Fire Protection Association®

Tall Buildings fire safety network

RISCAuthority

GREEN & LIVING WALLS AS EXTERNAL CLADDING

A joint guide to managing risk

Professor Jim Glockling

Monday 2nd December 2024

ABOUT

FPA Fire Protection Association®

RISCAuthority

RISCAuthority is a research scheme administered by the Fire Protection Association and supported by many UK insurers. Through the operation of its technical working groups, the scheme seeks to support measures that improve and promote property and business resilience measures.

ABI

TRAVELERS

NIG

Swiss Re Corporate Solutions

AVIVA

CHUBB

AIG

Covea Insurance

ageas

Aspen

UMAL

Allianz

AXA

QBE

TOKIO MARINE

RSA

GENERALI

Liberty Mutual INSURANCE

CNA HARDY

SOMPO INTERNATIONAL

ZURICH

HDI GERLING

ecclesiastical

NFU Mutual

ACCELERANT

GrowingRevolution

Scotscape

Vertical Meadow

Viritopia

Biotecture

CONTENTS

BENEFITS OF LIVING WALLS

- A clear statement of ‘Green Intent’ - brand
- Improvement of city air quality
- Reduction of urban heat island effect
- Increased city biodiversity
- Habitat creation
- Slowing water run-off
- Ambient noise reduction
- Improved living and working environment

In short:

- Reduced energy bills (heating and air conditioning)
- Healthier cities
- Happier people

NET ZERO RISK CHALLENGES

Department for Business, Energy & Industrial Strategy

THE NON-DOMESTIC PRIVATE RENTED SECTOR MINIMUM ENERGY EFFICIENCY STANDARDS

The Future Trajectory to 2030

Any caveats?

- Without reducing safety?
- Without reducing Property Resilience?
- Without reducing Business Resilience?
- Without reducing Service Delivery Resilience?
- Without reducing FRS support?
- Maintaining insurability?

JLL commits to making net zero carbon mainstream and to operating at net zero carbon by 2030 in the UK

Property repositions to enter zero carbon future

19 Feb 2020, 11:01

As developers respond to the climate emergency, engineers and architects are being pushed to devise solutions to the challenge of carbon reduction. *Paul Unger* talks with Steve Merridew, low energy design expert at BDP in Manchester.

Avison Young has committed to a carbon-neutral future by signing up to the World Green Building Council's Net Zero Carbon Buildings Commitment.

Fore Partnership announces ambitious net zero carbon 2025 target

In Green Watch 11:50, 05 June 2020 By Virna Asara

Built Environment, Top Stories

Major UK housebuilder commits to net zero emissions by 2040

Barratt Developments has also set a target to ensure its new house types will be net zero carbon by 2030

Dimitris Mavrokefalidis

More Articles

Wednesday 29 July 2020

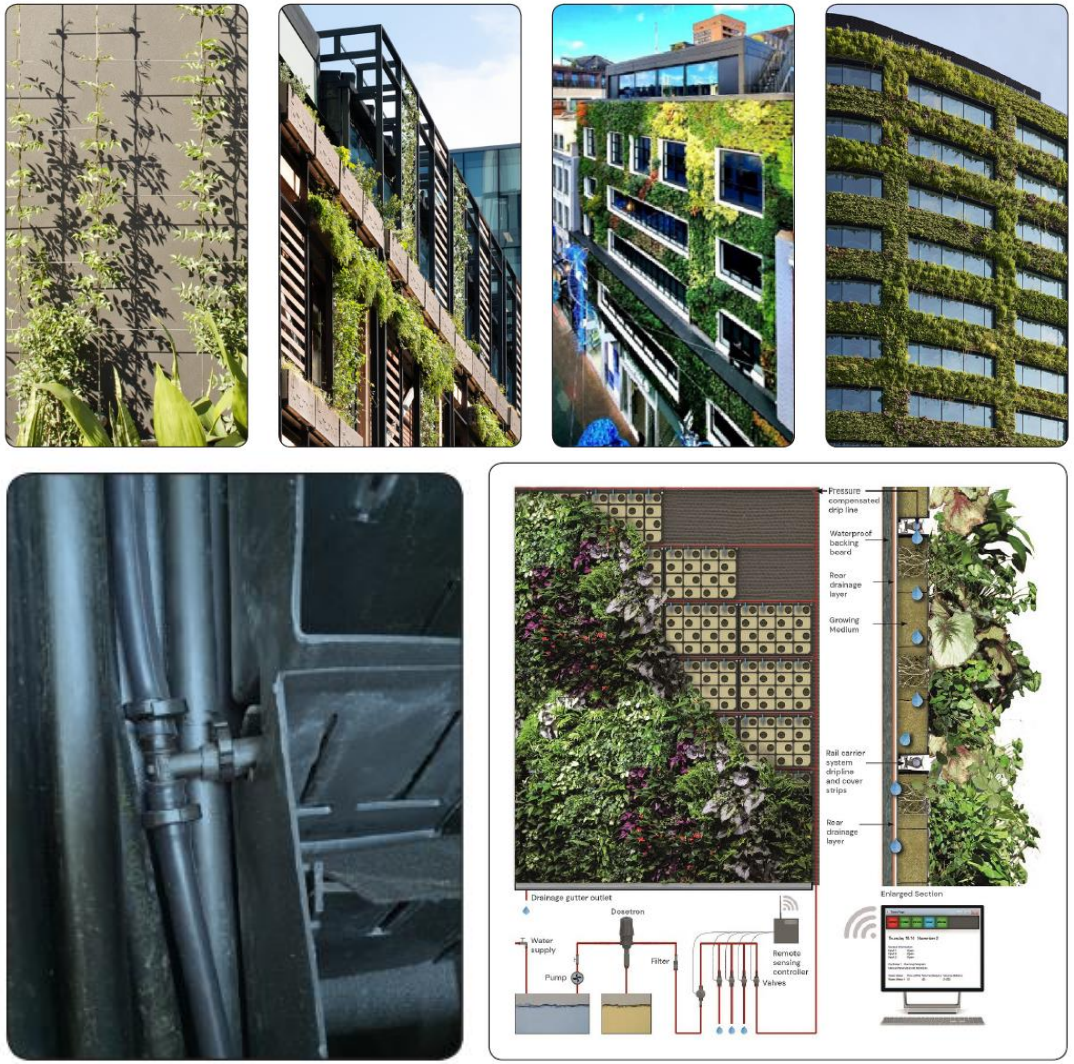
Grosvenor Britain & Ireland makes Zero Carbon Commitment

Grosvenor Britain & Ireland ('GBI') has committed to achieving net zero carbon operational emissions* from all its directly managed buildings, including historic listed buildings** by 2030.

CHALLENGES OF LIVING WALLS

Living wall systems come in many forms and the challenges mentioned below will be applicable to some but not all designs:

- **combustibility** of the planted **biomass** and its dependency on irrigation and maintenance to keep ignition and fire spread potential to a minimum
- the extensive use of **plastics** in some Living Wall designs in the potting, irrigation, and drainage systems
- the potential **complexity** of creating a fire-safe design when incorporated into a **rainscreen** type cladding system
- a lack of guidance on the management of **penetrations** (windows and vents) to prevent fire ingress or egress between the building's internal compartments, wall voids, and the Living Wall
- a lack of relevance of some **certification tests** to address the fire challenges
- the potential for the aforementioned factors to allow mass fire spread over the building, both via the planted surface, and within **wall cavities** behind the potting system
- an overall inadequacy in Building Regulations to address property protection
- a need to additionally consider **water** and **wind** damage potential

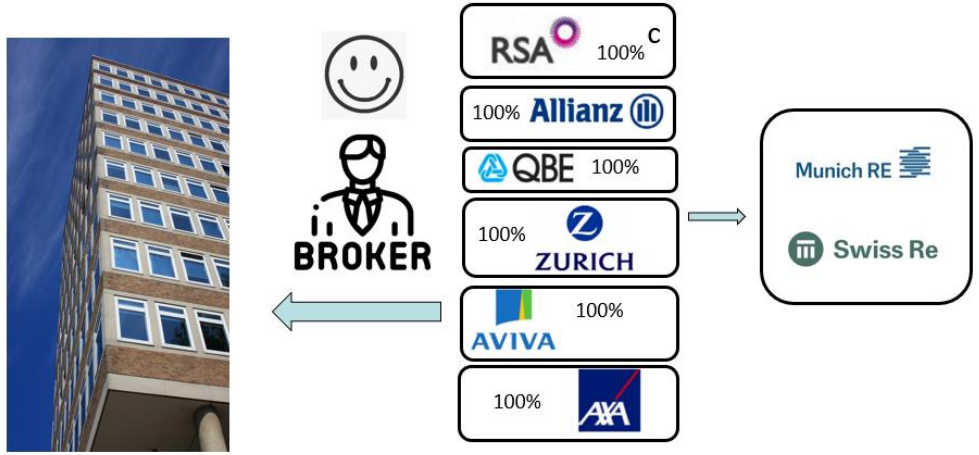


INSURANCE IMPLICATIONS

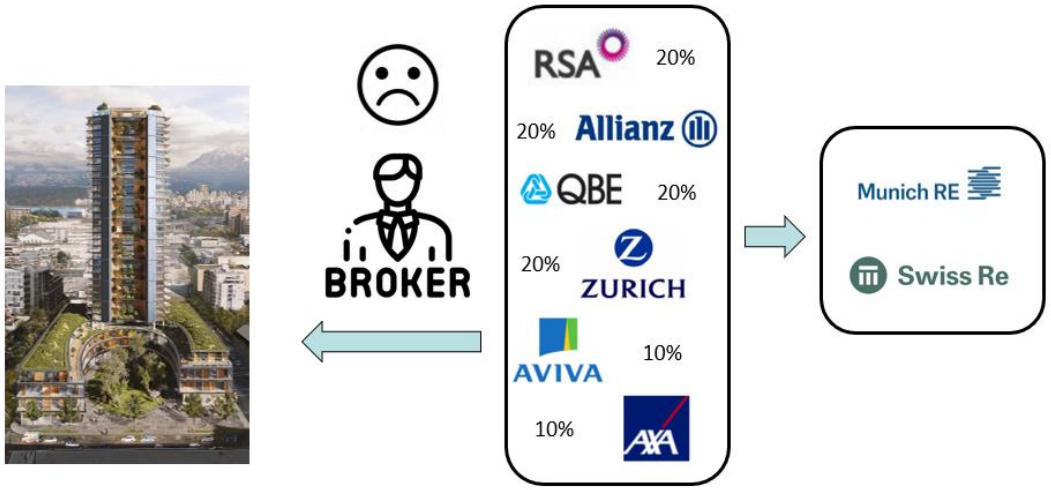
The provision of insurance is not a right and it is also not provided to hedge against easily foreseeable problems and under-researched initiatives. To this end:

- Designers and specifiers must understand the 'insurer perspective' and build in features designed to 'court' the necessary insurance if ideas are to get further than the paper on which they are drawn.
- Insurer confidence =
    - Competitive market
    - Lots of available capacity
    - Less reinsurance cover
    - Lower prices
    - Less policy conditions
- Lack of insurer confidence =
    - Restricted market
    - Limited capacity -> multiple organisation risk sharing
    - Poorer returns as more reinsurance cover is purchased
    - High cost of insurance
    - More policy conditions

Trusted and good technical understanding = choice, excess capacity, and competition



A lack of trust / technical concern = a lack of available insurance capacity



INSURANCE - EML

The most import measure is EML:

EML – Estimated Maximum Loss

- The maximum extent of damage that will be incurred by the building should i.e. a fire start.
- Most buildings are not insured for total loss (EML=100%) **BECAUSE a compelling case can be made for the extent of damage being limited.**
- Primary consideration is potential for mass fire spread:
  - Over the surface of the building (Cladding / Living Walls)
  - Through the occupied spaces (Compartmentation)
  - Through voids (Fire Stopping)
- Many Net Zero and green initiatives are very challenging for EML estimation
- Where the insurer is unable to robustly define how the fire event will reasonably end, an EML of 100% is most probable
- **This guide seeks to assist the designers and specifiers understand relevant risk control measures that will appeal to insurers**

EML ~ 4 floors of 17

MANY FACTORS CONTRIBUTE TO OVERALL 'INSURABILITY'

		Underwriting Relevant Building Features	(compliant building assumed)	
		Building scenario described	Residential Apartment Block	
			Drop Down List - Scroll down for more options	
Occupancy & use	1	Occupancy and use	Mixed commercial and residential	
Scale	2	Number of Storeys above ground	< 4 Storeys	
	3	Building footprint	900m2<1,600m2 (40mx40m)	
	4	Size of largest compartment by Area	20%	of building footprint
	5	Size of largest compartment by Volume	20%	of building volume
Structure & Fabric	6	Ground floor structure	Same as building structure	
	7	Structural material	Structural Timber Modular Stack	
	8	Construction method	Modular	
	9	Core structure	Same as Structure	
	10	Floor / Ceiling	Timber alternating with concrete	
	11	Cladding system	Rainscreen with NC insulation and NC Cladding	
	12	Interior Surfaces	Bare structure	
Other risk factors	13	Atria	Yes - open	
	14	Basement car parks	Yes	
	15	Balconies	No	
	16	Swimming pools / spa baths	Yes	
	17	Hazardous materials	No	
	18	Green surfaces	Green Roof	
	19	Green Energy	Wind & Solar	
Fire mitigations	20	Combustible void protection	Dry lined	
	21	Suppression system protection	No Suppression	
	22	Separation	5m<10m	
	23	Firefighter provisions	Wet Risers	
	24	Stairwells	2	
Water-peril mitigations	25	Designed for flood	Yes - Raised on water insensitive stilts	
	26	Designed for EoW	Detection, Control, and Fail-to-safe devices	

INTRODUCING THE JOINT GUIDANCE

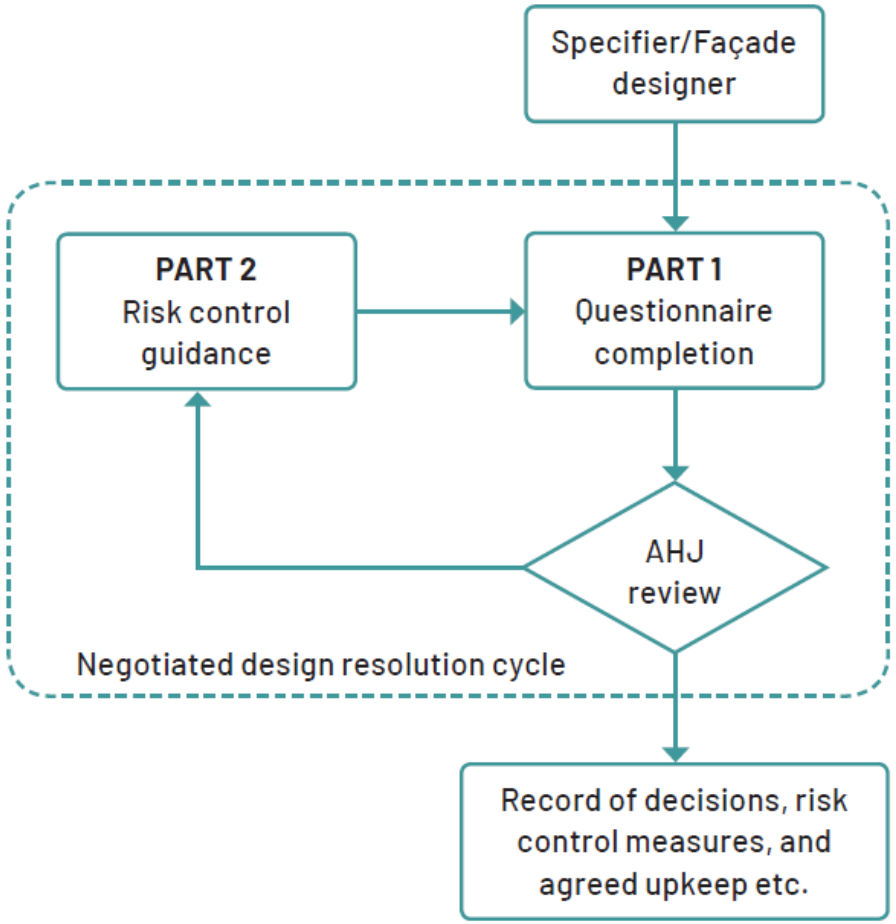
- A truly collaboratively produced document
- It does not have all of the answers, but does the best with what is currently available and acts as a call for further research
- **Seeks to assist the designers and specifiers understand relevant risk control measures that will appeal to insurers or other AHJ without being prescriptive.**
- Provides a framework for negotiated design development through information exchange and common guidance

STRUCTURE

- Scoring Matrix
- Information Exchange Questionnaire
- Common Guidance
- 19 Core Principles of risk control
- Additional Appendices

Principles:

1-7 : Engagement, Testing & Documentation
8-10 : Materials
11-15 : Design
16-19 : Upkeep & Monitoring



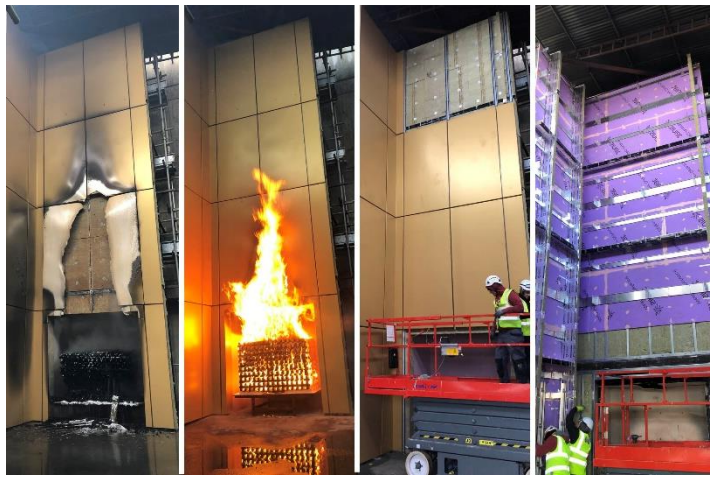
CORE PRINCIPLES OF LIVING WALL RISK CONTROL:
ENGAGEMENT, TESTING, AND DOCUMENTATION

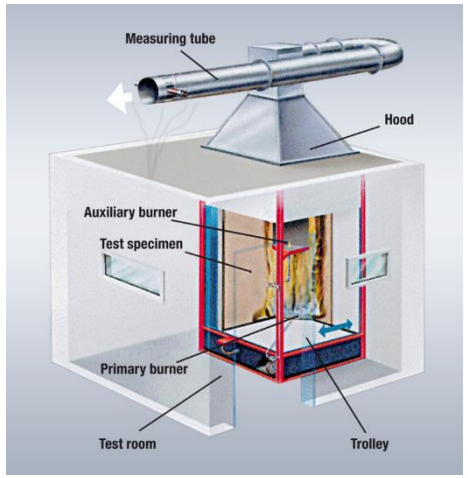
Principle 1

- Engage with all stakeholders at the earliest opportunity and maintain dialogue for the entire lifecycle of the building.

Principle 2

- Fire testing must be appropriate to the end use situation and provide an opportunity to test the limit of tolerable irrigation downtime.





CORE PRINCIPLES OF LIVING WALL RISK CONTROL:
ENGAGEMENT, TESTING, AND DOCUMENTATION

Principle 3

- A photographic record of all key fire prevention and performance design detailing shall be made during installation of the system and provided to the owner.

Principle 4

- The building's fire risk assessment shall be updated to include consideration of the Living Wall.

CORE PRINCIPLES OF LIVING WALL RISK CONTROL:
ENGAGEMENT, TESTING, AND DOCUMENTATION

Principle 5

- The system shall be supplied with a handbook detailing system design, monitoring, inspection, maintenance, corrective actions, and training requirements, and include system end-of-life instruction.

Principle 6

- An emergency plan for residents and all other stakeholders shall be provided for at-risk or neglected Living Wall systems.

- Should the building be occupied?
- Are other nearby buildings put at risk?
- Will the building be insured when in this condition?
- Will the building be legally in breach of legislation when in this condition?
- What parameters should be used for describing unsafe conditions, what are the limits, and how should they be measured?

CORE PRINCIPLES OF LIVING WALL RISK CONTROL: ENGAGEMENT, TESTING, AND DOCUMENTATION

Principle 7

- The system must always be covered by a maintenance contract, ideally with the OEM or an OEM trained or approved service provider.

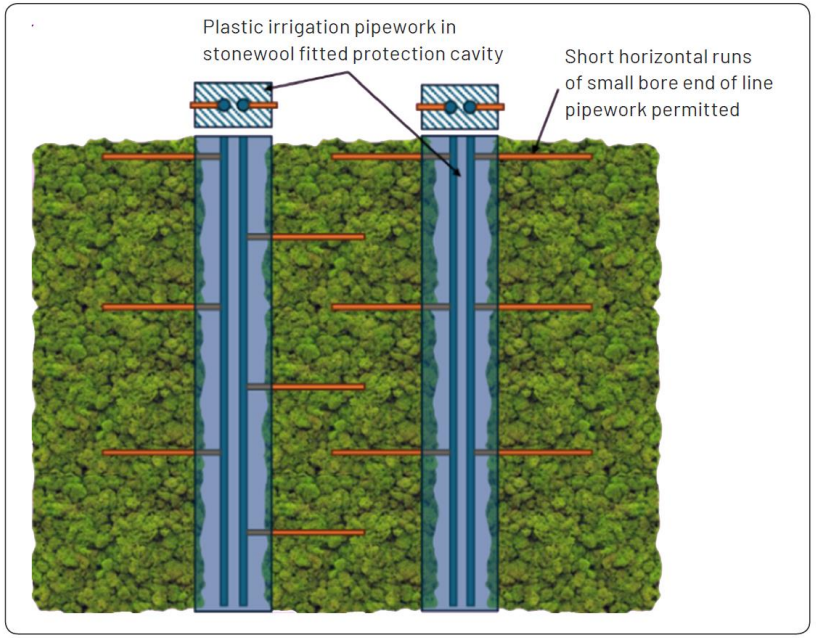
CORE PRINCIPLES OF LIVING WALL RISK CONTROL: MATERIALS

Principle 8

- Use non-combustible system component materials wherever possible.

Principle 9

- Where combustible construction materials must be used, minimise their ability to participate in or spread fire.



CORE PRINCIPLES OF LIVING WALL RISK CONTROL: MATERIALS

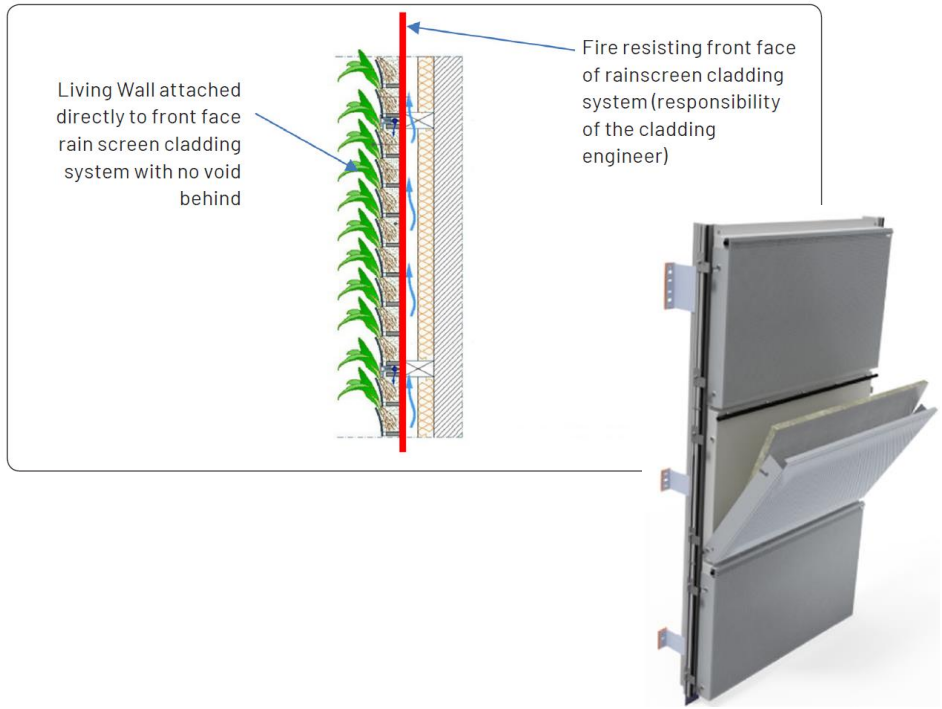
Principle 10

- Plants and potting medium shall be selected to reduce the likelihood of ignition and reduce the rate and extent of fire spread.

CORE PRINCIPLES OF LIVING WALL RISK CONTROL: DESIGN

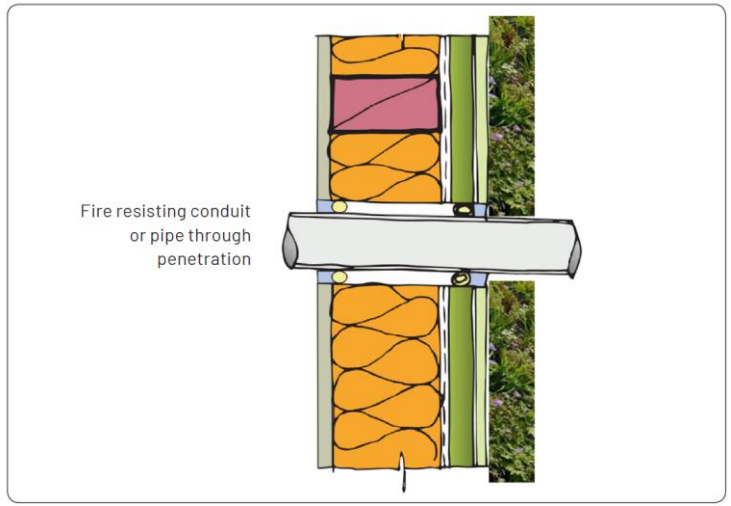
Principle 11

- When used as part of a rainscreen-type cladding system, there shall be physical demarcation between the cladding system and Living Wall (fire separation).



Principle 12

- The design shall protect against the spread of fire through both ingress and egress at all penetration.



CORE PRINCIPLES OF LIVING WALL RISK CONTROL: DESIGN

Principle 13

- The use of Living Walls must not act to amplify the risks attributable to other building features, such as those presented by combustible cladding, combustible structural building components, façade lighting, and the use of photovoltaic panels.

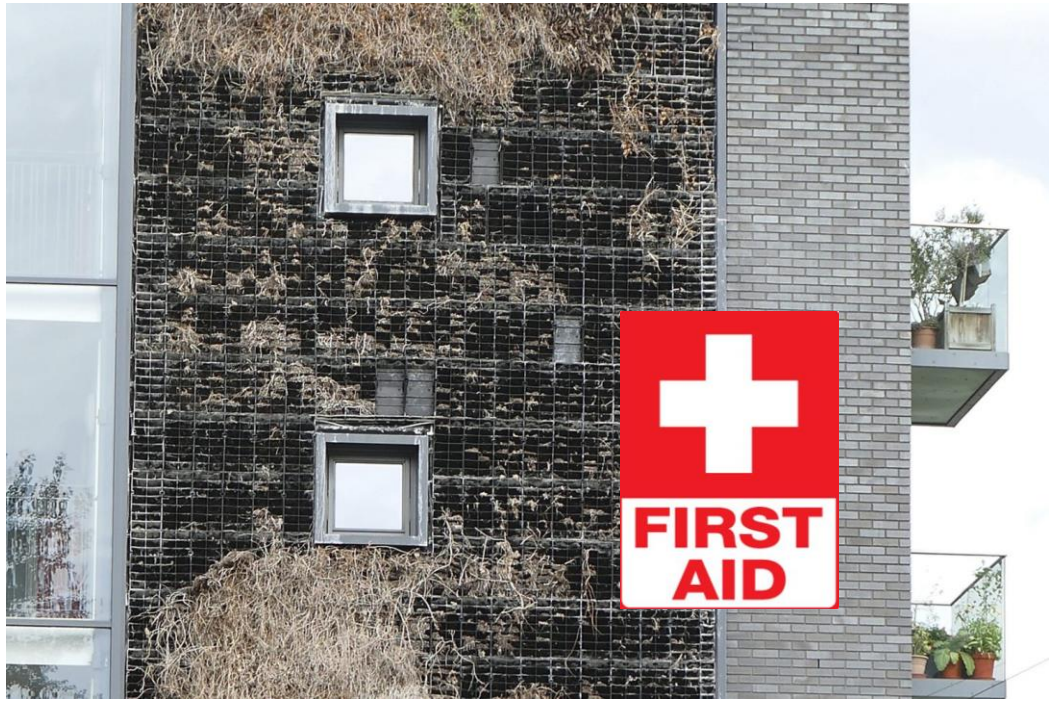
Principle 14

- Living Walls shall be designed to reduce the likelihood of ignition and limit the rate and extent of vertical and horizontal fire spread over the planted media.

CORE PRINCIPLES OF LIVING WALL RISK CONTROL: DESIGN

Principle 15

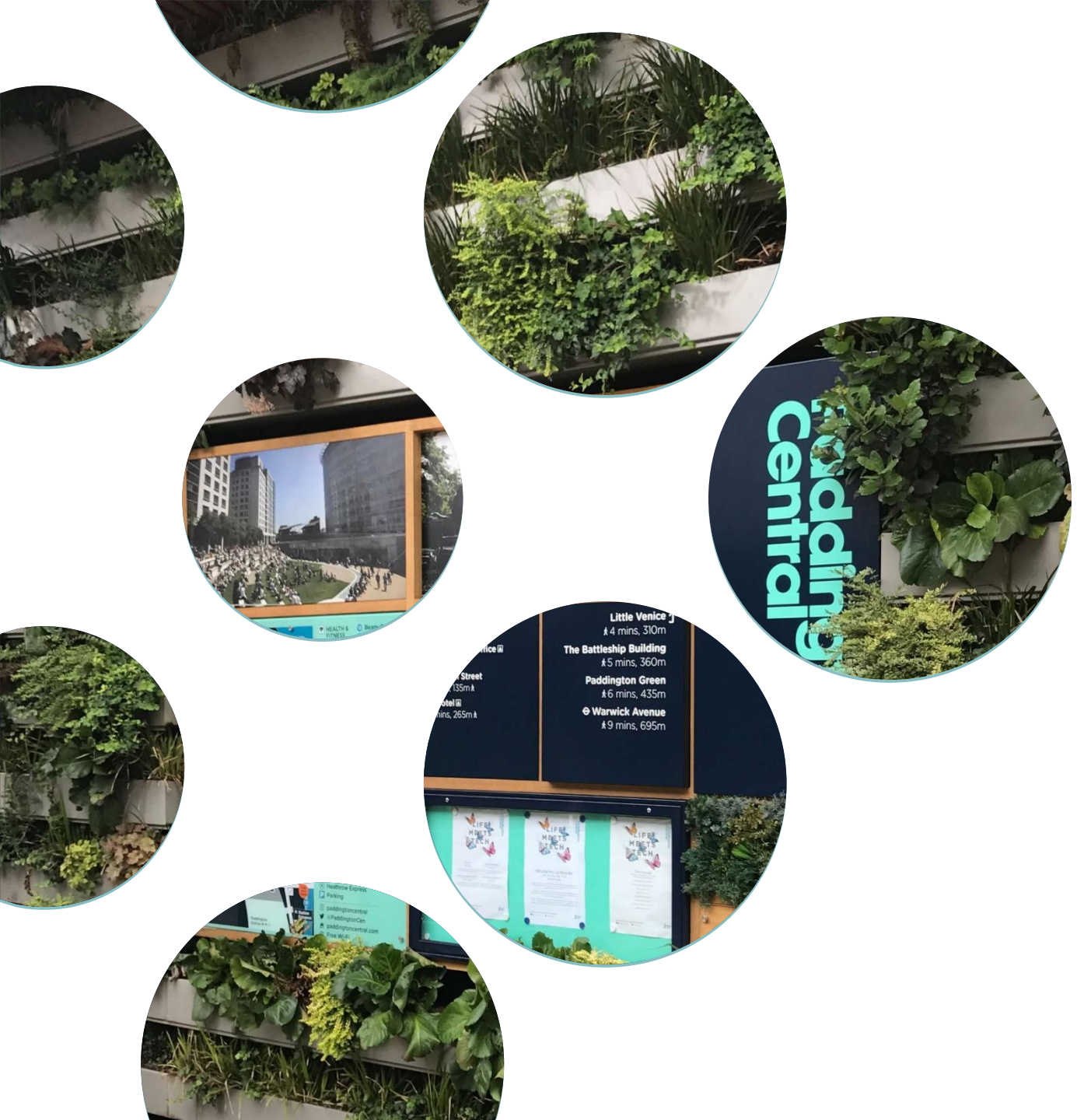
- The system shall be designed to facilitate simple effective repair.



NEXT STEPS

Research

- Missing installation parameters for separation distances and fire breaks
- Criteria for small scale test evaluation consistent with monitoring, service, and repair timescales
- Feedback and improvement with experience



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THANK YOU

Professor Jim Glockling on behalf of RISCAuthority and FPA

Glockling consulting