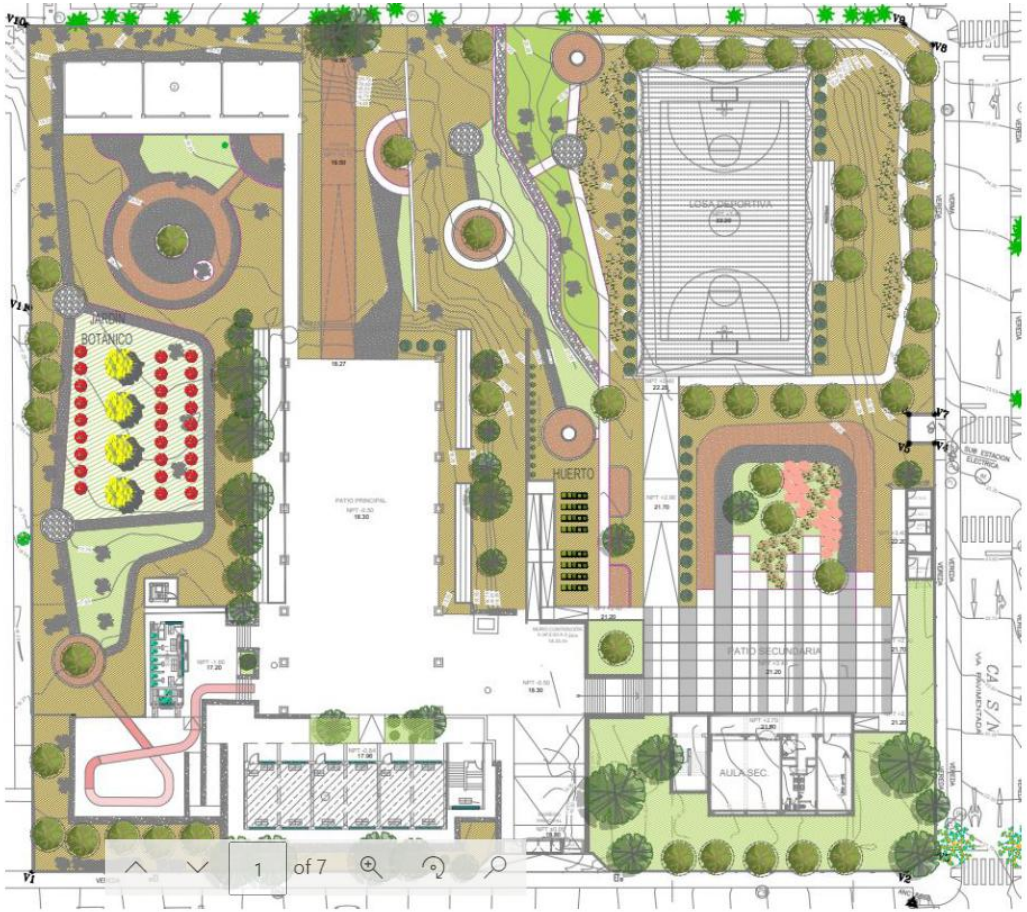
Flood Mitigation Measures



Safer and resilient

Scalable and replicable

Outdoor Spaces



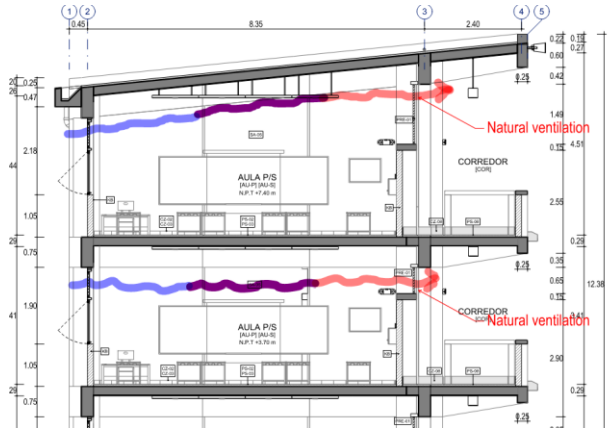
Sustainable

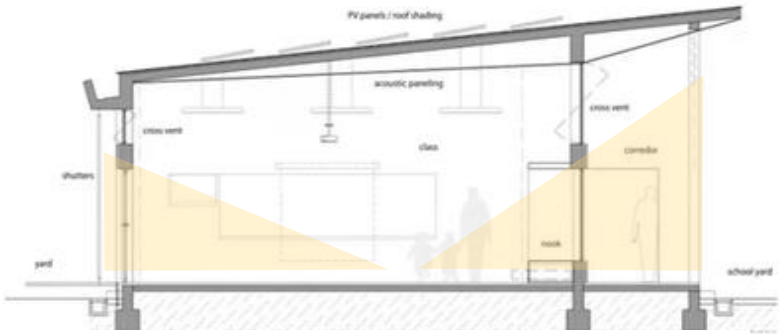
Cultural & social appropriateness

Safer and resilient

Inclusive, accessible and child-friendly

Improved teaching & learning environment





MBR Improved module – Section

74 Schools

Lasting Legacy

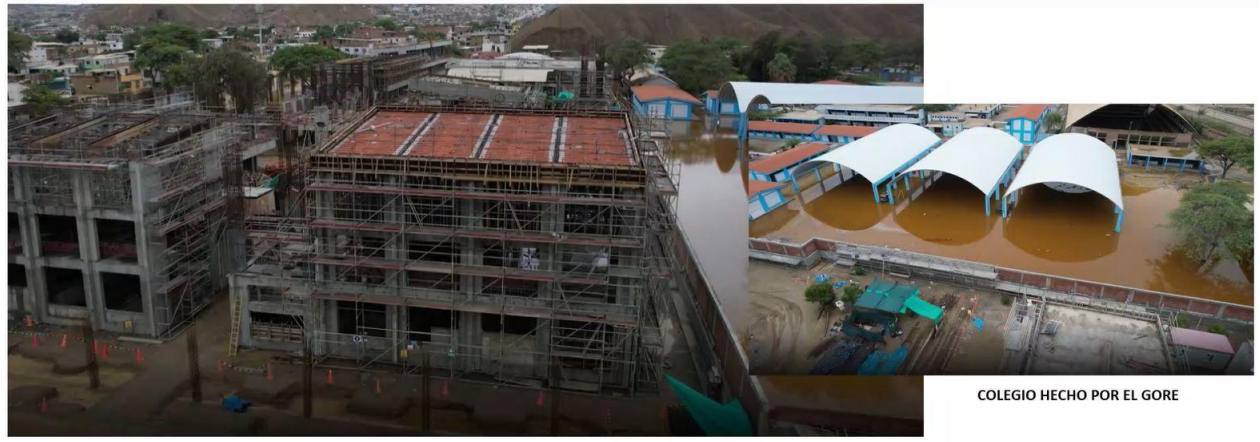
“Please send my warm regards to those individuals, along with our heartfelt thanks on behalf of the entire community – this small community of Chiquitoy, but one filled with gratitude.

We truly appreciate what they’ve done for future generations, because this isn’t just about 2023, 2024, or 2025 – it’s something that will last for many generations to come.

Speaking from experience, I can say I’ve lived through traditional infrastructure, which, although modest, served us well and allowed us to work. Now, with this modern development, we ask ourselves: how will we make the most of it? How will we highlight it? How will we express our gratitude?

So please carry this message: our deep appreciation. We are truly happy and thankful, and we pray that God blesses abundantly all those who contributed, shared ideas, and formed part of the great team that made this possible.”

Luisa Victoria



COLEGIO HECHO POR EL GORE

IRI EN LOCAL EDUCATIVO IGNACIO MERINO - REGION PIURA

✓ Se evidencia que parte de la mejora con respecto al nivel de inundación fue superado en el caso de las intervenciones G2G.

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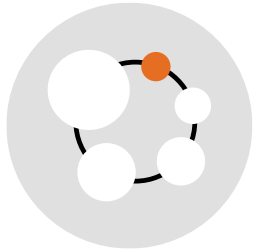
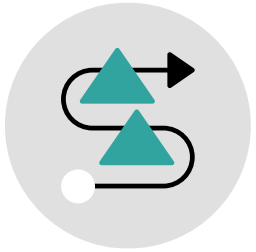
Lessons for UK

Climate resilience must be systemic – not siloed.



Adaptation measures must be scalable & replicable & context specific.



Strategic planning at the portfolio level is essential to avoid piecemeal solutions.

Collaboration & Stakeholder engagement is critical

We need to act quickly before it's too late.

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Local Implementation

Resilience Plans in Somers Town, Camden

Somers Town Future Neighbourhoods 2030

SUPPORTED BY MAYOR OF LONDON

SOMERS TOWN NEIGHBOURHOOD FORUM

Somers Town Community Association

Camden

ARUP

Context

Future Neighbourhoods programme

- The Future Neighbourhoods 2030 programme, led by the GLA, supports climate action and social equity at the neighbourhood level.
- Focus on energy, transport, health, and community value, with equity and inclusion built into its goals.
- In 2024, Camden appointed Arup to work with schools across the borough to enhance climate resilience.

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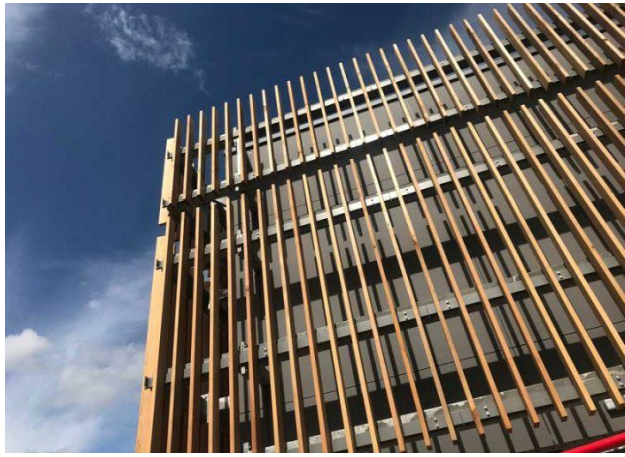
Context

The need for adaptation action in London

- London already faces extreme heat, flash flooding, and drought
- These risks are worsening pressures on buildings, infrastructure, and nature
- Schools are already feeling the impacts
- Without action, climate risks could severely affect health, safety, and learning
- Children are especially vulnerable, especially the very young and those with special needs

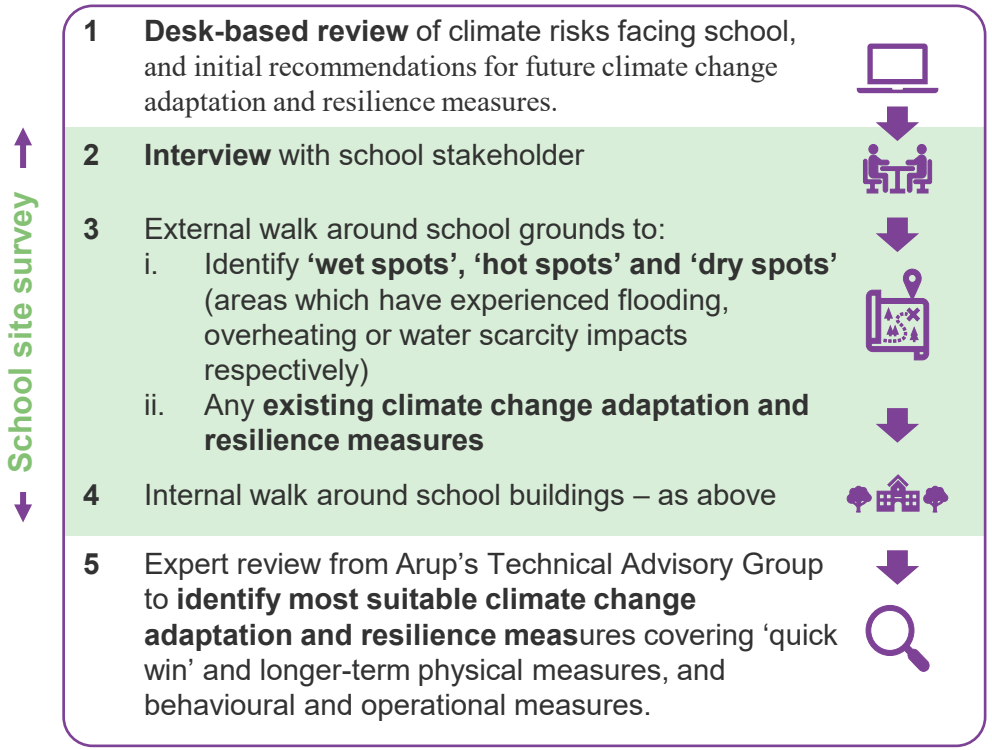


Project overview

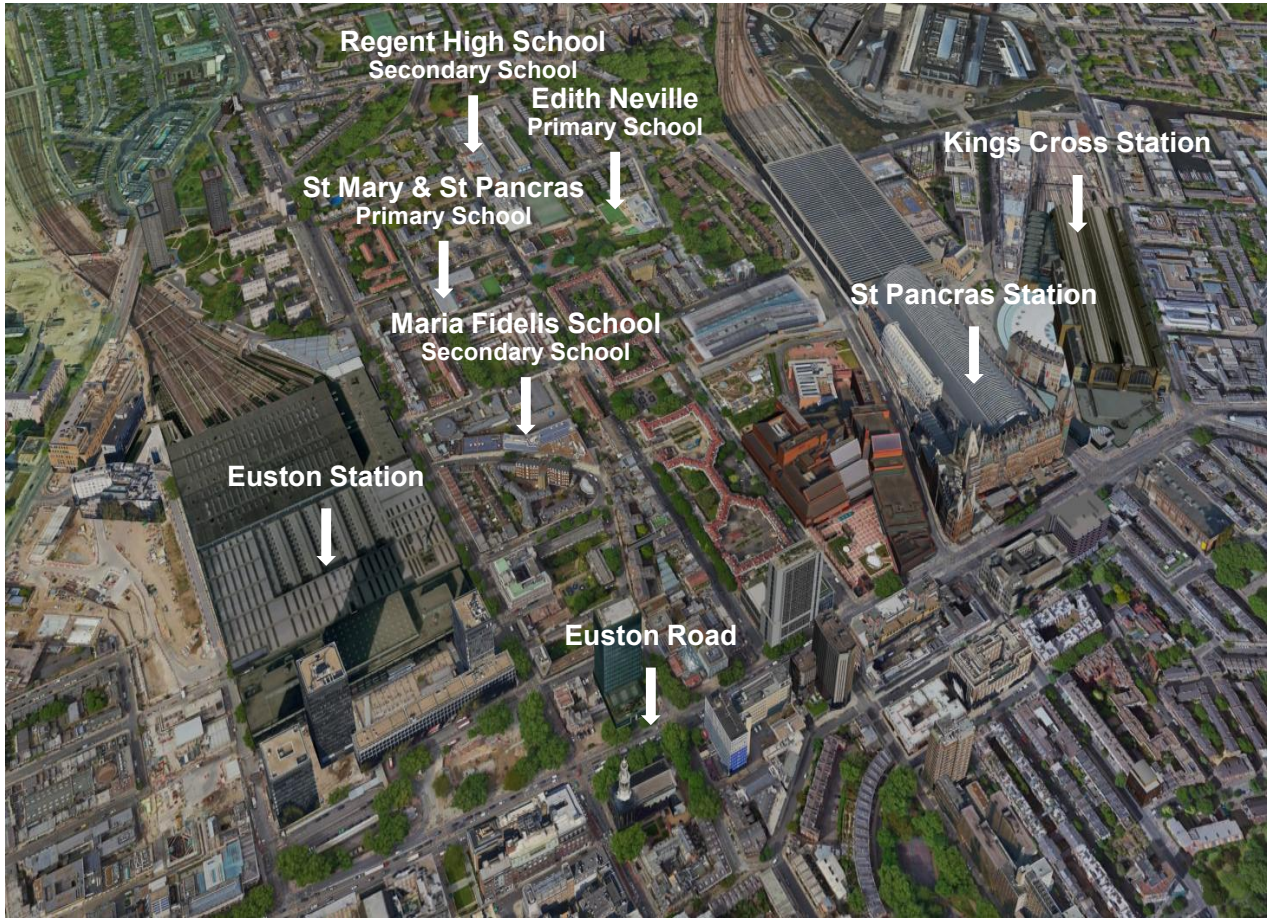
- Bespoke Climate Adaptation Plans with schools in Somers Town, Camden

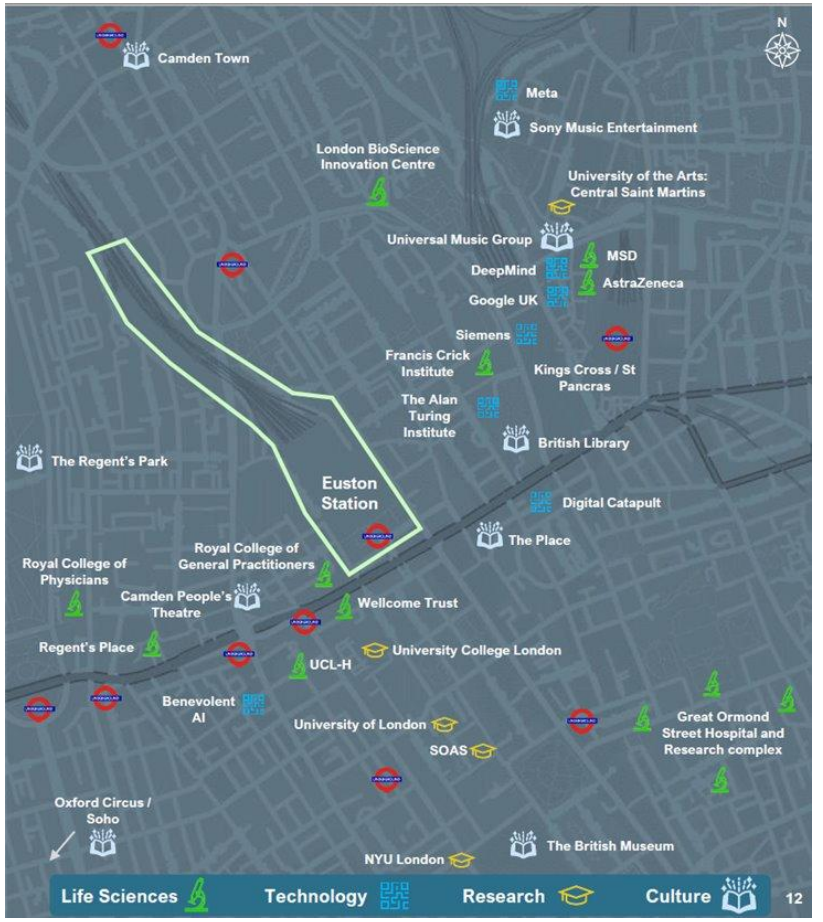
- Plans include:
  - Climate hazard analysis
  - Site visits (where feasible, x2)
  - Physical and behavioural measures
  - Funding guidance

- A replicable model for community-led, climate-informed investment



The Schools in Somers Town





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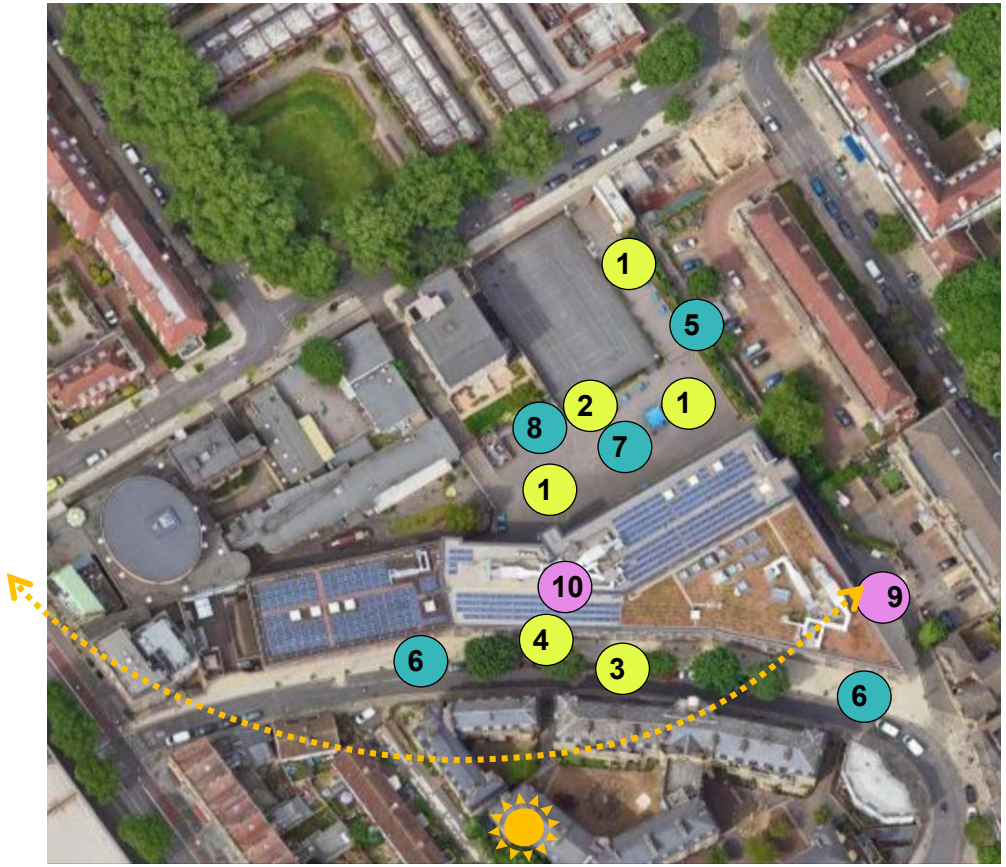
Maria Fidelis Catholic School

Site Survey: October 2024

	Additional risks addressed	Quick wins
Heat risk		
1 Grounds shade: Sail		Q
2 Grounds Shade: Lunch Benches		Q
3 Green Screen		Q
4 Awning or Canopy		Q
Flood risk		
5 SuDS Rain Planters		
6 Rain Garden: Linear		
7 Filter Drain		Q
8 Rain Gardens: Non Linear		
Water scarcity		
9 Rainwater harvesting: water butt		Q
10 Internal water efficiency measures		Q



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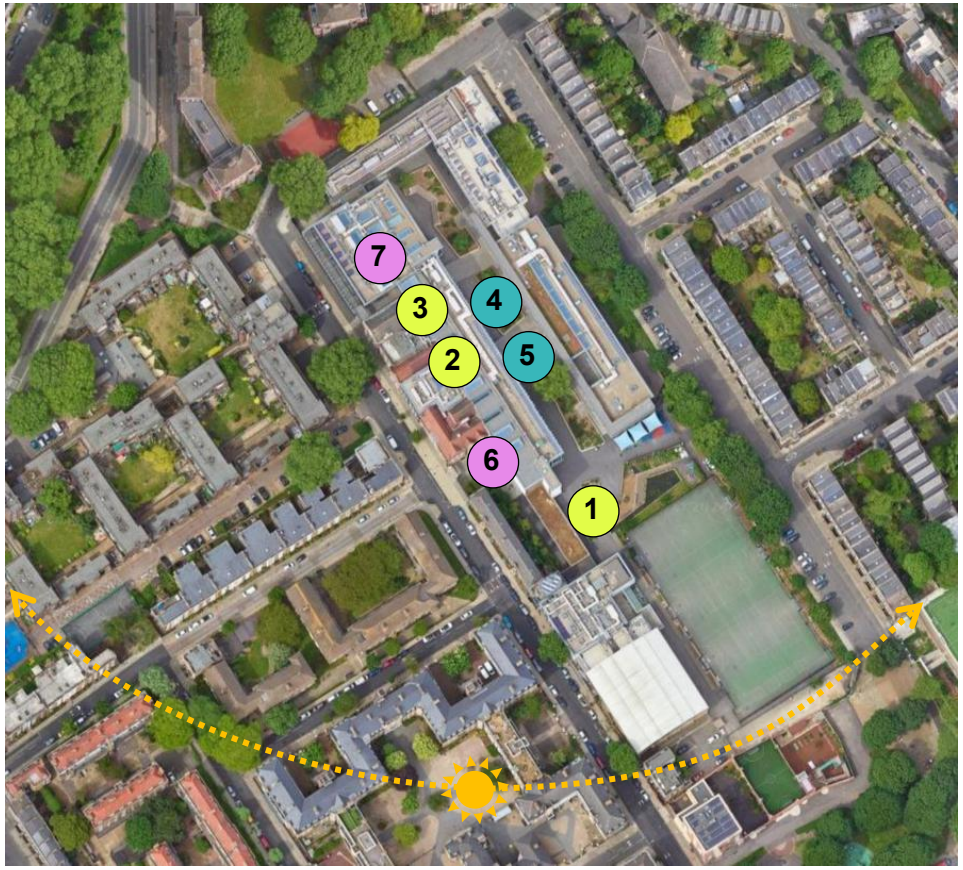
Regent High School

Site Survey: November 2024

	Additional risks addressed	Quick wins
Heat risk		
1 Solar Shade: Sail		Q
2 External Roof Blinds		Q
3 Window Solar Protection	●	
Flood risk		
4 Rain Garden: Linear	✹	
5 Filter Drain	✹	
Water scarcity		
6 Rainwater harvesting: water butt		Q
7 Internal water efficiency measures		Q



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Behaviour and Education Measures

In partnership with local charities

Open City

Global Action Plan

Climate Change All Change

UCL Climate Change and Sustainable Education

Image source: Open City – Education Pathway: London

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Funding and Implementation Support

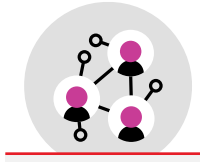
Physical measures

- Seed fund: £5K per school (GLA + Camden Climate Alliance)
- Additional funding: Multi-funder approach encouraged – leverage S106
- Camden Climate Alliance support with implementation
- Camden Schools Climate Charter
- External grants and funding streams

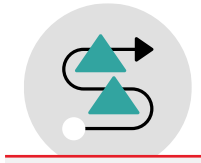
Behavioural and operational measures
Low or no cost. Likely to require staff training or policy updates.

Closing Thoughts

Design, operations and maintenance: How to make the design more sustainable? How to make maintenance easier for schools?

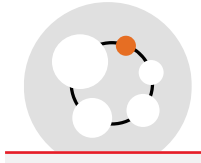


Site visit is best to understand local challenges and interview schools' stakeholders on main issues.



Climate Adaptation Plan methodology in place – replicate and scale up.

Need readiness and capacity.



Identify key challenges to implementation.

Physical adaptation measures are not enough. Behaviour change and education on climate change are necessary to support successful adaptation.

Learn from other successful programmes (e.g., Cool Schools in Europe, Oasis Programme).

Contact

Hayley Gryc

Hayley.Gryc@arup.com

Education Business Leader (UKIMEA)

Manon Dangelser

Manon.Dangelser@arup.com

Senior Climate Consultant

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