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CITY OF LONDON

Planning and Transportation Committee

Date: TUESDAY, 5 MARCH 2024

Time: 10.30 am

Venue: LIVERY HALL - GUILDHALL

Members:
Deputy Shravan Joshi (Chairman)
Graham Packham (Deputy Chairman)
Deputy Randall Anderson
Brendan Barns
Ian Bishop-Laggett
Deputy Michael Cassidy
Deputy Simon Duckworth
Mary Durcan
John Edwards
Anthony David Fitzpatrick
Deputy John Fletcher
Dawn Frampton
Deputy Marianne Fredericks
Jaspreet Hodgson
Amy Horscroft
Alderman Robert Hughes-Penney
Deputy Charles Edward Lord
Antony Manchester
Deputy Brian Mooney
Deputy Alastair Moss
Alderwoman Jennette Newman
Deborah Oliver
Alderwoman Susan Pearson
Judith Pleasance
Deputy Henry Pollard
Alderman Simon Pryke
Ian Seaton
Hugh Selka
Luis Felipe Tilleria
Shailendra Kumar Kantilal Umradia
William Upton KC
Jacqui Webster
Vacancy

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Ian Thomas CBE
Town Clerk and Chief Executive

AGENDA

NB: Certain matters for information have been marked * and will be taken without discussion, unless the Committee Clerk has been informed that a Member has questions or comments prior to the start of the meeting. These information items have been collated in a supplementary agenda pack and circulated separately.

Part 1 - Public Agenda

1. **APOLOGIES**

2. **MEMBERS' DECLARATIONS UNDER THE CODE OF CONDUCT IN RESPECT OF ITEMS ON THE AGENDA**

3. **MINUTES**

   To agree the public minutes and summary of the meeting held on 31 January 2024.

   For Decision
   (Pages 7 - 20)

4. **OUTSTANDING ACTIONS***

   Report of the Town Clerk.

   For Information
   (Pages 21 - 22)

5. **SALISBURY SQUARE DEVELOPMENT - APPROPRIATION FOR PLANNING PURPOSES**

   Report of the City Surveyor.

   For Decision
   (Pages 23 - 56)

6. **HISTORIC BUILDINGS RETROFIT TOOLKIT**

   Report of the Interim Executive Director, Environment.

   For Decision
   (Pages 57 - 140)

7. **COMMERCIAL BUILDING REFURBISHMENT - GUIDANCE AND CASE STUDIES**

   Report of the Interim Executive Director, Environment.

   For Decision
   (Pages 141 - 294)

8. **TRANSPORT FOR LONDON - LOCAL IMPLEMENTATION PLAN FUNDED SCHEMES 2024/25**

Report of the Interim Executive Director, Environment.

For Decision
(Pages 295 - 300)

9. **DRAFT HIGH-LEVEL BUSINESS PLAN 2024/25 – ENVIRONMENT DEPARTMENT**

Report of the Interim Executive Director, Environment.

For Decision
(Pages 301 - 314)

10. **CITY CORPORATION MANAGED CAR PARKS – TARIFF CHANGES**

Report of the Interim Executive Director, Environment.

For Decision
(Pages 315 - 326)

11. **CITY CORPORATION RESPONSE TO GOVERNMENT CONSULTATIONS ON BROWNFIELD LAND PRIORITISATION AND PERMITTED DEVELOPMENT RIGHTS**

Report of the Interim Executive Director, Environment.

For Decision
(Pages 327 - 350)

12. **CONSIDERATE LIGHTING CHARTER UPDATE***

Joint report of the City Surveyor & the Interim Executive Director, Environment.

For Information

13. **LEVELLING UP AND REGENERATION ACT***

Report of The Remembrancer.

For Information

14. **GENERAL MICROMOBILITY UPDATE AND ACTIONS FOR IMPROVING DOCKLESS BIKE HIRE IN THE CITY***

Report of the Interim Executive Director, Environment.

For Information

15. **BUSINESS PLAN 2023/24 PROGRESS REPORT (PERIOD 2, AUGUST – NOVEMBER 2023)***

Report of the Interim Executive Director, Environment.

For Information

16. **RISK MANAGEMENT UPDATE REPORT***

Report of the Interim Executive Director, Environment.

For Information

17. **PUBLIC LIFT & ESCALATOR REPORT***

Report of the City Surveyor.

For Information

18. **TO NOTE THE MINUTES OF THE PLANNING APPLICATIONS SUB-COMMITTEE - 26 JANUARY 2024***

For Information

19. **TO NOTE THE DRAFT PUBLIC MINUTES OF THE STREETS AND WALKWAYS SUB-COMMITTEE - 30 JANUARY 2024***

For Information

20. **QUESTIONS ON MATTERS RELATING TO THE WORK OF THE COMMITTEE**

21. **ANY OTHER BUSINESS THAT THE CHAIRMAN CONSIDERS URGENT**

22. **EXCLUSION OF THE PUBLIC**

MOTION – That under Section 100(A) of the Local Government Act 1972, the public be excluded from the meeting for the following items on the grounds that they involve the likely disclosure of exempt information as defined in Part I of the Schedule 12A of the Local Government Act.

For Decision

Part 2 - Non-public Agenda

23. **TO NOTE THE DRAFT NON-PUBLIC MINUTES OF THE STREETS AND WALKWAYS SUB-COMMITTEE - 30 JANUARY 2024***

For Information

24. **NON-PUBLIC QUESTIONS ON MATTERS RELATING TO THE WORK OF THE COMMITTEE**

25. **ANY OTHER BUSINESS THAT THE CHAIRMAN CONSIDERS URGENT AND WHICH THE COMMITTEE AGREES SHOULD BE CONSIDERED WHILST THE PUBLIC ARE EXCLUDED**

PLANNING AND TRANSPORTATION COMMITTEE

Wednesday, 31 January 2024

Minutes of the meeting of the Planning and Transportation Committee held at the Guildhall EC2 at 9.00 am

Present

Members:

Deputy Shravan Joshi (Chairman)
Graham Packham (Deputy Chairman)
Brendan Barns
Deputy Simon Duckworth
Mary Durcan
John Edwards
Deputy John Fletcher
Deputy Marianne Fredericks
Deputy Charles Edward Lord
Deputy Brian Mooney
Alderwoman Jennette Newman
Deborah Oliver
Alderwoman Susan Pearson
Judith Pleasance
Alderman Simon Pryke
Ian Seaton
Hugh Selka
William Upton KC
Jacqui Webster

Officers:

Polly Dunn	-	Assistant Town Clerk
Zoe Lewis	-	Town Clerk's Department
Fleur Francis	-	Comptroller and City Solicitor's Department
Gudrun Andrews	-	Environment Department
Rob McNicol	-	Environment Department
Bruce McVean	-	Environment Department
Tom Nancollas	-	Environment Department
Garima Nayyar	-	Environment Department
Gwyn Richards	-	Environment Department
Michelle Ross	-	Environment Department
Peter Wilson	-	Environment Department
Gwyn Richards	-	Environment Department
Dionne Williams-Dodoo	-	People and HR
Adeola Lawal	-	People and HR

1. **APOLOGIES**
   Apologies for absence were received from Deputy Randall Anderson, Ian Bishop-Laggett, Dawn Frampton, Jaspreet Hodgson, Alderman Robert Hughes-Penney, Deputy Henry Pollard and Shailendra Umradia.

2. **MEMBERS' DECLARATIONS UNDER THE CODE OF CONDUCT IN RESPECT OF ITEMS ON THE AGENDA**
   There were no declarations.

3. **MINUTES**
RESOLVED – That the public minutes of the previous meeting held on 12 December 2023, be approved as an accurate record.

4. *** OUTSTANDING ACTIONS**
The Committee received a report of the Town Clerk setting out the list of Outstanding Actions.

RECEIVED.

5. **CITY PLAN 2040**
The Committee considered a report of the Interim Executive Director Environment concerning the City Plan.

Officers gave a presentation on the City Plan 2040. An Officer stated that the City Plan was the City of London Corporation's vision for how the Square Mile would develop up to 2040, and it set out a suite of policies to guide development in the city, ensuring growth was economically, socially and environmentally sustainable.

The Officer stated that the plan had been in production for a number of years, with initial issues and options explored and consulted on in 2016, a draft plan consulted on in 2018/19, and a proposed submission version of the plan produced and consulted on in 2021. At that point Members had decided to revise the plan and undertake further work and increase the evidence base.

Members were informed that over the last 18 months, new evidence had been produced and further informal engagement had taken place. The City Plan had been amended to reflect the findings, the engagement responses received, and to align the plan with other updated corporate strategies. Work was also informed by the advice of the Local Plans Sub-Committee. The Officer stated that the evidence documents were available on the Corporation's website, and they included extensive work on historic buildings, tall buildings and their impacts on office demand and capacity.

The Officer stated that the consultants from Arup and from Knight Frank were in attendance at the meeting.

An Officer stated that the plan had also been updated in light of changes to the National Planning Policy Framework (NPPF) in December 2023. Work had been undertaken to ensure alignment both with national policies in the NPPF and regional policies in the London Plan. Changes to the NPPF included how the housing requirement was to be calculated, changes to the transitional arrangements and the timings the City Plan would be examined against.

Officers outlined the outcomes of engagement, the direction of the redrafted plan and they summarised the main changes to policies. They proposed that the latest version of the City Plan be progressed through pre-submission consultation before being submitted to the Secretary of State for public examination.

An Officer stated that the Corporation had its own suite of strategies and policies, many of which were currently being refreshed, and these had been woven into many aspects of the City Plan. There was also a broad suite of planning guidance and supplementary planning documents which had informed the City Plan.

The next steps were outlined to Members. An Officer stated that if the Committee approved the plan, it would be submitted to the Policy and Resources Committee and then to the Court of Common Council in March 2024. Regulation 19 consultation would then be undertaken in which there would be an opportunity for all interested parties to comment on the plan. All of the previous consultation responses had been published as part of the statement of consultation that would be provided to the planning inspector when the City Plan was submitted, and Officers stated that they would strongly recommend that people should make their representations known, as the plan had significantly changed since previous versions.

Following the Regulation 19 consultation, responses would be submitted to the Secretary of State with the plan and he would appoint an independent examiner from the planning inspectorate to undertake a public examination. There would be public hearings and those who had made representations could take part. There would be a report from the inspector that would set out any changes that might be required to the plan. It would then be brought back to the Committee seeking approval to adopt the City Plan in summer 2025.

An Officer stated that the London Plan aimed to create 3.5 million square metres of additional office floorspace within central London over the time period of 2016 to 2041. It expected local authorities to support the unique agglomerations and dynamic clusters of world city businesses within the Central Activities Zone. The City of London Corporation was the key agglomeration area and as such, national and internationally significant office functions should be supported as well as the centres of excellence and specialist clusters that were in the square mile e.g. the legal cluster within the west of the city.

Members were informed that The London Plan also addressed issues of heritage and issues of tall buildings. Boroughs needed to include policies to conserve, promote and actively protect and interpret the outstanding universal value of world heritage sites. The Tower of London was a world heritage site on the City’s border. The Mayor for London had also identified three strategically important landmarks and designated views – St. Paul's Cathedral, the Palace of Westminster and the Tower of London that should be reflected in local plans. Development plans also needed to set a definition for tall buildings for particular localities and to determine if there were locations where tall buildings might be an inappropriate form of development. Building heights should be identified on maps in development plans. The London Plan also expected the distinct environment and heritage of the Central Activities Zone to be sustained and enhanced.

An Officer outlined the main areas of the City Plan that had changed and developed. He stated that the City Plan sought to provide an additional 1.2 million square metres of office floor space as a minimum. This figure was based on the extensive study that was conducted by Arup and Knight Frank, which explored three major different scenarios for how office workers might occupy their workspaces in the future. The central projection had been chosen as the one to inform the City Plan although trends over recent months indicated that there could be a need for more floor space, which was why 1.2 million square metres was set as a minimum figure.

An in-house modelling exercise, looking at where the capacity for new office floor space might come forward within the city had been undertaken, and this highlighted the importance of the city cluster and ensuring that there was sufficient capacity for growth in the future. Evidence published on the Corporation's website showed that the city cluster was required to have the potential to provide over 700,000 square metres of additional office floorspace in addition to the approvals that were in the pipeline and this constituted over 50% of the floor space capacity within the City.

As well as a strategic policy on offices set out in the City Plan and policy setting out the types of office development to be encouraged in the square mile, the plan also set out a policy which sought to protect existing floor space. This reflected the findings around Grade B office space, where demand was waning and it introduced a retrofit fast track, allowing a more straightforward route to change use to hotels, cultural and education uses in certain circumstances where existing buildings were being retained.

In relation to sustainable development, there was a need for development to follow a retrofit first approach to their sites with a requirement for a thorough exploration of the potential for retaining and retrofitting existing buildings as a starting point for appraising site options. This would be one of the first local plans to articulate the retrofit first approach. This did not mean retrofit only e.g. there would be sites where there was a potential significant uplift for new development, which could then capitalise on the city's public transport accessibility. Developments were required to establish the most sustainable and suitable approach for the site.

There was a new policy on biodiversity net gain, which included approaches that would support the biodiversity action plan. This included introducing a strategy for green routes connecting up the sites of importance for nature conservation around the City, helping to create green corridors for wildlife. This was complemented by the existing urban greening factor approach in the City Plan, and both would help improve and enhance the biodiversity and greening of the city as development came forward.

The Officer stated that the Destination City vision was woven throughout the plan. It covered a broad range of different policies, from those on open spaces and retail to the approach to the supply of hotels. The plan put greater emphasis on the need to deliver a wide range of inclusive cultural and other public spaces. This work had been informed by the cultural planning framework, which had been developed in collaboration with Publica, and required the provision of on-site facilities for arts, culture and leisure from the largest developments. Medium sized developments would be required to contribute either on-site or through a financial contribution. This complemented the approach on tall buildings, which required those developments to incorporate publicly accessible open space. Many viewing galleries, roof gardens and public spaces had been delivered in recent months and years.

Other priorities for the plan were -

- to create a more inclusive, healthier and safer city for everybody;
- to create a square mile that promoted equity, diversity and social inclusion in the design and use of buildings and public spaces; and
- to promote the expansion of the City's sport and recreation offer by encouraging sport and recreation provision as parts of new development and helping to deliver a network of free outdoor sporting facilities in the City.

There were also policies in the plan to support suicide prevention, the creation of quieter areas in the city and the need to incorporate safety and security into the design of buildings from the outset.

In relation to housing and residential areas, the plan set out a requirement of a total of 1,706 dwellings over 15 years from 2025/26. This was informed by the London Plan requirement for 146 swellings per year up to 2029, and the government's national standard methodology, which gave a figure of 102 units beyond this time frame. Specific site allocations had not been identified, but there were significant amounts of approvals in the pipeline. Over time, historically, the City had delivered an average of 174 units per year, well above the 114 units that would be required on average over the lifetime of this plan. Policies in the plan set out the suitable locations for new housing as well as setting out a clear approach to protecting the amenity of existing residents in the City.

Policies on tall buildings, views and heritage had been informed by updated evidence. In relation to tall buildings, an extensive assessment exercise was undertaken and it was found that most of the City was very sensitive to tall building development. Only two areas were identified as sensitive, meaning that they could in principle accommodate more tall building development. These were the City Cluster and the Holborn and Fleet Valley area to the west of the city.

Heights were modelled using 3D modelling software and over 70 strategic views drawn from the Mayor’s London View Management Framework, the UNESCO guidance relating to the Tower of London and other local policy and guidance. This shaped not only the areas which would be, in principle, appropriate for tall building development but also the heights that would be appropriate in principle. There was a complex array of strategic view constraints which were used to produce contour maps for proposed tall building development. Members were shown images of the modelling and constraints.

The Chairman thanked Officers for their work on this substantial piece of work and stated that the City Plan provided a concise and clear a vision for the City and he welcomed sustainability being at the heart of the plan.

The Chairman asked for Members' questions of Officers.

In relation to questions about the Bevis Marks Synagogue, the Officer stated that the City Plan proposed a new immediate setting area for Bevis Marks Synagogue. This was the area around the synagogue judged by Officers to contribute positively to its significance as a listed building. These elements could be protected in future planning decisions. This was a bespoke proposal for the synagogue and was similar to the Monument immediate setting area, which already existed. The proposal for the synagogue was the result of a listening exercise which came from the previous Regulation 19 consultation in 2021, where many representations were made requesting this kind of proposal. Proposals for the immediate setting were shared with the synagogue as they were an important stakeholder as the long-term occupant of the building to which the immediate setting area related. However, it was considered that any amendments proposed by the synagogue should be considered with the full range of stakeholder responses as part of the Regulation 19 consultation so that all views in relation to amending any parts of this immediate setting proposal could be taken into account.

The Officer stated that the immediate setting consisted of those elements of the listed buildings setting which contributed to its significance and the synagogue courtyard. The wider setting was the modern city scene which consisted of tall buildings, and some tall buildings were already visible in relation to the synagogue and from the synagogue courtyard. Officers considered that the wider modern setting did not contribute to the synagogue's significance.

In response to Members' questions about tall buildings, an Officer stated that the London Plan required a positive approach to the siting of tall buildings. The current policy in the adopted plan stated that tall buildings in inappropriate areas would be refused without any form of assessment and the City Plan sought to conform with the London Plan.

A Member commented on the reference to Smithfield Market relocating on page 305 of the agenda pack and asked if the wording "should the market be relocated" could be replaced with "when the market relocates". The Officer stated that the conditional term had been used just in case the market did not relocate, although it was understood that in the Corporation's perspective there was the full intention for the market to relocate. Planning documents had to plan for various different scenarios and therefore the conditional term had been used. It was expected that by the time the plan was adopted in 2025, this could be a modification that would be recommended to the inspector.

A Member queried how long the Article 4 direction in relation to housing would be in place. An Officer stated that Article 4 directions were put in place by the City of London Corporation and they lasted until they were withdrawn or potentially amended by the Secretary of State. Although there was no indication that that would be the case, Members were reminded that the City of London was the only place where an Article 4 direction had been allowed by the Secretary of State to cover the entire area of the local authority. The retrofit fast track approach introduced a policy for routes through different alternative uses, where an office floor space would be proposed to be lost. In all scenarios there would be a requirement for marketing evidence covering a period of no less than 12 months for that office to continue as office uses. There were then a number of approaches. The detail of these approaches was set out in the Officer report and was outlined by Officers.

A Member raised concerns about daylight and sunlight assessments not being cumulative and taking account of previous light loss and asked whether they could take account of previous light loss e.g. over the previous 5 years. An Officer stated that local planning authorities had to adhere to the BRE guidance which did not provide a methodology for assessing cumulative impacts going back over time.

In response to Members' questions about the modelling of office floorspace requirement and how figures compared to other financial centres around the world, an Officer stated that there was 1.47 million additional square metres of floorspace that could come forward. A modelling exercise had been undertaken to look at potential capacity on different sites. Factors including economic growth would have a significant impact on the extent to which new office development came forward in the City and 1.2 million square metres of additional office floorspace was the minimum amount required. The City Cluster played a vital role in meeting demand, and the sites within that area were very tightly constrained.

The Officer stated that sites had to deliver office floor space as well as wider benefits. The City was providing the most significant amount of additional floorspace over the next 15 years compared to other London boroughs. It was difficult to compare figures internationally as the City of London was a small area but vacancy rates were a useful indicator of the current situation. Vacancy rates were around 22% for New York, 11% for Singapore and 14% for Hong Kong. Paris and Tokyo had lower vacancy rates. London's vacancy rate as a whole had decreased since the pandemic to around 7.3%. Within the City, the vacancy rate was approximately 10%. Vacancy rates for best-in-class office space were just under 7%. Vacancy rates for other office stock was increasing to 10% and above. Although vacancy rates depended on economic cycles and many other factors, currently London was performing well but there was a need to provide additional floorspace to retain a low vacancy rate.

In response to a Member's request for more information on the aspects which made the City attractive for offices to be located, the Officer stated that there were unrivalled public transport connections and over 6 million people of working age were within a 45 minute journey of the square mile. 99.6% of the City's offices were within a 5-minute walk of one public transport tube station or mainline railway station and many were within more than a 5-minute walk of more than one station. The time zone London was in was also a benefit. London's cultural offer, including Destination City, was another benefit plus amenity space was being provided within offices and also in the wider area. Occupiers wanted environmental credentials within their buildings.

In response to a Member's question about the risks of a pepper-potting approach of residential units, the Officer stated that it was important to maintain a separation between allowing office growth and offices to thrive and to reduce impacts of both uses on each other. A Member endorsed this approach and stated that there had been difficulties when residential buildings were within an office area.

A Member commented on how well connected the City was but raised concern about it being one of the oldest parts of the network. She emphasised the need of upgrading to ensure accessibility and raised particular concern about overcrowding at Tower Hill Station. She stated that to encourage more tall buildings, developers would need to fund the upgrading of the tube network and the transport network. She also stated that riverside walkways were congested and this would need to be addressed. An Officer stated that under the planning contributions policy, appropriate contributions were sought from developers. Contributions were required, specifically through the Community infrastructure Levy to assist in the delivery of the infrastructure necessary to support the implementation of the City Plan and the City's Transport Strategy. In addition, the government and TfL were frequently in negotiations about long term funding for TfL, to assist them to upgrade their stations.

A Member raised concerns about noise complaints from Southwark. Officers would discuss noise issues through the duty to cooperate meetings. There was formal process through the duty to cooperate process, so statements of common ground could be agreed. A Member commented that noise issues across the river had been ongoing for many years.

A Member stated that the context in the history of when Bevis Marks Synagogue and St Paul's Cathedral were built had contributed to their design and size, but they were both living embodiments of their religions and both buildings, irrelevant of size were important heritage buildings. She stated that a development was refused due to the impact on the synagogue and stated the importance of the sky and view around the courtyard of the synagogue as a religious building as well as the importance of light into the synagogue. She stated that the same protection should be given to the heritage skyline. The Member stated that there were concerns about protection being removed under policy 14. She also stated the suggestion put forward by the synagogue to widen the immediate area could help address concerns. She suggested that before going out to consultation, the area could be widened and then if people wanted it reduced, they could respond accordingly.

An Officer stated that the seclusion of the synagogue, reflected its origins and the history of that community at that time. It was in recognition of this that the proposed area had been proposed. The Officer stated that during the Regulation 19 consultation, there would be an opportunity for full consideration by bodies such as Historic England. He added that Officers considered that the sky setting of the synagogue as compared to the sky setting of the cathedral, was fundamentally different.

The London Plan’s proactive approach to the location of tall buildings was being followed and each proposal was taken on its merits. Areas were being outlined where tall buildings would be appropriate in principle, rather than where they would be inappropriate. The Officer stated that a decision in December 2023 designated a conservation area which had a tall building within the designation. He added that the Barbican Conservation Area was a conservation area characterised by tall buildings.

A Member asked how the future requirement of office floorspace was measured. An Officer stated that employment forecasts were the starting point and a pan-London approach was needed. The work of the GLA on employment projections was taken into account.

Matt Dillon, Director and Leader of the City Economics team at Arup, stated that along with Andrew Tyler at Frank Knight, the team had produced the report on office space forecasts. A model for future office needs was based on a number of factors - economic growth projections broken down by subsector and area of London, trends in office attendance, the number of office contracts that lasted for 10 years, the flight to quality and the square feet per employee (which had decreased prior to the pandemic but was now increasing), trends in prices and potential price softening. Three different scenarios were outlined in the report, which produced a spread of between 6 and 20 million square feet needed by 2040 or 2042. The middle scenario was then chosen. He added that it should be noted that the return to the office had been stronger than might have been assumed at the time and whilst economic growth had been weak, London's performance within that looked to be strong.

Andrew Tyler, Frank Knight stated that the government had set out the minimum energy standards for Energy Performance Certificates (EPC's) to ensure that all buildings were rated B by 2030. Across London, 140,000,000 square feet was rated C or below. In the City submarkets, 32 million square feet of offices was rated C or below and 60% was 100,000 square feet or above. He stated that it would be difficult for smaller buildings to achieve the required EPC ratings. The flight to quality from the occupiers also meant Grade B offices no longer had much demand in the City.

In response to a Member’s questions, an Officer stated that the immediate setting proposals both of the Monument and the Bevis Marks Synagogue were not designed to curtail the statutory duty to have regard to their settings. The local planning authority did not have the power to change their status and was trying to be more explicit and articulate about the elements of setting in these two very important cases which contributed to significance and which were therefore worth preserving. The silhouettes or the envelopes proposing as part of the tall building strategy were fundamentally shaped by their impacts or the impacts of them on the three strategic landmarks and they satisfied D9A and 9B of London plan policy, which was where tall buildings should be located and to what heights notionally. This did not remove the need for any qualitative assessment of the individual schemes as they came forward.

A Member asked for clarity on the representation from SAVE Britain's Heritage. An Officer stated that the City Plan was not trying to limit in any way the protection afforded to the synagogue, it was trying to articulate those precise elements of the setting that made a positive contribution to its significance. This did not supersede in any way the standard processes by which proposals and their impact on the building and its setting would be assessed.

The legal adviser addressed the statutory requirements as they were overarching and applied separately to the development plan and there were strong duties. She stated that statute protected all listed buildings. The legal adviser stated that statute protected all listed buildings (Section 66 of the Listed Building and Conservation Areas Act) and that setting had a very wide definition in the national policy framework. The development plan could not reduce the statutory protection, so the setting of the Bevis Marks Synagogue remained protected by statute. The legal adviser stated that harm to the significance of the asset as a result of impact on any part of the setting must by law be given considerable importance and weight, so the identification of an immediate setting could not leave the balance of the setting unprotected. The aim of identifying the immediate setting was initial planning judgment for the purpose of the plan and as to that part of the setting on which the building most relied for its significance. The impact of a building anywhere within its setting would need to be judged on a case-by-case basis as applications were received and this would include any impacts on the existing sky gaps if they formed part of the setting. In relation to questions about whether it should be extended to include the whole block, Officers considered that choosing a whole city block as an immediate setting when significant parts of it might be outside the setting would present difficulties, would be difficult to defend and have a sound argument at public examination.

Seeing no further questions, the Chairman moved to the debate on the item. He stated that following this scrutiny by the Planning and Transportation Committee, there would then be scrutiny by the Policy and Resources Committee and then scrutiny at the Court of Common Council. After this, the influence Members would have would end and it would become a technical document to go towards public consultation. All stakeholders would be able to express their views during the formal, statutory consultation. The City Plan would then be submitted to the Secretary of State with all the representations made under the Regulation 19 consultation for the Secretary of State to decide if any amendments were required. The Chairman stated that this plan was started in 2016 and it was going through a thorough process. He added that it was imperative to continue with the process to get to the end stage.

A Member asked for clarification on the process after the Regulation 19 consultation. The Chairman clarified that it was intended that after the Regulation 19 consultation and any corrections being made, the Plan would be submitted as a whole and he stated that there was substantial evidence that underpinned it. He stated that the Planning and Transportation Committee, Policy and Resources Committee and the Court of Common Council were being asked to approve the plan as a whole., to allow it to go through to the next stage of public consultation and any modifications proposed, if there were any, would go to the Secretary of State and then public examination.

A Member asked for clarification on the process to be followed if modifications were required. An Officer stated that, subject to approval, a list of further changes to the City Plan in response to public representations would be compiled by the Planning and Development Director in liaison with the Chairman and Deputy Chairman of the Planning and Transportation Committee. This was the standard approach that was taken by many local authorities and it would enable the plan to be progressed quickly to the Secretary of State, and then to a planning inspector to allow them to consider all the issues. The planning inspector would put together those modifications that they considered necessary to make the plan sound. Any modifications put by the planning inspector would be subject to further consultation following the examination in public. The Officer recommendations included authorisation to the Planning and Development Director, in consultation with the Chairman and Deputy Chairman to make non-material amendments and editorial changes in the lead up to the public consultation.

A Member raised concern that the process outlined could mean the plan submitted to the Secretary of State was different to that approved. She suggested there should be a special meeting of the Planning and Transportation Committee if modifications were required. The Chairman stated that there had been a number of Member briefings, Members had had sight of the City Plan and the Local Plans Sub-Committee had scrutinised the plan so there had been many opportunities for comments. The Secretary of State would be given details of the process and changes that had taken place as part of the transparent process. It was important that the inspector and the Secretary of State scrutinised the Corporation's processes.

A Member suggested that the policies, documents and maps could be made more user-friendly and that processes should be fair and transparent to encourage people to engage.

A Member suggested that any changes agreed by the Director of Planning and Development, the Chairman and Deputy Chairman could be shared with the Committee Members.

Having fully debated the item, the Committee proceeded to vote on the recommendations before them.

Votes were cast as follows: IN FAVOUR – 18 votes
OPPOSED – None
There was 1 abstention.

The recommendations were therefore carried.

RESOLVED – That Members of The Committee

1. Agree the proposed changes to the City Plan set out in Appendix 2 of the Officer report and that the City Plan 2040 (Appendix 3 of the Officer report) be published for pre-submission consultation, subject to the approval of the Policy and Resources Committee and Court of Common Council;
2. Agree that, following consultation, the City Plan, the public representations and other supporting documentation be submitted to the Secretary of State, for examination;
3. Authorise the Planning and Development Director, in liaison with the Chair and Deputy Chair of the Planning & Transportation Committee, to compile a list of further changes to the City Plan in response to public representations and submit this to the Secretary of State; and
4. Authorise the Planning and Development Director to make further non-material amendments and editorial changes prior to public consultation and submission to the Secretary of State.

6. *** ANNUAL ON-STREET PARKING ACCOUNTS 2022/23 AND RELATED FUNDING OF HIGHWAY IMPROVEMENTS AND SCHEMES**

The Committee received a report of the Chamberlain concerning the Annual On-Street Parking Accounts and Related Funding of Highways Improvements and Schemes before submission to the Mayor for London.

RESOLVED - That Members of the Committee note the contents of the report before submission to the Mayor for London.

7. *** TO NOTE THE MINUTES OF THE PLANNING APPLICATIONS SUB-COMMITTEE - 8 DECEMBER 2023**

The Committee received the public minutes of the meeting held on 8 December 2023.

RECEIVED.

8. **QUESTIONS ON MATTERS RELATING TO THE WORK OF THE COMMITTEE**

A Member stated that he had been liaising with Officers on whether a register existed of conditioned community, cultural and heritage space and also start-up space and space for social enterprises and charity use. He had been advised that there was not a register but a draft was in process.

The Member asked how these were recorded so that they could be promoted to interested parties and how the spaces were monitored post development to ensure they were being used for the correct purpose or whether they were used at all.
An Officer stated that there were some community spaces in operation and there were more currently under construction. Officers would consider which team corporately should keep records and Members would be kept updated. The Officer thanked the Member for raising this and stated that a register would be maintained and publicised externally.

9. **ANY OTHER BUSINESS THAT THE CHAIRMAN CONSIDERS URGENT**

Member-Led Recruitment

The Committee considered a report of the Chief People Officer and Executive Director of Human Resources which outlined the proposed process for the recruitment to the Executive Director of Environment post. This report had been circulated as a late report.

An Officer stated that it was intended to have recruited to this post by mid-April 2024. The candidate's start date would be dependent on their availability. The Officer stated that the report would also be submitted to the Corporate Services Committee, Port Health and Environmental Services Committee, the Natural Environment Board and also the Licensing Committee under urgency in order to progress with the recruitment as soon as possible. The Officer highlighted the elements of the recruitment process which were set out in the Officer report.

A Member stated the importance of seeking applicants widely from different backgrounds and requested that this take place.

RESOLVED – That Members of the Committee

1. Agree the proposed recruitment timetable (including assessment centre) as outlined in the Officer report;
2. Agree the proposed Interview panel as outlined in this report;
3. Agree the proposed selection of search and select agencies (headhunters) for this appointment; and
4. Agree that decisions on alternative panel representation from the committee, e.g. in the event of an absence or availability of a Member is delegated to the Town Clerk and Chief Executive. This is to allow the recruitment to continue without delay.

Alan Benson

The Chairman stated that it was with great sadness that the news of Alan Benson's death last month was received. He stated that Alan was a passionate and tireless campaigner for disabled people's right to travel freely and confidently. His work included co-chairing Transport for All, the disabled-led group that worked to break down barriers to create an accessible transport system and the City of London Corporation had been working with the group for a number of years.

The Chairman added that as a member of the Transport Strategy Board, Alan had a significant influence on the City's efforts to make its streets accessible and inclusive. He stated that Alan would be sorely missed and he would like to take this opportunity for the Committee to record his considerable contribution to improving travel for disabled people and to offer sincere condolences to Alan's wife, his family and his colleagues.

10. **EXCLUSION OF THE PUBLIC**

RESOLVED – That under Section 100(A) of the Local Government Act 1972, the public be excluded from the meeting for the following items on the grounds that they involved the likely disclosure of exempt information as defined in Part I of the Schedule 12A of the Local Government Act.

11. **NON-PUBLIC MINUTES**
RESOLVED – That the non-public minutes of the meeting held on 12 December 2023 be approved as an accurate record.

12. *** ANNUAL ON-STREET PARKING ACCOUNTS 2022/23 AND RELATED FUNDING OF HIGHWAY IMPROVEMENTS AND SCHEMES - NON-PUBLIC APPENDIX**
RESOLVED - That the non-public appendix be noted.

13. **NON-PUBLIC QUESTIONS ON MATTERS RELATING TO THE WORK OF THE COMMITTEE**
There were no non-public questions.

14. **ANY OTHER BUSINESS THAT THE CHAIRMAN CONSIDERS URGENT AND WHICH THE COMMITTEE AGREES SHOULD BE CONSIDERED WHILST THE PUBLIC ARE EXCLUDED**
There were no additional urgent items of business for consideration in the non-public session.

The meeting closed at 11.00 am

Chairman

Contact Officer: Zoe Lewis
zoe.lewis@cityoflondon.gov.uk

Agenda Item 4

PLANNING AND TRANSPORTATION COMMITTEE – OUTSTANDING ACTIONS

Item	Date	Action/ Responsible Officer	Progress Update and Date to be progressed/completed
1	17 Nov 2020, 15 Dec 2020, 5 Jan 2021, 26 Jan 2021, 16 Feb 2021, 24 Feb 2021 9 March 2021, 30 March 2021, 22 April 2021, 12 May 2021 8 June 2021, 29 June 2021, 20 July 2021, 7 Sept 2021, 21 Sept 2021, 26 Oct 2021, 16 Nov 2021, 14 Dec 2021, 11 Jan 2022 1 Feb 2022, 22 Feb 2022, 26 April 2022, 17 May 2022, 7June 2022 1 July 2022, 19 July 2022, 20 Sept 2022 11 Oct 2022, 1 Nov 2022, 10 Jan 2023 7 March 2023, 11 May 2023, 18 July 2023 3 October 2023 21 November 2023 12 December 2023, 31 January 2024, 5 March 2024.	**Member Training** **Chief Planning Officer and Development Director / Director of the Built Environment** A Member questioned whether there would be further training provided on Daylight/Sunlight and other relevant planning matters going forward. She stated that she was aware that other local authorities offered more extensive training and induction for Planning Committee members and also requested that those sitting on the Planning Committee signed dispensations stating that they had received adequate training. The Chair asked that the relevant Chief Officers consider how best to take this forward. He also highlighted that the request from the Town Clerk to all Ward Deputies seeking their nominations on to Ward Committees states that Members of the Planning & Transportation Committee are expected to undertake regular training.	**UPDATE: (5 March 2024):** New Committee Members are provided with training on key aspects. A programme of wider Member training was implemented in 2023. The first of the recordings (regarding Material Planning Considerations) were sent to members with a Q&A on this topic prior to the 11 May 2023 Planning and Transportation Committee meeting. The next member training material on fire safety has been arranged for 29 February 2024. Heritage training is being arranged for Quarter 1 2024.

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Committee(s):	Date(s):	Item no.
Planning and Transportation Committee	5 March 2024	

Subject:	Public
Salisbury Square Development - Appropriation for Planning Purposes	
Report of:	**For Decision**
City Surveyor	

Ward (if appropriate):
Farringdon Within Castle Baynard Ward

Summary

This report seeks your approval for the appropriation of land for planning purposes in order to engage the provisions of Section 203 of the Housing and Planning Act 2016 ("Section 203") to facilitate the carrying out of the redevelopment of Salisbury Square (the "Redevelopment Site").

The City Corporation (in its capacity as local planning authority) granted planning permission to the City Corporation (in its capacity as landowner of the Redevelopment Site) for a scheme for the Redevelopment Site on 30 July 2021 under planning reference 20/00997/FULEIA ("the Development"). The Development provides for a new combined law courts building, a new police station, offices and public realm. There is a critical path for the Development arising from the programme for Her Majesty's Courts and Tribunals Service ("HMCTS") to occupy the new City of London Law Courts building for the administration of justice within 3 months of Practical Completion on 28 September 2026 and from the need for the City of London Police to occupy the new police station by March 2027 when its lease on existing premises at 21 New Street ends.

Delva Patman Redler, Rights of Light consultants to the City of London have advised that the Development is at risk due to injunctable Rights of Light which are most unlikely to be released on the basis of reasonable compensation negotiations within the foreseeable future.

Implementation of the Development within the critical path programme would be facilitated by the appropriation of the Main Development Site for the planning purposes of the Development. This would remove the injunction risk pursuant to Section 203. Section 203 authorises interferences with Rights of Light and Section 204 provides that compensation is payable for any interference with a right or interest or breach of a restriction which is authorised by Section 203. Negotiations to settle compensation payments would continue after any appropriation and all existing offers made to rights holders would be honoured.

(This report has been updated (at Paragraph 6 and Appendix 1) since it was deferred from your meeting of 12 December 2023 to reflect the current position)

Recommendation

It is recommended that it be resolved that:

1. The Main Development Site is no longer required for the purpose for which it was acquired;
2. The Main Development Site to be appropriated for the planning purpose of the Development (in its current form or as it may be varied or amended); and
3. All existing offers made to rights holders be honoured.

Main Report

1. Background

1.1 The Development Site (see Site Plan at **Appendix 2**) comprises:

1.1.1 **Chronicle House, 72-78 Fleet Street; 80-81 Fleet Street; 2-3 Salisbury Court; Greenwood House, 4-7 Salisbury Court; 1 Salisbury Square and 8 Salisbury Court; Fleetbank House 2 -6 Salisbury Square; 35 Whitefriar's Street and 36-38 Whitefriar's Street** acquired by the City Corporation in its City Fund (local authority) capacity under Section 7 of the City of London (Various Powers) Act 1958 for "strategic purposes", prior to the Development being contemplated by the City Corporation ("The Main Development Site"); and

1.1.2 **69, 70 and 71 Fleet Street** acquired by the City Corporation in its City Fund (local authority) capacity under Section 7 of the City of London (Various Powers) Act 1958 in 2018 for the purposes of the Development.[1]

1.2 The City Corporation (in its capacity as local planning authority) resolved to grant planning permission for the Development on 22nd April 2021. The Development was

[1] The delegated report of 17/9/2018 which authorised the acquisition of 69-71 Fleet Street states that "*It is intended to hold 70 Fleet Street as a strategic property within the overall City Fund Estate*" However, in respect of the related disposal of Eden House, the Report to 10/10/2018 Property Investment Board of the Action taken Between Meetings states that the purchase of 70 Fleet Street is to be funded from the allocation of funds approved by Court of Common Council to proceed with a Combined Courts, Police and Commercial project on the Fleet Street Site. It can therefore be reasonably inferred that the 69, 70 and 71 Fleet Street site was acquired for the purposes of the proposal and therefore the requirement set out at section 203(2)(d) and (5)(d) of the Housing and Planning Act 2016 is satisfied.

supported by the Mayor. Planning permission was granted for construction of a new combined law court, a new police station, and a new office building together with public realm works on 30th July 2021 under planning reference 20/00997/FULEIA. An image of the permitted Development is at **Appendix 3.**

1.3 As set out in the Planning and Development Director's Report to the Special Planning and Transportation Committee of 22nd April 2021 ("the Planning Report"), the proposal was considered to be in substantial compliance with the policies that relate to it including the strategic objective to promote the City as the leading international financial and business centre and London Plan Policy S1 that supports the development of London's social infrastructure. The scheme provides a development that would reinforce the City's reputation as a global centre for business (especially legal business), with the state-of-the-art Court and police station supporting the vision to modernise and upgrade the justice system such that it works for everyone. The scheme delivers a high-quality commercial building which will meet business needs, supporting and strengthening opportunities for continued collaboration and clustering of businesses, especially in the legal services sector. The buildings would be designed to high sustainability standards with dedicated areas of planting and greening being incorporated to significantly increase the biodiversity on site. The scheme will preserve the special architectural and historic interest, as well as heritage significance of many of the buildings within the area.

1.4 The buildings formerly on the Redevelopment Site have been demolished and redevelopment has commenced.

1.5 There is a critical path for the Development arising from the programme for Her Majesty's Courts and Tribunals Service ("HMCTS") to occupy the new combined law courts building for the administration of justice within 3 months of Practical completion of 28 September 2026 and from the need for the City of London Police to occupy the new police station by March 2027 when its lease on existing premises at 21 New Street ends. Were the programme to be impeded or delayed the provision of public services and delivery of public benefits would be compromised, as set out in **Appendix 1**.

1.6 The Development raises Rights of Light issues as there are properties surrounding the Development Site which enjoy rights of light over the Development Site. A Right of Light is an interest in land (i.e. an easement) which entitles a neighbouring land owner to enjoy light across their neighbour's land. Development that causes interference with the right often entitles the rights holder to claim compensation and/or an injunction preventing development. In this case there are affected Rights of Light that could give rise to injunction applications to prevent the Development ("injunctable Rights of Light") (see List of Affected Properties at **Appendix 4**).

2. Appropriation and the operation of Section 203

2.1 A person may carry out building or maintenance work or may use land even if it involves interfering with a relevant right or interest (including rights of light) if the four conditions set out in Section 203(2)(3)(5) and (6) are satisfied (as applicable).[2] A person is liable to pay compensation for any interference with a relevant right interest which is authorised by section 203. Therefore where the statutory override provisions of Section 203 are engaged, no injunction may be obtained to prevent development causing such interference.

2.2 69-71 Fleet Street was acquired by the City Corporation (acting as local authority) after 13th July 2016 for the purposes of facilitating the Development and all four conditions referred to in Section 203(2) and (5) are satisfied in relation to that land.[3]

2.3 The Main Development Site was acquired in 2008 for "general strategic purposes" prior to the new combined court and police station proposals being contemplated. It was not therefore acquired for planning purposes related to the Development (being the building work now contemplated).

2.4 An appropriation of the Main Development Site for the planning purpose of facilitating the Development would result in Section 203 being engaged in respect of the entirety of the Development Site.

2.5 Section 12 authorises the City to appropriate land belonging to it to for any purpose for which it is authorised to acquire land if it is not required for the purpose for which it was acquired.

2.6 Court of Common Council resolved on 1 December 2011 that the determination of whether or not to proceed with acquisitions or appropriations should be delegated to your Committee (which may delegate matters to the Town Clerk in consultation with the Chairman and Deputy of your Committee). This was affirmed by Court of Common Council on 8 December 2016 (following changes to the relevant statutory provisions) in

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[2] The 4 conditions are that: the land has become vested in or acquired by a specified authority or appropriated by a local authority for planning purposes after 13 July 2016 or is other qualifying land; there is planning consent for the building; the authority could acquire the land compulsorily for the building; the building is used for purposes for which the land was vested in acquired or appropriated

[3] See footnote 4 in respect of conditions (a) to (c) and footnote 1 and paragraph 2.2 in respect of condition (d)

resolving that acquisitions and appropriations may be considered by your Committee on a case by case basis "*to allow developments to proceed (where they would otherwise be inhibited by injunctions or threats of injunctions prohibiting infringements of rights of light) subject to: (i) such development being in the public interest, such public interest being sufficient to justify interference with any private rights and proportionate; (ii) the relevant criteria [listed at paragraph 3.2 below] being met; and (iii) where feasible and appropriate in the circumstances of the case, prior consultation being carried out by rights holders being appropriately advised of the proposed resolution, made aware of any report, and provided with a contact at the City Corporation to whom they can direct comments*."

2.7 The relevant criteria (as referred to in paragraph 2.4 above) were set out in Appendix 1 to the report from your committee to the Court of Common Council which was presented on 8th December 2016. Those criteria are set out in paragraph 3.2 below, and their application is considered in **Appendix 1** to this report.

3. Considerations

3.1 In order to appropriate the Main Development Site for the planning purpose of facilitating the carrying out of the Development pursuant to Section 12 of the 1949 Act the City Corporation must be satisfied that the land is no longer required for the purposes for which it was acquired, and that the purpose for which the land is to be appropriated is one for which the City Corporation is authorised to acquire land.

3.2 In order to resolve to appropriate the Main Development Site in order to engage the Section 203 statutory override provisions your Committee must be satisfied there is a compelling case in the public interest that justifies authorising interference with relevant rights in order to allow the building or maintenance work or use proposed to be carried out within a reasonable time, and in particular, that:

3.2.1 There is planning consent for the proposed development;

3.2.2 Acquisition or appropriation and consequent engagement of Section 203 will facilitate the carrying out of development, redevelopment or improvement on or in relation to land, and in particular the proposed development for which planning consent has been obtained, or similar development;

3.2.3 The development, redevelopment or improvement will contribute to the promotion or improvement of the economic, social or environmental wellbeing of the City's area and those benefits could not be achieved without giving rise to all of some of the infringements - therefore it is in the public interest that the land be appropriated by the City for planning purposes, so as to facilitate the development proposed or similar development;

3.2.4 There will be infringements of one or more relevant rights or interests as defined in section 205(1) of the Housing and Planning Act 2016 or breach of a restriction as to user of land which cannot reasonably be avoided;

3.2.5 The easements to be interfered with cannot reasonably be released by agreement with affected owners within a reasonable time (and adequate evidence of satisfactory engagement, and where appropriate negotiation, has been provided for consideration by your Committee);

3.2.6 The ability to carry out the development, including for financial or viability reasons, is prejudiced due to the risk of injunction, and adequate attempts have been made to remove the injunction risks;

3.2.7 A decision to appropriate in order to engage Section 203 would be broadly consistent with advice given in the DLUHC Guidance on Compulsory Purchase so far as relevant;

3.2.8 The use of the powers is proportionate in that the public benefits to be achieved outweigh the infringement of human rights;

3.2.9 Rights holders have been consulted regarding the engagement of section 203 wherever feasible and appropriate in the circumstances of the case.

3.2.10 The authority could acquire the land compulsorily for the purposes of the building or maintenance work or the use of the land (and where the land in issue is currently owned by the authority it is to be treated for these purposes as not currently owned by the authority).

3.3 The issues are evaluated at **Appendix 1**. It is considered, on the basis of the evaluation at **Appendix 1**, that the criteria for appropriation of the Main Development Site are fully met (subject to consideration of any consultation responses, which will be reported to your Committee).

4. Legal Implications

4.1 The specific "Separation of Functions" considerations which applied to the determination of the application for planning permission (whereby members and officers involved in promoting the proposal should not also be involved in determining the planning application) are not engaged in considering whether or not to appropriate the Main Development Site for the planning purposes of the Development. The appropriation decision is for the City Corporation as local authority landowner (not as local planning authority). Other than for the determination of planning applications the usual principle applies that involvement in other committees does not give rise to conflicts, and Members are well used to wearing different "hats" and in only applying the considerations relevant to the decision before them.

4.2 Any appropriation would be recorded by a Memorandum of Appropriation prepared by the Comptroller and City Solicitor and placed on the Deed Packet for the redevelopment Site.

4.3 All other legal implications are included in the body of the report and Appendix 1.

5. Financial Implications

None

6. Consultees

On 21 September 2023 a letter was sent from the City to 14 affected rights holders advising that appropriation was being considered (**Appendix 6**). Affected rights holders were invited to contact the City Surveyor, Paul Wilkinson, within 14 days of the letter should they have any comments. Four responses were received seeking further negotiations, and challenging the lawfulness of appropriation including on the basis it would be premature (partly due to alleged lack of "meaningful engagement") In response to the three letters and one email, replies were sent and the City was open to counter-offers at all times. Since the letters were sent, compensation sums have been agreed with two of the parties who responded. The contents of the responses are not considered to undermine the justification for appropriation. In particular, the criteria at 3.2.5 above that **"the easements to be interfered with cannot reasonably be released by agreement**

with affected owners within a reasonable time" is considered to be met (notwithstanding the contents of the responses) for the reasons set out at paragraphs 3.2.5.3 and 3.2.5.4 of Appendix 1. In brief, this is largely because it is not realistic to envisage that agreements will be reached with all remaining rights holders within the critical path for the new combined court building and police station. In addition there remains a risk that rights holders may seek an injunction. Rights holders were advised of the report recommending appropriation placed on the Agenda for your 12 December 2023 meeting, and notified that they could provide comments to the City Surveyor. It became apparent just prior to the meeting of 12 December 2023 that not all rights-holders may have received the notice regarding the 12 December 2023 meeting. The item was therefore withdrawn from the Agenda. Appendix 1 has been updated since 12 December 2023 to reflect the current position regarding negotiations with rights holders. Rights holders have also been advised of this report to your meeting of 5 March and notified that they may provide comments to the City Surveyor.

Your Committee will be made aware of any further representations received from them.

7. Conclusions

It is considered that the appropriation of the Main Development Site for the planning purposes of the Development in order to engage the Section 203 statutory override provisions should be approved (subject to consideration of any consultation responses). The relevant criteria have been evaluated and the outcome of the evaluation supports the Recommendations. The Recommendations will facilitate the carrying out of the Development. Those with Rights of Light that are infringed will be entitled to compensation and negotiations to settle compensation will continue.

Background papers: Planning Report

Appendices:

1. **Evaluation**
2. **Site Plan**
3. **Image of Development**
4. **List of affected properties**
5. **Letter from Delva Patman Redler 12 September 2023**

5A. Letter from Delva Patman Redler 20 February 2023

6. **Consultation Letter from the City to affected rights holders**

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APPENDIX 1 – EVALUATION OF CRITERIA

The criteria for appropriation set out at Paragraph 3 of the Report are considered below (following the paragraph numbers in the Report):

3.1 **Is the Appropriation power in Section 12 engaged**

3.1.1 It is considered that the Main Development Site is no longer required for the purpose for which it was acquired**.** [4] The acquisition was intended to secure the future provision of Grade A floorspace which was rare in the vicinity at that time**.** However, it has since been determined, both in the City Corporation's landowner capacity and in the City Corporation's local planning authority capacity, that strategic objectives and the public interest can be achieved by the Development. As such, the Main Development Site is no longer required for the purpose for which it was acquired.

3.1.2 The City Corporation would be authorised to acquire the Main Development Site for the purposes of the Development (under Sections 226 and 227 of the Town and Country Planning Act 1990).

3.1.3 By reason of 3.1.1 and 3.1.2 the City Corporation's power to appropriate the Main Development Site for the purposes of the Development is engaged.

3.2 **In order to resolve to appropriate the Main Development Site your Committee must be satisfied there is a compelling case in the public interest** for the powers conferred by section 203 to be engaged in order that the Development can be carried out within a reasonable time, and in particular, that:

3.2.1 **There is planning consent for the proposed development**: Planning consent was granted on 30 July 2021 under reference 20/00997/FULEIA

3.2.2 **The appropriation and consequent engagement of Section 203 will facilitate the carrying out of the Development**:

[4] The Finance Committee report of 23/9/2008 seeking support for the potential acquisition stated that "*this particular acquisition has a number of strategic advantages*". The Urgency report to Court of Common Council of September 2008 stated that it was "*a large site capable of accommodating a substantial redevelopment scheme in this pivotal midtown location. It is envisaged that any redevelopment scheme would provide grade A space on substantial floorplates which are, at present, rare in the immediate vicinity*"

3.2.2.1 Demolition has occurred. The construction programme is for the main works contract to be delivered by Mace to achieve Practical Completion on 28 September 2026. Occupation of the new City of London Law Courts is planned within 3 months of Practical Completion i.e. by end December 2027 and for the City of London Police by the expiry of the lease for 21 New Street, 31 March 2027.

3.2.2.2 Given the indication from Delva Patman Redler outlined below that there are injunctable Rights of Light which are most unlikely to be released by agreement within a reasonable time, it does not appear that the Rights of Light issues can be resolved without use of Section 203, and appropriation is therefore considered to be necessary to facilitate the carrying out of the Development.

3.2.3 **The development, redevelopment or improvement will contribute to the promotion or improvement of the economic, social or environmental wellbeing of the authority's area**:

3.2.3.1

a) The proposed new combined court will allow court services to be relocated from the City of London Magistrate's Court (currently at 1 Queen Victoria Street) and the Mayor and City of London Court (a County Court, currently at Guildhall Yard) to the Development Site. The City Corporation (as landowner), in liaison with HMCTS is working to provide combined court accommodation for the Magistrate's Court and County Court to provide modern facilities which can harness modern technology to provide outstanding customer service, both virtually and through fewer, more suitable buildings better able to accommodate the necessary infrastructure. It is considered this will enhance the administration of justice, including in high-profile fraud and economic crime cases (including, potentially, international cybercrime). This will also help maintain the City's role as an international business centre by helping to consolidate the legal hub in the Fleet Street vicinity.

b) The proposed new police station will support the vision to modernise and upgrade the justice system such that it works for everyone, doing so through the use of new technology, infrastructure, services, processes and ways-of-working. The police station will provide headquarters for the City of London Police including in its role as lead force for economic and cyber-crime and deliver operational efficiencies. Alongside the Court, the introduction of the Police Station would offer a substantial public benefit and contribute to reinforcing the area as a legal quarter.

c) The commercial office building proposed for the eastern part of the Development Site will ensure the retention of some office space and contribute to meeting demand for new Grade A office space compliant with modern energy efficiency requirements, and contribute to the assembly of mixed uses at the Development Site.

d) The Development includes public realm enhancements such as an extended new amenity space in Salisbury Square and generously proportioned accessible new east-west public routes through the site. This would connect Whitefriars with Salisbury Court with approximately 100% increase of dedicated public realm across the development. In addition, Salisbury Square would increase in size by 42%. There would be enhanced pedestrian permeability with generous, wider routes between Fleet Street, Whitefriars Street, Primrose Hill and Salisbury Square, and a new, significant view of St Bride's Church Spire from the north passage.

e) The London Plan includes the following policies:

   i. Policy SD4 The Central Activities Zone – (CAZ) sets out the strategic priorities for the CAZ including the following:

      - The unique international, national and London-wide roles of the CAZ, based on an agglomeration and rich mix of strategic functions and local uses, should be promoted and enhanced.
      - The nationally and internationally significant office functions of the CAZ should be supported and enhanced by all stakeholders, including the intensification and provision of sufficient space to

meet demand for a range of types and sizes of occupier and rental values

- The distinct environment and heritage of the CAZ should be sustained and enhanced.
- The CAZ as a centre of excellence and specialist clusters including functions of state, health, law, education, creative and cultural activities, and other more local Special Policy Areas should be supported and promoted.

ii. Policy GG5 (Growing a good economy) states that those involved in planning and development must:

- Promote the strength and potential of the wider city region
- Seek to ensure that London's economy diversifies and that the benefits of economic success are shared more equitably across London
- plan for sufficient employment and industrial space in the right locations to support economic development and regeneration
- ensure that sufficient high-quality and affordable housing, as well as physical and social infrastructure is provided to support London's growth
- ensure that London continues to provide leadership in innovation, research, policy and ideas, supporting its role as an international incubator and centre for learning

iii. Policy E1 (Offices) states that the unique agglomerations and dynamic clusters of world city businesses and other specialist functions of the central London office market, including the CAZ, should be developed and promoted, and improvements to the quality, flexibility and adaptability of office space of different sizes (for micro, small, medium-sized and larger enterprises) should be supported by new office provision, refurbishment and mixed-use development

3.2.3.2 London Plan Policy S1 supports the development of London's "social infrastructure". Paragraph 5.1.1 provides that for the purposes of Policy S1 "social infrastructure" includes "*criminal justice and emergency facilities*".

3.2.3.3 The City of London Local Plan states:

Strategic Objective 1 – To maintain the City's position as the world's leading international financial and business centre

3.2.3.4 Paragraph 1.15 of the Local Plan states "It [the City Corporation] will, where necessary, use its land and property ownership to assist with site assembly and use its compulsory purchase powers to enable the high quality development the City needs"

3.2.3.5 In conclusion the appropriation of the Main Development Site to enable the operation of Section 203 will facilitate the carrying out of the Development which will contribute to the achievement and improvement of the economic well-being of the City by helping consolidate the legal business cluster and the City's role as a business centre. The environmental and social well-being of this part of the City will be promoted through the improvement of public realm and provision of accommodation for the better administration of justice and the City of London Police Force.

3.2.4 **There will be infringements of one or more relevant rights or interests which cannot reasonably be avoided:** Delva Patman Redler, the Rights of Light advisers appointed by the City Corporation in its capacity as landowner, have analysed the impact of the Development at the Main Development Site on the adjoining properties. Based on that advice there are 13 properties and 14 ownership interests, with injunctable rights of light. Two of the interests have released their rights through settled Deeds of Release. The remaining properties where rights have not been released are shown in **Appendix 4** to this Report. This is made up of 11 commercial properties (2 of which have residential upper floors) and 1 residential property. As regards the impacts in planning terms, issues of daylight sunlight and overshadowing were fully considered when the committee resolved to approve the consented scheme on 14 June 2021. That evaluation set out in the Planning Report concluded that there are a small number of major and moderate adverse impacts, but for many windows and rooms the impact is considered to be minor adverse or negligible. When considered against the wider benefits of the scheme, including the substantial improvements to Salisbury Square and sunlight to the square, these impacts are considered to be acceptable and in line with policy DM10.7 of the Local Plan.

3.2.5 **The easements to be interfered with cannot reasonably be released by agreement with affected owners within a reasonable time:**

3.2.5.1 Delva Patman Redler advise that it is not possible to make any further small alterations to the size or shape of the Development at the Main Development Site such as to have any meaningful impact on the rights of light position.

3.2.5.2 The exacting requirements of the combined court and the need to comply with the HMCTS design guide includes multiple stair cores, controlled and public circulation and a disposition of internal accommodation that has been carefully designed with an external envelope within the constraints of the London View Management Framework. This resultant design averts the risk of interference between judicial, jury staff, witnesses and the public that could result in contamination and hearings being adversely affected .

There are similar, exacting operational requirements of the City of London Police force that determine the disposition of internal accommodation and separation of specialised units, economic crime department, forensics, vulnerable witnesses etc within the blast hardened structure that defines the shape and massing of the building.

For these reasons any further shouldering of the upper floors of the court building and police headquarters is not possible without impacting the operational effectiveness of this infrastructure of national importance.

3.2.5.3 In deciding whether it is necessary to appropriate the Main Development Site so as to rely on Section 203 and thereby facilitate the carrying out of the Development, consideration should be given to whether agreements to permit infringement can be reached with owners of affected properties with rights of light on reasonable terms and within reasonable timeframes.

3.2.5.4 The history of the negotiations between the City Corporation (as landowner) and persons whose rights of lights are infringed by the Development is that Delva Patman Redler were appointed in September 2019 to analyse the impact of the Development on 22 adjoining properties. 20 freehold owners and one long leaseholder of 20 impacted properties were approached. The owners of the other two properties were not approached because the City of London Corporation own the freehold titles and it is understood no other party enjoys a right to light over the development site. Following surveyor appointment internal layouts were confirmed and the technical assessments updated. 7 property interests were deemed to not be impacted by the development. Of these 7 property interests, 6 adjoining freehold owners' surveyors have been notified the negotiation is closed. No further comment or concern has been raised by those neighbours and it is not expected they will do so in the future. The mutual release is being sought with the 7th property interest because it is also being redeveloped. The 14 remaining property owners, who are likely to suffer a material loss of light, have all been made offers of compensation. Deeds of Release have been settled in respect of two interests. The most recent offers were made in December 2023. Compensation sums have been agreed in respect of a further three owners. The offers were calculated using the industry standard book value methodology with a multiplier. Delva Patman Redler consider the offers made to be fair and reasonable and they have successfully agreed compensation with five rights holders (including two Deeds of Release). Any further progress will be reported at your meeting. Delva Patman Redler state that, despite the offers being made at a fair and reasonable level, they have been unable to conclude negotiations with all rights holders. Delva Patman Redler advise that the inability to conclude negotiations creates considerable concern that the development will not be able to progress within the set timetable as planned, and that this could put successful delivery of the development at risk. Delva Patman Redler draw attention to the fact that it would be open to the owner of a neighbouring property to seek an injunction. There is little or no incentive for rights holders to prioritise or commit resources (even where paid for by the developer) on promptly progressing settlements, whereas the developer's interests are in securing settlements promptly within the project programme, otherwise construction works are at risk of being halted by injunction Any injunction resulting in the suspension of construction works would significantly impact the public benefit that the development will provide and would exacerbate the backlog of judicial cases that the Ministry of Justice is seeking to recover. Delay to construction works would further impact the City of London Police force's effectiveness in fighting crime within the Square Mile in fighting fraud and economic crime where COLP are the nation's leading force. The new headquarters for COLP will provide a resilient, state of the art headquarters that consolidates the facilities that existed at Snowhill, Wood Street and the ageing Bishopsgate station that does not provide the infrastructure and facilities for effective policing in the 21st century. These existing facilities were designed and built where national policing encountered completely different threats and potential risks to infrastructure in providing crime prevention. The new headquarters for the force will be designed to withstand a range of risks to policing including blast, chemical and biological threats and potential terrorist threats. The new headquarters will incorporate a completely modern custody suite designed to the latest Home Office standards. The remaining provision of internal accommodation will combine a co-location of different departments working across the force both nationally and locally in effectively and efficiently fighting major crime, particularly in the specialist areas of cyber, fraud and economic crime.

3.2.5.5 The need for the new City of London Law Courts to become operational at the earliest time is of also of importance. The ageing Mayor's and City of London Court, and the City of London Magistrates' Court currently provide a total of eight hearing rooms. The City of London Law Courts that will replace these sites will provide a total 18 hearing rooms, ten additional hearing rooms compared with existing court capacity, of which eight will be new additional Crown Court rooms. The new court building combines magistrates, civil courts and Crown courts which brings also operational efficiencies for HMCTS, by locating staff and resources into a single large location. It will also provide more modern facilities for court users, including lifts, wide corridors, access for wheelchairs and a range of other measures to make it more accessible for people with disabilities. Any suspension of construction works would delay access to the benefits of ten additional courtrooms and improved facilities for court users, placing a potential risk on future court performance for HM Courts & Tribunals Service who are currently committed to reducing the number of outstanding cases in the criminal justice system.

As reported by the Law Society, data released in April 2023 shows that problems in the criminal justice system are persisting, the Law Society of England and Wales has said. From February 2022 to February 2023 there was a 6% increase in the Crown Court backlog of outstanding cases, despite a 1% fall from January – February 2023 where the Crown Courts outstanding caseload rose by 3,539 cases from 57,539 in February 2022 to 60,898 February 2023. The continuing lack of progress to reduce the backlog makes it unlikely the government will achieve its target of cutting the number of cases waiting to come to court to 53,000 by March 2025. HMCTS management information reveals that there was an increase in the number of outstanding cases in the Magistrates' Court, undermining suggestions from government that the situation is improving.

3.2.5.6 In this case, Delva Patman Redler consider that there is a risk that a neighbouring owner/s may seek an injunction. The risk that an injunction may be sought causes great uncertainty and undermines the prospect of the scheme being delivered. On the basis of the Delva Patman Redler letters(**Appendices 5 & 5A**) there is also a very considerable risk that negotiations with affected owners will not be completed within a reasonable time, and that the programme for provision of much needed court and police facilities will be delayed or frustrated. In addition Delva Patman Redler advise [that there are counter offers beyond reasonable market figures and that] reasonable offers have been made. [The quantum of the counter offers is another indicator that agreement is not likely to be reached within a reasonable period.]

3.2.5.7 That being the case, Delva Patman Redler consider it most unlikely that, in the foreseeable future, negotiations will result in agreements to release Rights of Light. For the reasons set out at paragraph 3.2.5.6, it is virtually inevitable that there will be extant Rights of Light in place long after the date when (if the critical path programme is adhered to) the construction of the Development would infringe such Rights.

3.2.5.8 The matters referred to by Delva Patman Redler at paragraphs 3.2.5.4, 3.2.5.6 and 3.2.5.7 of this report are set out in their letter of 12 September 1993 at **Appendix 5** of this report and their letter of 20 February 2024 at **Appendix 5A** of this report.

3.2.6 **The ability to carry out the Development is prejudiced due to the risk of injunction, and adequate attempts have been made to remove the injunction risks**: This criteria is considered met for the reasons set out at 3.2.5

3.2.7 **A decision to acquire or appropriate in order to engage section 203 of the Housing and Planning Act 2016 would be broadly consistent with government advice** given in the Department of Levelling Up, Housing and Communities Guidance on Compulsory Purchase (2019): the principles set out in the guidance as to whether a compulsory purchase order is justified reflect the criteria adopted by Court of Common Council and evaluated in this Appendix. It is considered that the evaluation and recommendation are consistent with the principles in the guidance**;** in particular there is a compelling case in the public interest for the provisions of section 203 to be engaged in order to facilitate the carrying out of a development which is desirable in the public interest.

3.2.8 **The use of the powers is proportionate in that the public benefits to be achieved so as to outweigh the infringement of human rights:**

3.2.8.1 The Human Rights Act 1998 requires the City Corporation to act in accordance with the European Convention on Human Rights (ECHR) in deciding whether or not to agree the Recommendations. Article 1 of the First Protocol of the ECHR provides that every natural or legal person is entitled to peaceful enjoyment of their possessions. Appropriation which engages Section 203 to allow interference with rights of light involves interference with a person's rights under this Article. As these rights are enjoyed by corporate bodies as well as individuals all of those whose rights will be affected can claim an infringement.

3.2.8.2 However, the rights to peaceful enjoyment of possessions this Article is a qualified rather than absolute right, as the wording of Article 1 of Protocol 1 permits the deprivation of an individual's possessions where it is in the public interest and subject to the conditions provided for by law, and (in relation to the right to respect for private and family life and a person's home) Article 8(2) allows for interference which is "in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the protection of health and morals, or for the protection of the rights and freedoms of others".

3.2.8.3 There must therefore be a balancing exercise between the public interest and the individual's rights whereby any interference in the individual's rights must be necessary and proportionate. "Proportionate" in this context means that the interference must be no more than is necessary to achieve the identified legitimate aim. A "fair balance" must be struck between the rights of the individual and the rights of the public. It is for members to consider the issues raised in this report and to strike that "fair balance" in coming to its decision.

3.2.8.4 In the present case it is considered that the public interest in facilitating the redevelopment outweighs the rights of the individuals to peaceful enjoyment of their possessions and that the proposed appropriation in order to engage the Section 203 statutory override provisions amounts to a proportionate interference in all the circumstances. In this regard the fact that infringements cannot feasibly be reduced and the availability of compensation to those who are deprived of their Rights of Light are of relevance to the issue of proportionality. As regards the compensation sums, it is intended that all negotiated settlements and, where there is no settlement, all existing offers made to rights holders (as set out at **Appendix 5**), will continue to be honoured after any appropriation resolution made by your Committee. This matter is addressed in at Recommendation 3.

3.2.8.5 The public benefits arising from the redevelopment are set out above. The key benefits of the Development need to be balanced against the infringements are set out at paragraph 3.2.4 above and **Appendix 4**. The Development cannot be feasibly altered to avoid right of light infringements. If the Development does not proceed, the benefits identified above will not be delivered.

3.2.8.6 The planning implications of the Development have been fully considered and the Development has been deemed acceptable.

3.2.9 The developer has consulted with rights holders regarding the engagement of section 203 wherever feasible and appropriate in the circumstances of the case: consultation has taken place as set out at paragraph 6 of the Report.

3.2.10 The authority could acquire the land compulsorily for the purposes of the Development: if the City Corporation did not already own the land, it would be able to acquire it using compulsory acquisition powers under Section 226 of the Town and Country Planning Act 1990

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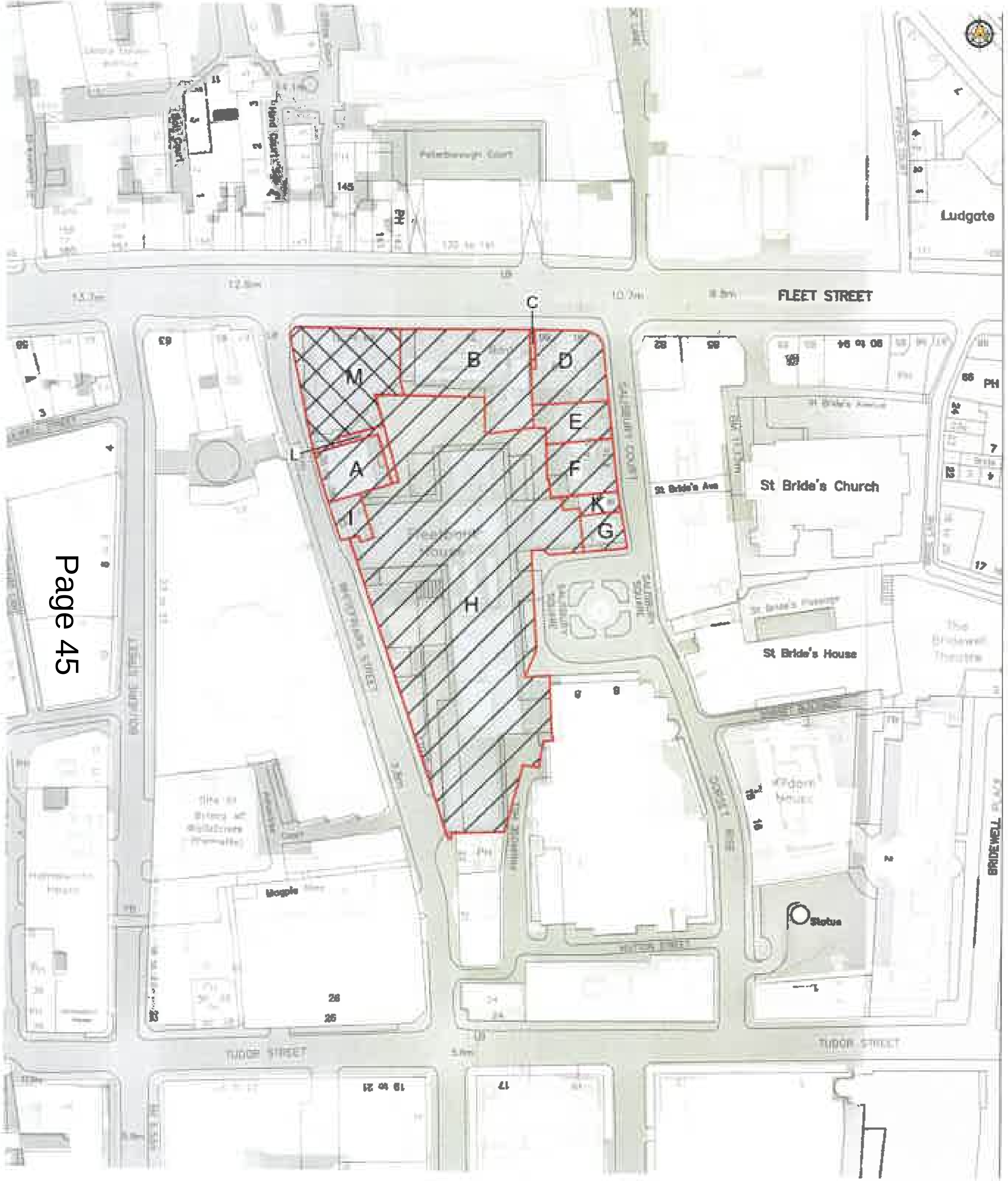

DEVELOPMENT SITE:

A: 36, 37 And, 38 Whitefriars Street:

B: Chronicle House:

C: Land on the South side of Fleet Street:

D: 80/81 Fleet Street:

E: 2 and 3 Salisbury Court:

F: 4 to 7 Salisbury Court:

G: 1 Salisbury Court:

H: Fleetbank House:

I: Coach & Horses PH:

K: 8 Salisbury Court:

L: Land on the east side of 36-38 Whitefriars Street:

M: 69, 70 & 71 Fleet Street:

KEY:

- Site Land Boundaries (Indicative Only)
- Main Development Site
- 69-71 Fleet Street

NO DIMENSIONS TO BE SCALED FROM THIS DRAWING

SOURCE DATA:

NOTES:

APPENDIX 2

DELVA PATMAN REDLER
Chartered Surveyors

TITLE:

DRAWING:
LOCATION PLAN
Rights of Light
Highlighting Main Development Site Land Boundaries

JOB NO: 19433

LOC_ROL_003 A

APPENDIX 3

APPENDIX 4

DELVA PATMAN REDLER

Development	Fleet Street - COL
Job Number	19433
Date	25th September 2023

#MAP REF	Property Address	Freehold (FH) or / Leasehold (LH)	Registered Proprietor owner	Commercial or Residential
	150 and 151 Fleet Street, London, EC4A 2DQ	NGL788746 FH	Kayne Properties UK Limited	Commercial
	146 Fleet Street, London, EC4A 2BU	NGL802373 FH	David Alan Pearlman and Susan Pearlman	Commercial
8	143 Fleet Street and 144 Fleet Street, London, EC4A 2BP	81176 FH	Alma Terra Mater UK LTD	Commercial ground floor, Residential upper floors
9	142 Fleet Street, London, EC4A 2BP	LN204323 FH	City Building Company Limited	Commercial ground floor, Residential upper floors
10	131, 132, 134-139 & 141 Fleet Street, London, EC4A 2BJ	NGL495896 FH	Fleet Street Investments III Limited	Commerical

DELVA PATMAN REDLER

Development	Fleet Street - COL
Job Number	19433
Date	25th September 2023

#MAP REF	Property Address	Freehold (FH) or / Leasehold (LH)	Registered Proprietor owner	Commercial or Residential
11	130 Fleet Street, London, EC4A 2BH	NGL599232 FH	Leafgreen Estates Limited	Commercial
13	82 to 85 Fleet Street, London, EC4Y 1AE	89382 FH	Stenville Holdings Limited	Commercial
14	St Brides House, 10 and 11 Salisbury Square, London, EC4Y 8JD	LN191111 FH	Rreef St Bride's Limited	Commercial
15	3 Dorset Rise, London, EC4Y 8EN	LN43899 FH	Oval Properties 1701 Limited	Commercial
20	24 Tudor Street, London, EC4Y 0AY	NGL723128 FH	24 Tudor Street Limited	Residential
21	26-28 Tudor Street, London, EC4Y 0AY	NGL785620 LH	DWS Grundbesitz GMBH	Commercial

DELVA PATMAN REDLER	
Development	Fleet Street - COL
Job Number	19433
Date	25th September 2023

#MAP REF	Property Address	Freehold (FH) or / Leasehold (LH)	Registered Proprietor owner	Commercial or Residential
22	Land and buildings on the South side of fleet Street (65 Fleet Street)	NGL763302 FH	Whitefriars Limited	Commerical

APPENDIX 5

DELVA PATMAN REDLER
Chartered Surveyors

Ref: 19433/jr

12th September 2023

One George Yard
London EC3V 9DF

020 7936 3668

info@delvapatmanredler.co.uk
www.delvapatmanredler.co.uk

City of London Corporation
Guildhall
PO Box 270
London
EC2P 2EJ
Care of: Tim Cutter of Avison Young

Private and confidential

Dear Tim,

Rights of light progress to date considering the redevelopment of Salisbury Square
Planning reference: 20/00997/FULEIA

Delva Patman Redler LLP (DPR) have been commissioned to conduct a comprehensive review and assessment of the potential light loss that could arise from the consented Salisbury Square development, particularly concerning its impact on adjacent properties.

Following the identification of 20 potentially impacted properties, DPR has been further instructed to engage with the relevant neighbouring owners with a view to cultivating an amicable resolution in the form of a deed of release and appropriate compensation.

Initial letters went to 21 relevant neighbouring owners on the 17th January 2022. Following which, all owners have since appointed an advisor to act and advise on their behalf. All technical assessments have been updated based on the agreed layouts from the respective internal surveys. These updated technical assessments have since been agreed upon with the respective advisors for each of the properties considered.

Where the updated analysis shows no material loss, a letter has been sent to the neighbour's advisors to confirm that no infringement will occur, and the matter is, therefore, closed. There have been no objections to these letters to date, and none are expected in the future. There were also results that show a likely material reduction in light in the post-development scenario. It was and remains DPR's recommendation to seek a deed of release from the relevant owners of these properties. Subsequently, an offer of compensation and request for a deed of release entered into was made to those owners between October and December 2022.

A small percentage of owners have accepted the compensation offer made, demonstrating the reasonable nature of these. These are in the process of being finalised by way of the deed of release.

However, there are a number of properties where we have not yet concluded matters, and these remain outstanding. Based on comments from the neighbouring owner's surveyors and the lack of any meaningful response to any offers, it is DPR's understanding that there is a desire from neighbouring owners to wait to progress any further discussions until they receive clarity on whether the development site will be appropriated in accordance with Section 203 of the Housing and Planning Act 2016 (s203).

In many instances, it has been communicated that there is an assumption that this will be adopted. Therefore, from the neighbouring owners' perspective, clarity of this is key before their respective advisors assist them in making a decision on the next steps. A single response from a neighbouring owner's representative has been received. It has been clearly communicated that no settlement will be achieved unless a revised offer of at least x33 of the book value is made. This is beyond the scope of what could be considered a reasonable offer, and therefore, DPR has concluded they cannot recommend this is accepted.

Also at:
Delva Patman Redler
The Quay
12 Princes Parade
Liverpool L3 1BG

Delva Patman Redler
40 Berkeley Square
Bristol
BS8 1HP

Although it is the intended strategy to continue discussions with the relevant neighbours to reach amicable conclusions, there is a risk that a neighbour may seek an injunction. It is understood that in this worst-case outcome, there is a negative and potentially costly impact on the successful completion of the development. By seeking the protective powers of s203, the development may proceed as planned, allowing for the public benefit to be realised with no undue delay caused by outstanding rights of light discussions. In parallel, the discussions with the relevant neighbours can proceed in a fair and reasonable manner unhindered by time constraints and focusing the discussions on reasonable compensation offers and terms on which any deed of release will be based.

It is hoped this letter provides clarity on the matter to date and DPR's view on the application for S203.

Yours sincerely

Delva Patman Redler

Delva Patman Redler LLP

APPENDIX 5A

DELVA PATMAN REDLER
Chartered Surveyors

Ref: 19433/jr

20th February 2024

One George Yard
London EC3V 9DF

020 7936 3668

info@delvapatmanredler.co.uk
www.delvapatmanredler.co.uk

City of London Corporation
Guildhall
PO Box 270
London
EC2P 2EJ
Care of: Tim Cutter of Avison Young

Private and confidential

Dear Tim,

Rights of light progress to date considering the redevelopment of Salisbury Square
Planning reference: 20/00997/FULEIA

As you are aware, Delva Patman Redler LLP (DPR) has been commissioned to conduct a comprehensive review and assessment of the potential light loss that could arise from the consented Salisbury Square development, particularly concerning its impact on adjacent properties.

Following the proactive and amicable engagement with 21 neighbours across 20 properties who are deemed to enjoy a right to light and may suffer a material loss of light to their demise post-development, we have been able to undertake internal surveys and update the technical assessment, which measures the light pre and post-development.

Of 21 properties, it was confirmed and communicated with 7 neighbours through their appointed surveyors their rights will not be infringed upon due to the technical results showing all rooms will remain well-lit post development or not see a material reduction in light.

The remaining 14 owners, whose demise is likely to suffer a material change in light, have been made an offer of compensation. The first offer made was in March 2021, which was accepted, and consequently, a deed of release has been agreed. The remaining initial offers were made between June and December 2022. One party accepted the initial offer.

Of the remaining 12 owners, a revised offer was made in December 2023. These offers were made at a fair and reasonable level. Since they were made, it has been confirmed that 3 owners have accepted the revised offers. A further 2 additional owners are also understood to be satisfied with the offer at surveyor level. However, we await their formal client confirmation on these.

Of the remaining outstanding individual negotiations, despite offers made at a fair and reasonable level, we have been unable to reach an amicable conclusion. This creates a considerable concern that the development will not be able to progress within the set timetable as planned. This could put the successful delivery of the development at risk.

Without a reasonable conclusion in the form of a deed of release, the site remains open to a neighbouring owner potentially seeking an injunction as a legal remedy.

Also at:
Delva Patman Redler
The Quay
12 Princes Parade
Liverpool L3 1BG

Delva Patman Redler
40 Berkeley Square
Bristol
BS8 1HP

While it is understood it is still the full intent of the development team to seek a reasonable conclusion with neighbouring owners, the threat of a potential detrimental legal remedy and counter offers that may be beyond one might find typical market figures leads us to conclude that, in the foreseeable future, negotiations are most unlikely to result in agreements to release rights to light.

Yours sincerely

Delva Patman Redler

Delva Patman Redler LLP

Enc. Negotiation Tracker Timeline

APPENDIX 6

City Surveyor's Department
Paul G Wilkinson MSc, BSc, MRICS
The City Surveyor

CITY OF LONDON

[redacted]

Telephone 020 7332 1502
Email Paul.Wilkinson
@cityoflondon.gov.uk

Date 21 September 2023

Dear Sirs

Redevelopment of Salisbury Square, Planning ref: 20/00997/FULEIA, Rights of Light

I am writing to you in respect of the proposed development at Salisbury Square.

I am aware that you have been written to by the City's retained Right of Light consultants, Delva Patman Redler, acting on behalf of the City Corporation as property owner, with a view to agreeing an appropriate level of compensation for the loss of light to your property at 150 and 151 Fleet Street and that to date no agreement has been documented.

The scheme has received planning permission and would deliver acknowledged planning, economic, and social benefits. The scheme is moving forward with delivery due in December 2026 (in respect of the Courts) and March 2027 (in respect of the police station).

Due to these pressing timescales and the lack of any agreement, consideration is being given to appropriating the Salisbury Square site for planning purposes in order to engage powers under S203 of the Housing and Planning Act 2016 to facilitate the carrying out of the development. The information received from Delva Patman Redler regarding the need for appropriation is set out in their attached letter.

This is being provided to you in advance of finalising any report. Should you have any comments please let me know within 14 days of the date of this letter.

Yours faithfully

[redacted]

Paul Wilkinson
City Surveyor

City of London PO Box 270, Guildhall, London EC2P 2EJ
Switchboard 020 7606 3030
www.cityoflondon.gov.uk

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Committee(s): Planning & Transport Committee	Dated: 05/03/2024
Subject: Retrofit of Historic Buildings	**Public**
Which outcomes in the City Corporation's Corporate Plan does this proposal aim to impact directly?	4. Communities are cohesive and have the facilities they need. 5. Businesses are trusted and are socially and environmentally responsible. 10. We inspire enterprise, excellence, creativity and collaboration. 11. We have clean air, land and water and a thriving and sustainable natural environment.
Does this proposal require extra revenue and/or capital spending?	**N**
If so, how much?	**-**
What is the source of Funding?	**-**
Has this Funding Source been agreed with the Chamberlain's Department?	**-**
Report of: Director for the Environment	**For Decision**
Report author: Aled Thomas, Department for the Environment	

Summary

The City of London is home to more than 600 listed buildings (covering an area of about 500,000m2), 28 conservation areas, 48 scheduled ancient monuments and four historic parks and gardens.

For centuries, these buildings have been adapted to respond to changing environmental and social contexts, securing their cultural and economic benefits for future generations.

With the climate emergency representing the single greatest challenge facing our generation, bold and ambitious action is needed to unlock the potential in our built heritage and reduce greenhouse gas emissions. Adapting them to the extreme effects of a changing climate.

Furthermore, the reuse, refurbishment and retrofit of existing buildings represents a crucial step in reducing the impact of the built environment, which is responsible for almost 40% of greenhouse gas emissions, 50% of extracted materials, and one third of waste globally.

By creatively unlocking the potential in our heritage buildings we can provide long lasting, resilient and beautiful places, whilst preserving our natural resources and reducing emissions.

The Historic Buildings Carbon Reduction and Climate Resilience Challenge was a collaboration between the City Corporation and Purcell during 2023 as one of the actions in the Climate Action Strategy. The Challenge has drawn from research and engagement with owners, occupiers, and caretakers of historic buildings within and around the City, which highlighted that whilst there is a large amount of interest and focus on tackling the climate emergency in heritage buildings, action has so far been limited, and projects that have sought to lead the way are not widely publicised or shared.

To address these issues, the campaign has culminated in an open-access, **Heritage Building Retrofit Toolkit** which provides a nine-step methodology aimed at empowering building owners to initiate the adaptations necessary to reduce carbon emissions and build climate resilience in their heritage buildings.

Whilst the diversity of the built heritage within the Square Mile is a considerable challenge (there is no one-size-fits all solution), the toolkit aims to provide a common methodology. Framed around eight core building types (or typologies), the toolkit is intended to facilitate a better understanding of heritage retrofit, drawing comparisons across similar buildings, and developing an adaptable and considerate approach.

By collating and signposting best practice principles and examples across these typologies, the toolkit provides a resource that will allow building owners to confidently start the process of responsible retrofit, build a business case and deliver the adaptations necessary.

In November 2023, Historic England published a draft Advice Note on 'Climate Change and Historic Building Adaptation' primarily aimed at local planning authorities, heritage consultants and those involved in the planning process.

Recommendation(s)

Members are asked to:

- Agree the Heritage Building Retrofit toolkit for publication and dissemination.
- Note the planned next steps relating to promotional and knowledge-development actions.
- Note the forthcoming 'Heritage Building Retrofit' retrofit event on 21 March to promote the Toolkit and associated actions.

Main Report

Background

1. The City of London is home to more than 600 listed buildings (covering an area of about 500,000m2), 28 conservation areas, 48 scheduled ancient monuments and four historic parks and gardens.

2. For centuries, these buildings have been adapted to respond to changing environmental and social contexts, securing their cultural and economic benefits for future generations.

3. With the climate emergency representing the single greatest challenge facing our generation, bold and ambitious action is needed to unlock the potential in our built heritage, reduce greenhouse gas emissions and adapt them to the extreme effects of a changing climate.

4. The City Corporation's Climate Action Strategy's Square Mile project plan for 2023/24 included a commitment to run a '**Historic Buildings - Carbon Reduction and Climate Resilience Challenge'** to explore current opportunities and barriers to the retrofit of heritage buildings. Purcell, leading heritage consultants with significant experience of working in the City of London, were contracted to support the delivery of the Challenge.

5. The 'Challenge' engaged owners, occupiers and caretakers of historic buildings within and around the City as well as other key stakeholders (e.g. architects, developers, contractors, local authority officers). The launch event at the London Centre in early 2023 attracted more than one hundred attendees which reflected the interest in this issue. This was followed by more in-depth discussions with specific groups (e.g. places of worship, Livery companies) and an on-line campaign through the Commonplace platform to capture information and case studies.

6. The research and engagement highlighted that whilst there is a large amount of interest and focus on tackling the climate emergency in heritage buildings, action has so far been limited, and projects that have sought to lead the way are not widely publicised or shared.

Current Position

7. To address these issues, the Challenge has culminated in an **open-access Historic Building Retrofit toolkit** which provides a nine-step methodology aimed at empowering building owners to initiate the adaptations necessary to reduce carbon emissions and build climate resilience in their heritage buildings. It draws on latest best practice guidance and sets an iterative, whole building approach that is sensitive to the particular challenges of heritage buildings

8. Whilst the diversity of the built heritage within the Square Mile is a considerable challenge (there is no one-size-fits all solution), the toolkit aims to provide a common methodology. It **highlights eight core building types (or typologies) within the Square Mile:**

    - Places of worship
    - Liveries and guilds

- Municipal buildings
- Large public structures
- 18th Century townhouses
- 19th and 20th Century commercial
- Industrial
- 20th Century modern

Within each typology, the toolkit seeks to facilitate a better understanding of heritage retrofit potential, drawing comparisons across similar buildings, and developing an adaptable and considerate approach.

9. By collating and signposting best practice principles and examples across these typologies, the toolkit provides a resource that will allow building owners to confidently start the process of responsible retrofit, build a business case and deliver the adaptations necessary. The nine-step methodology, summarised below, is based on.

Historic England – New draft advice on climate change and building adaptation

10. On 13 November 2023, Historic England published draft advice for consultation that aims to provide clear and consistent advice on balancing climate action with building adaptation. The Historic England Advice Note (HEAN) is primarily aimed at local planning authorities, heritage consultants and those involved in the planning process.

11. The final Advice Note will provide:

- Advice on the need for planning permissions or other consents for some of the common changes required to decarbonise and improve the energy efficiency of historic buildings.
- Advice to assist local planning authorities – and other parties involved in the planning process – in determining proposals to decarbonise and improve the energy efficiency of historic buildings to enable positive climate action. Some typical building adaptations in response to climate change impacts are also included.
- Advice on how local plans and other planning mechanisms can deliver a positive strategy for historic buildings that proactively supports climate action.
- Signposting to other relevant information, advice, and guidance.

12. The draft advice note seeks to address key questions about listed buildings and homes in conservation areas, including clear advice on insulation, boilers and heating systems, heat pumps, draft-proofing, replacing or adapting windows, and installing solar panels. This will dispel some of the myths around actions that can be taken in a listed building or conservation area.

13. The draft Historic England Advice Note and the Retrofit Toolkit are aligned in seeking to provide clarity and to support consistent decision-making for proposals to reduce carbon emissions and improve the energy efficiency of historic buildings.

Options

14. The Challenge has generated a significant amount of interest in the adaptation of heritage buildings. This underlines the point that the owners and tenants of heritage buildings are increasingly setting their own net-zero goals and developing pathways for delivering on these ambitions.

15. Various options have been considered on ways of continuing engagement and promotional actions. The proposed next steps are set out in the next section.

Proposals

16. The toolkit will be promoted with key stakeholders in the Square Mile. In terms of immediate next steps, an event will be held on 21 March to promote the toolkit and to highlight some of the retrofit case studies.

17. Officers will pursue opportunities to test the toolkit through forthcoming retrofit schemes. This includes City Corporation-led schemes as well as those led by external parties.

18. The toolkit includes case studies of recent retrofit schemes in the Square Mile. Additional case studies will be added as schemes emerge and will form part of the wider pool of Square Mile retrofit/refurbishment case studies

19. Alongside the toolkit, there is also a need for further knowledge-development and training actions alongside the toolkit. Options are currently being explored.

Key Data

20. Buildings account for 65% of carbon emissions in the City of London. The City is also home to more than 600 listed buildings. These buildings are often challenging to retrofit given their sensitive heritage status. This work has sought to empower owners of listed buildings to consider the potential for adapting their buildings, improving their energy efficiency and making them resilient to climate change.

Corporate & Strategic Implications

21. Buildings are the largest source of greenhouse gas emissions in the Square Mile. The reduction of emissions from buildings and their resilience to climate change are key priorities in the City Corporation's Climate Action Strategy. Heritage buildings are a critical element of the City's building stock.

22. The Toolkit directly supports the draft City Plan 2040's Strategic Policy S11 (Historic Environment) which says, "The City's historic environment will be protected, celebrated and positively managed by encouraging sensitive sustainable retrofit of designated as well as non-designated heritage assets and improvements that would benefit climate resilience and adaptation."

Financial implications

23. Any future resource requirements will be included within Climate Action Strategy project plans.

Resource implications

24. None

Legal implications

25. None

Risk implications

26. None

Climate Implications

27. The Challenge and Toolkit are part of the actions of the Climate Action Strategy's Square Mile project plan. Reducing the carbon emissions from buildings is the main challenge for achieving a net-zero Square Mile.

Equalities, Resource and Security implications

28. None

Conclusion

29. The 'Historic Buildings - Carbon Reduction and Climate Resilience Challenge' has generated a significant amount of engagement and interest in the adaptation of historic buildings to ensure they are fit for the future.

30. The resulting Heritage Building Retrofit Toolkit aims to empower building owners to initiate the adaptations necessary to reduce carbon emissions and build climate resilience in their heritage buildings.

Appendices

Background Papers

- Appendix 1 - Heritage Buildings Retrofit Toolkit

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CITY OF LONDON

PURCELL

HERITAGE BUILDING RETROFIT TOOLKIT

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CITY OF LONDON

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CONTENTS

Fig. 1 **Historic Building Challenge stakeholder engagement event held in January 2023.** *Photographer: James Gifford-Mead*

FOREWORD

A challenge for the whole city

As with many other cities across the world, the City of London Corporation has adopted ambitious climate goals, with a Climate Action Strategy to achieve net zero in the City by 2040.

As the oldest, most historic part of London, the City (or Square Mile), is the place from which modern-day London grew. From its origins in around AD50 to the present day, the Square Mile has never stood still. Constantly adapting, it has responded to political and social evolution, catastrophic disaster, and technological advancement.

It now needs to respond to a rapidly changing environment brought on by the effects of climate change, transitioning away from a reliance on fossil fuels towards a regenerative future. As a fundamental part of the Square Mile's identity, the physical remnants of the City's past - its historic buildings - must be part of this transition.

As part of our Climate Action Strategy, the Corporation has worked with Purcell to deliver a Historic Building Carbon Reduction and Climate Resilience Challenge. The Challenge represented an initial attempt to engage with and bring together heritage building owners and occupiers in the City to better understand how they perceive this issue; identify particular barriers and opportunities; share and promote knowledge; as well as recognising existing good practice. The results have informed this toolkit.

It is clear many owners and occupiers are already on a journey to understand and reduce their carbon emissions and delivering climate resilience in their historic buildings. As the custodian of many heritage assets, the Corporation itself is part of this journey and wants to share our own experiences and learn from others. The Challenge is very much an initial step and we are committed to ensuring our policies and resources support others to take action.

As with many climate actions, addressing this challenge potentially provides significant wider benefits – in terms of reducing energy costs; creating comfortable and healthy internal environments; and prolonging the lifespan of buildings. These are increasingly important factors in the way we sustainably manage and develop our built environment.

This challenge is not restricted to the Square Mile. Recent research suggests improving the energy efficiency of historical properties could reduce carbon emissions from the UK's buildings by 5% each year. Retrofitting these buildings could generate £35bn of economic output a year, create jobs as well as playing a crucial role in achieving climate targets. Therefore, we very much hope this toolkit will be of interest beyond the Square Mile and contribute to wider discussions on this important topic.

I would like to express my gratitude to all those who contributed to the development of this toolkit and to Purcell for their hard work and expertise.

Keith Bottomley CC
Deputy Policy Chairman
City of London Corporation

EXECUTIVE SUMMARY

The City of London is home to more than 600 listed buildings (covering an area of about 500,000m^2), 27 conservation areas, 48 scheduled ancient monuments and four historic parks and gardens. For centuries we have adapted these buildings to respond to changing environmental and social contexts, securing their cultural and economic benefits for future generations.

With the climate emergency representing the single greatest challenge facing our generation, bold and ambitious action is needed to unlock the potential in our built heritage and reduce greenhouse gas emissions. Adapting them to the extreme effects of a changing climate.

Furthermore, the reuse, refurbishment and retrofit of existing buildings represents an crucial step in reducing the impact of the built environment, which is responsible for almost 40% of greenhouse gas emissions, 50% of extracted materials, and one third of waste globally.

By creatively unlocking the potential in our heritage buildings we can provide long lasting, resilient and beautiful places, whilst preserving our natural resources and reducing emissions.

The Historic Buildings Carbon Reduction and Climate Resilience Challenge is a collaboration between the City of London Corporation (CoLC) and Purcell, running from 2022 to 2023. It is set within the context of the CoLC's wider Climate Action Strategy, which sets out how the organisation will achieve net zero, build climate resilience and champion sustainable growth.

The Challenge has drawn from research and engagement with owners, occupiers, and caretakers of historic buildings within and around the City, which highlighted that whilst there is a large amount of interest and focus on tackling the climate emergency in heritage buildings, action has so far been limited, and projects that have sought to lead the way are not widely publicised or shared.

In an effort to address these issues, the campaign has culminated in this open-access, digital toolkit which provides a nine-step methodology aimed at empowering building owners to initiate the adaptations necessary to reduce carbon emissions and build climate resilience in their heritage buildings.

Whilst the diversity of the built heritage within the Square Mile is a considerable challenge (there is no one-size-fits all solution), the toolkit aims to provide an common methodology. Framed around eight core building types (or typologies), it is intended to facilitate a better understanding of heritage retrofit, drawing comparisons across similar buildings, and developing an adaptable and considerate approach.

By collating and signposting best practice principles and examples across these typologies, the toolkit provides a resource that will allow building owners to confidently start the process of responsible retrofit, build a business case and deliver the adaptations necessary.

The nine-step methodology, summarised below, is based on latest best practice guidance and will ensure an iterative, whole building approach that is sensitive to the particular challenges of heritage buildings.

1. **Start from a position of knowledge**
   Understanding the existing building is crucial to developing an appropriate retrofit response. Gather all available data and consider the building's architectural and historic interest; context, construction and condition; form and layout; performance and patterns of use; energy consumption and any anticipated future changes.

2. **Identify the risks**
   Consider the increased risks from our changing climate, like overheating and water ingress from extreme weather events. These should be addressed as part of any retrofit. Also consider the risks of maladaptation, for example reduced heritage significance, increased energy consumption, abortive work, fire safety, moisture build up, poor air quality.

3. **Evaluate the opportunities**
   Opportunities to reduce carbon emissions and build climate resilience should follow a whole building approach, where the consequences of every retrofit measure is fully understood, and the building is considered as a whole system. Priority should be given to measures that eliminate unnecessary energy wastage and mitigate the impact of unavoidable energy use, before considering improvements to a buildings fabric, and installing zero carbon systems.

4. **Develop a whole building retrofit plan**
   This should set out a plan for all the work that will be needed to retrofit the building, how it will be phased and how each phase interrelates. It should set out the building constraints and risks; carbon reduction and climate resilience strategy; requirements for statutory approvals; as well as a plan for monitoring and reporting energy consumption.

5. **Build a business case**
   The benefits of taking climate action in heritage buildings go beyond reducing carbon emissions to reduced energy costs and providing long-term energy security; creating healthy, comfortable internal environments; ensuring resilience against future uncertainty and minimising risks; increasing market value and avoiding stranded assets. Clearly identifying these benefits, and understanding any external funding opportunities will help build a strong business case.

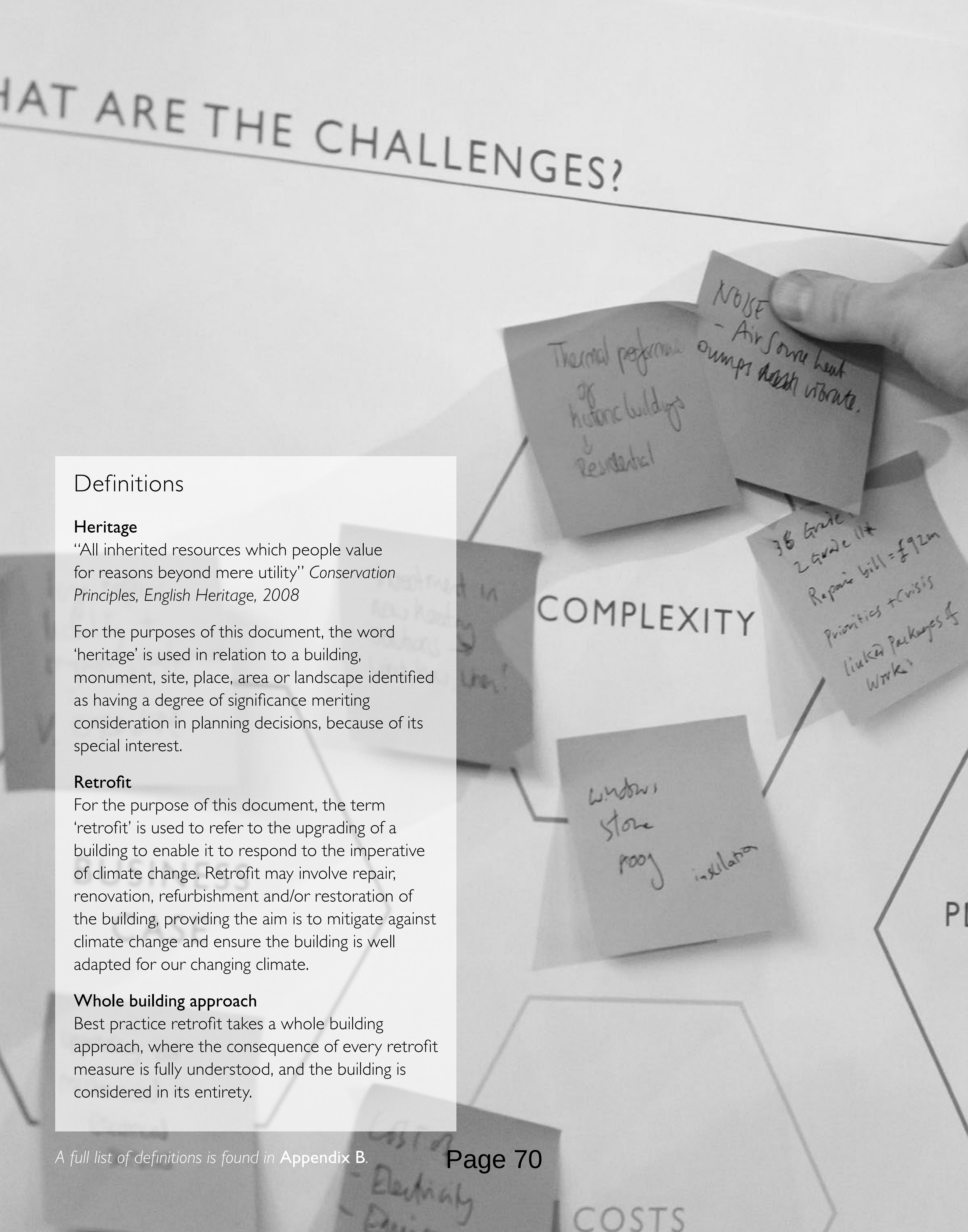
6. **Detail design and specification**
   All changes, whether small-scale repairs or larger alterations, require an appropriate level of detailed consideration. Seek professional advice and consider issues such as compatibility with future phases; whole life carbon; usability; vapour permeability and moisture movement; air tightness and adequate ventilation; and thermal performance.

7. **Seek relevant approvals**
   With some retrofit work, particularly involving a listed building, or buildings in a conservation area, certain statutory approvals will need to be obtained prior to starting the work. Consult with an expert and confirm approval requirements with the CoLC in terms of planning; listed building consents; building regulations; and party wall awards.

8. **Installation and work on site**
   Site operations can have a significant impact on the effectiveness of a retrofit project. Find a contractor who is familiar with your building type and construction and shows interest in what you are trying to achieve.

9. **Feedback loop**
   The ongoing monitoring and long-term oversight of the delivered outcomes will be key to understanding the impacts of any retrofit project. Test the completed building against the original brief; engage with building users to ensure correct operation; and feedback lessons into future projects.

Fig. 2 **Historic Building Challenge stakeholder engagement event held in January 2023.** *Photographer: James Gifford-Mead*



Definitions

Heritage
"All inherited resources which people value for reasons beyond mere utility" *Conservation Principles, English Heritage, 2008*

For the purposes of this document, the word 'heritage' is used in relation to a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its special interest.

Retrofit
For the purpose of this document, the term 'retrofit' is used to refer to the upgrading of a building to enable it to respond to the imperative of climate change. Retrofit may involve repair, renovation, refurbishment and/or restoration of the building, providing the aim is to mitigate against climate change and ensure the building is well adapted for our changing climate.

Whole building approach
Best practice retrofit takes a whole building approach, where the consequence of every retrofit measure is fully understood, and the building is considered in its entirety.

A full list of definitions is found in **Appendix B**.

INTRODUCTION

What is the purpose of this toolkit?

The purpose of this toolkit is to provide clear and actionable guidance for owners, occupiers and caretakers of historic and listed buildings, to help them take steps to reduce carbon and build climate resilience in their heritage buildings.

The intention isn't to replace or supersede existing guidance on this topic, but to collate and signpost best practice principles and examples. This will provide a resource enabling building owners to confidently start the process of responsible retrofit, build a business case and deliver the adaptations necessary.

Whilst this toolkit draws on the historic environment of the Square Mile, referencing typologies that are most significant to the City's unique character, it is equally relevant to towns and cities in the UK and around the world who are exploring how to adapt their historic buildings for a sustainable future.

Who is this toolkit for?

This toolkit is intended to provide a starting point and reference guide for anyone wishing to reduce energy use, address carbon emissions, and build climate resilience in heritage buildings of any type. It will be especially useful for the following groups.

- Owners, occupiers and developers of historic and listed buildings.
- Local authority conservation and planning officers, building control and approved inspectors.
- Professionals and consultants employed to undertake retrofit design work on historic and listed buildings.
- Building contractors and suppliers employed to undertake retrofit construction work in historic and listed buildings.

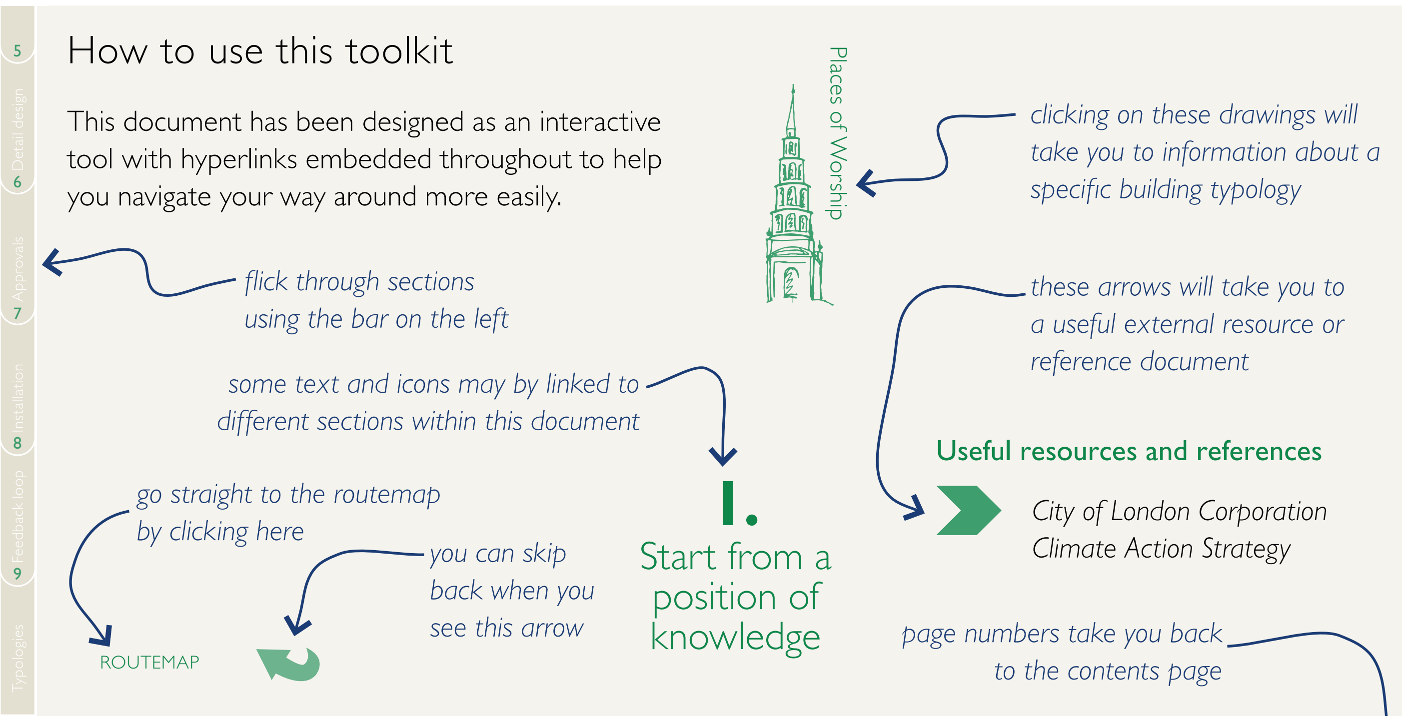
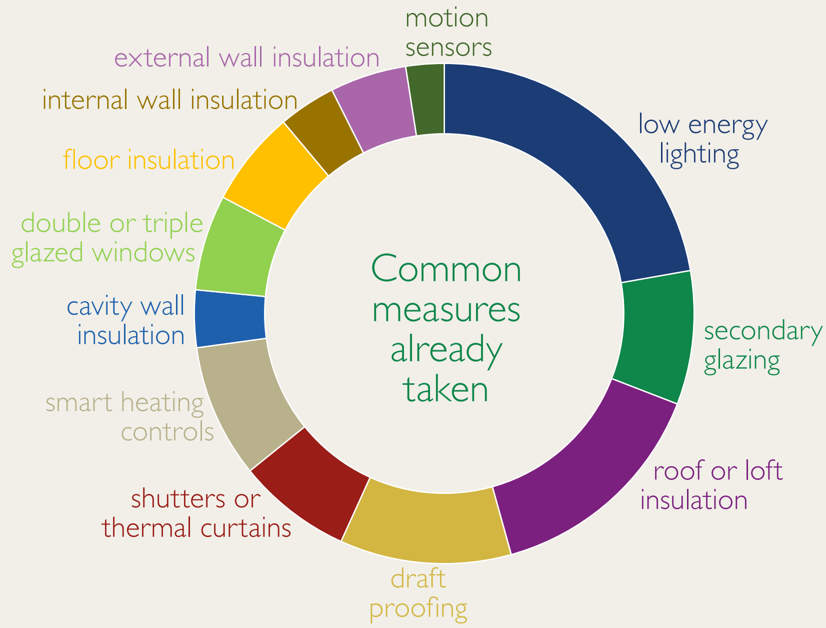


Fig. 3 How to use this toolkit guidance.

48%

of respondents have a climate action strategy



Priorities for heritage buildings in the Square Mile

1. Protecting the unique characteristics of the building
2. Reducing carbon emissions
3. Providing a comfortable internal environment
4. Ensuring we can run our business in the most efficient way
5. Preparing my building for a changing climate
6. Adapting the building to changing market requirements
7. Ensuring maximum cost per square metre value

Barriers to climate action in heritage buildings

business case
constraints
conservation officers
cost
confusing
lack of knowledge
planning process
benchmarking
complexity
red tape
conflicting priorities
engagement
overwhelming
specialists required
inertia
lack of skills

Fig. 4 Summary of key findings from engagement with owners, occupiers and caretakers of heritage buildings in the Square Mile.

Why we need action

The broader benefits created by taking climate action in our built heritage go far beyond reducing carbon emissions. From reduced running costs and providing long-term energy security; creating healthy, comfortable internal environments; ensuring resilience against future uncertainty and minimising risks; increasing market value and avoiding stranded assets; and delivering on green commitments; all with the added benefit of conserving our built heritage for the long-term, and protecting our natural resources, by utilising the buildings and places we already have.

Whilst there is a large amount of interest and focus on tackling the climate emergency in heritage buildings across the city, action has so far been limited. Projects that have sought to lead the way in terms of carbon reduction and climate resilience, are not widely publicised or shared.

Through extensive engagement with CoL stakeholders, including a series of in-person and online events, interviews, and targeted surveys, CoLC has tried to establish the following:

- **Where are we?** To determine where various organisations are along their net zero journey.
- **What are the challenges?** To understand what is hindering climate action in the Square Mile's historic and listed buildings.
- **What do we need?** Looking for solutions to facilitate greater action in the Square Mile.

The discussions, debates and collated data highlight a number of key concerns and challenges including:

Costs

A lack of funding, government support, and the challenges of building a viable business case, were all seen as significant barriers to action.

Where to start

A lack of coherently communicated and readily accessible advice and guidance was also considered a key challenge, with some open source resources deemed too complex.

Consistent messaging

Obtaining planning and listed building consent, in particular a lack of consistent advice across boroughs was seen as unnecessarily confusing. There was a call for more top down support, particularly in relation to the National Planning Policy Framework (NPPF) which fails to offer clarity to those trying to balance sustainability against heritage value.

Skills and training

A lack of relevant skills at all levels, both within organisations and across the supply chain was seen as an issue. There was a call for more training and upskilling opportunities that might help bridge the gaps within organisations between those who take an active interest in sustainability and those making decisions at the top.

Collaboration and knowledge sharing

The complexity of negotiating the right advice, approach, and funding challenges, particularly for smaller organisations, can be incredibly daunting. Sharing lessons, providing strong, collaborative networks of peers, and mutual benchmarking were all seen as opportunities.

This toolkit is intended to help address some of these issues. In particular, by providing easily accessible advice and guidance on where to start, and how to build a business case for retrofit projects in heritage buildings.

It has been developed in tandem with new policy guidance that intends to provide consistent messaging on how to balance sustainability against heritage value. In addition, the toolkit links to case study examples aimed at sharing knowledge, lessons and experiences from those who have started this process, in the hope that this will inform others and inspire more action.

Legislative and policy context

The policy and regulatory landscape is rapidly evolving in response to the climate emergency. The following sets out key policy aspects to be considered.

National Planning Policy Framework (NPPF)

The NPPF sets out the Government's planning policies for England and how these should be applied in planning policies and documents. The NPPF reiterates that the purpose of the planning system is to "contribute to the achievement of sustainable development", acknowledging the role planning can play in securing radical reductions in greenhouse gas emissions and adapting to climate change.

Paragraph 8 of the NPPF states that sustainable development should include moving to a low carbon economy, and paragraph 152 provides that the planning system should support the transition to a low carbon future. There is National Planning Practice Guidance about mitigation and adaptation measures in the planning process to address the impacts of climate change.

The NPPF indicates that local authorities should plan for new development in ways which reduce greenhouse gas emissions consistently with the Government's zero carbon buildings policy and adopt nationally described standards.

The Department for Levelling Up, Housing, and Communities is currently updating the NPPF and a public consultation is in progress. On climate change, Chapter 14 proposes to attribute greater weight to energy efficiency improvements in existing buildings.

Minimum Energy Performance of Buildings Bill

The UK Government is also progressing a Minimum Energy Performance of Buildings Bill which will require commercial building tenancies to obtain a minimum Environmental Performance Certificate (EPC) rating. While some listed buildings in the City may be exempt (given compliance would "unacceptably alter the character or appearance" of the buildings), several listed building schemes in the City are aligning their retrofit with these goals in mind.

London Plan

The current London Plan is committed to ensuring the capital leads the way in tackling climate change by making London a net zero-carbon city by 2030. It requires major development proposals to be net-zero carbon and achieve a minimum on-site carbon reduction of at least 35% beyond 2013 building regulations. Where the zero-carbon target cannot be fully achieved on site, payments to a carbon offset fund or off-site delivery are sought.

Useful resources and references

- *National Planning Policy Framework,* Department for Levelling Up, Housing & Communities UK Government, 5 September 2023
- *Planning (Listed Building and Conservation Areas) Act 1990,* UK Government, legislation.gov.uk
- *Legal requirements for listed buildings and other consents,* Historic England Website
- *The London Plan: The Spatial Development Strategy for Greater London,* Mayor of London, March 2021

City of London Local Plan

The City of London Local Plan, adopted in 2015 is the strategy for planning the City. It sets out the vision for shaping the Square Mile up to 2026 and contains the policies which guide planning decisions within the City. The Plan is currently under review and will be replaced by the new City Plan once it is adopted in early 2024.

The City of London Local Plan (2015) requires all redevelopment proposals to demonstrate the highest feasible and viable sustainability standards in the design, construction, operation and "end of life" phases of development. It requires major developments to achieve a minimum BREEAM rating of "excellent" and aim for "outstanding". (Policy CS15 – Sustainable Development and Climate Change).

The Plan also seeks to "safeguard the City's listed buildings and their settings, while allowing appropriate adaptation and new uses." "Proposals for sustainable development, including the incorporation of climate change adaptation measures, must be sensitive to heritage assets."

Climate Action Strategy 2020-2027, City of London Corporation, September 2023

Planning for Sustainability – Supplementary Planning Document (SPD)

The Corporation is producing supplementary planning guidance to support its sustainability policies in the City. It is being produced in conformity with the policies in the London Plan. The SPD includes dedicated chapters on retrofitting and reuse; greenhouse gas emission and energy; the circular economy; climate resilience; biodiversity and green infrastructure.

Climate Action Strategy 2020-2027

In 2020, the City of London Corporation adopted a radical Climate Action Strategy which breaks new ground and sets out a pathway to achieving net zero emissions for both the Corporation's activities and the wider activities of businesses and residents in the Square Mile. In adopting the strategy, the Corporation has committed to:

- Achieve net zero carbon emissions from our own operations by 2027
- Achieve net zero carbon emissions across our investments and supply chain by 2040
- Support the achievement of net zero for the Square Mile by 2040
- Climate resilience in our buildings, public space and infrastructure

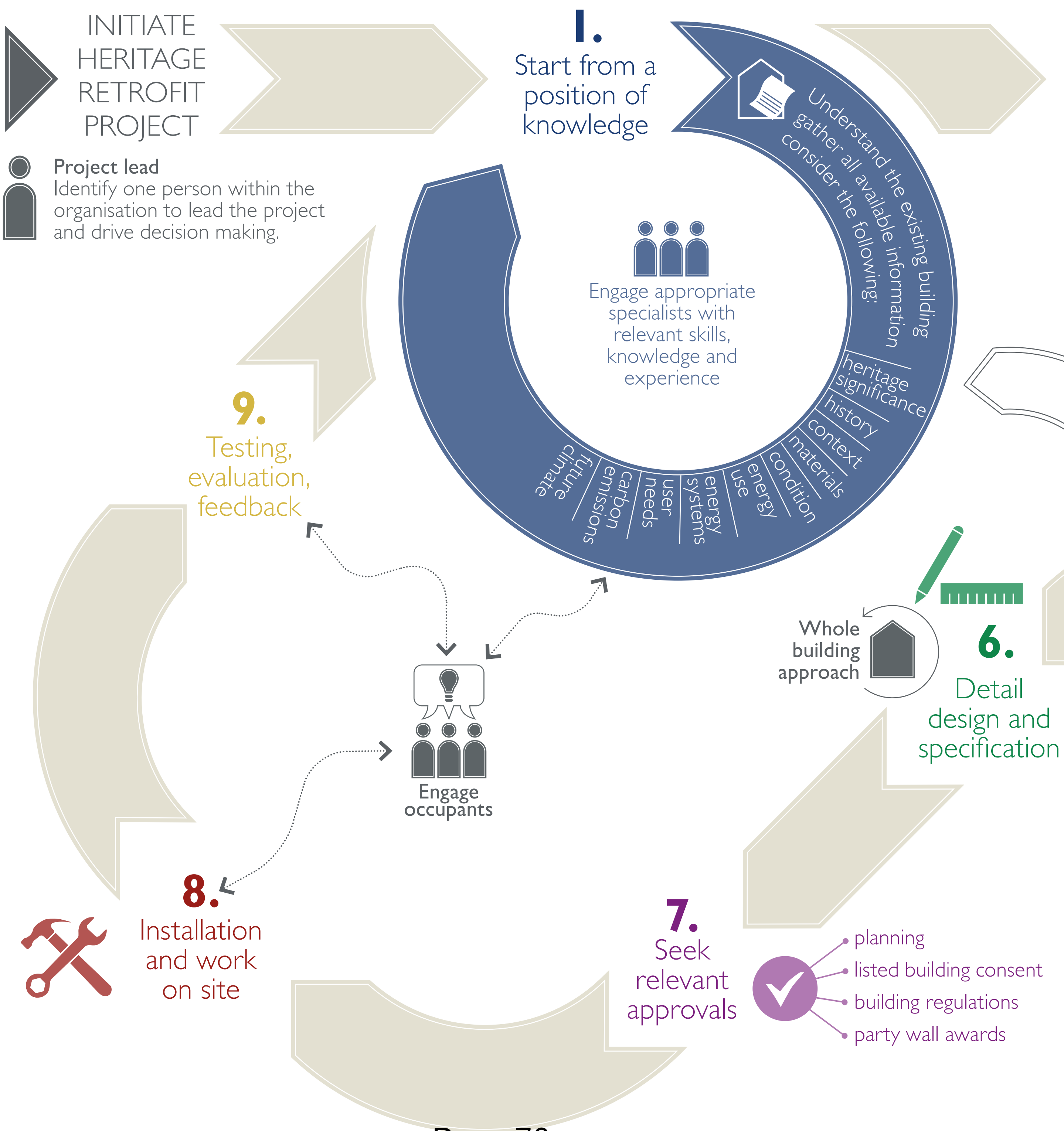
Square Mile Local Area Energy Plan 2023

The Square Mile Local Area Energy Plan sets out a vision for a zero carbon energy system and the associated infrastructure, policy and programmes which will be needed to realise the plan. It sets out actions that need to be taken by key actors in the City, including the Corporation itself, local and national government, energy providers, regulators, industry and residents.

HERITAGE BUILDING RETROFIT ROUTEMAP

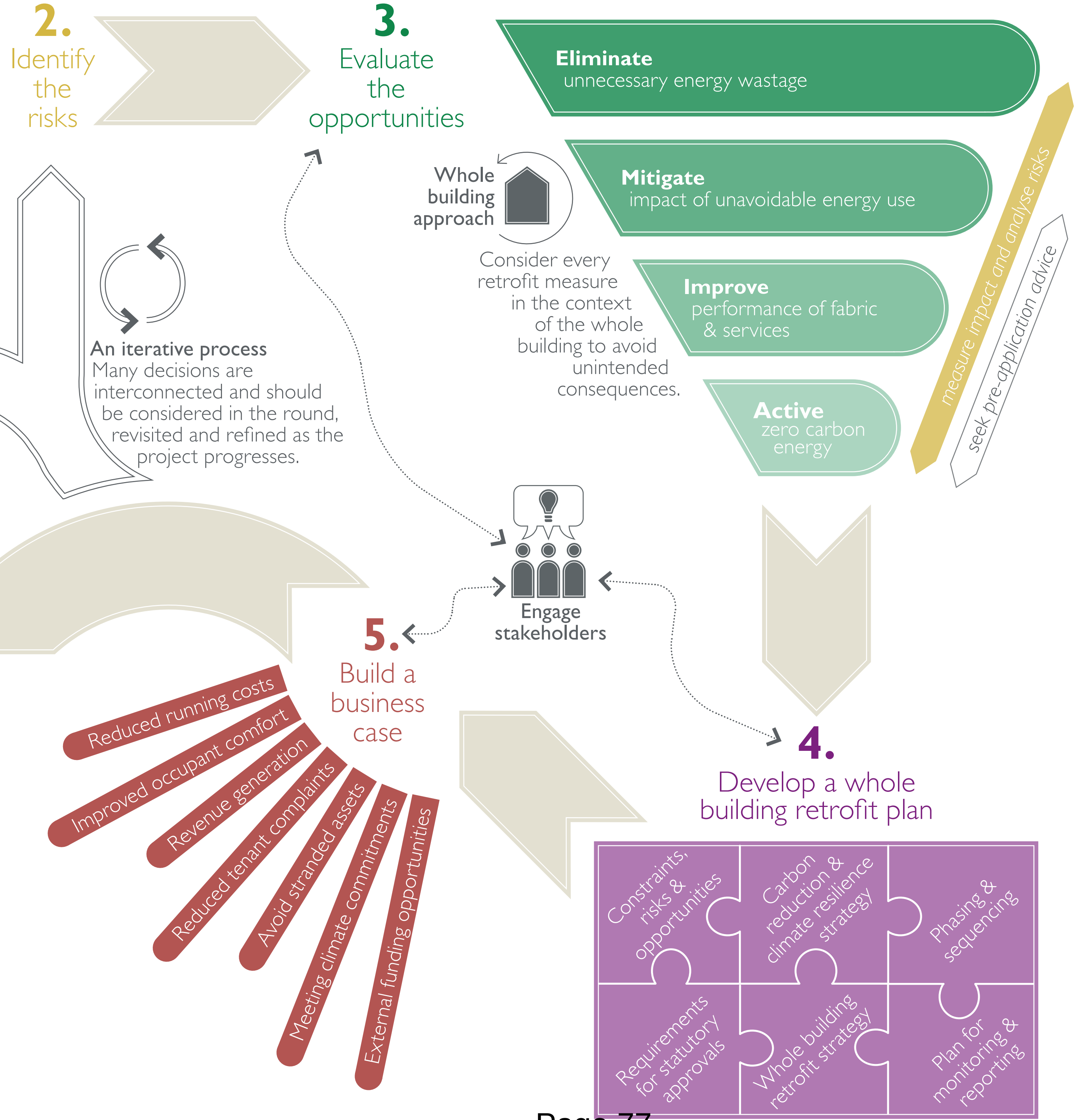
This routemap provides a summary of the process that should be followed for reducing carbon emissions and building climate resilience in heritage buildings.

The process is intended to be scalable, and the effort and resources required to follow this approach should be commensurate to the complexity of the project.



...click on a building typology to see common opportunities

Fig. 5 **Heritage building retrofit routemap**



GETTING STARTED

Who to involve

An important consideration at the start of any project is who to involve in the process, both within the organisation, and any external advisors or professionals. Depending on the complexity of the building(s) and the organisation, developing a retrofit plan for a heritage building might involve many different people from a range of backgrounds. Allocate one person within the organisation, with a good knowledge of the building and the organisational structure, to lead the project and drive decision making. Consider engaging the following:

- key decision makers
- financial lead
- facilities manager and maintenance team
- building users / occupiers
- tenants or regular users of the building

Most retrofit projects, particularly those involving heritage buildings, involve at least one building professional, and many projects involve several, with a range of roles. The selection and appointment of the project team will depend on the scale, complexity and nature of the project. It is strongly recommended that you appoint trained, professional people who are experienced and skilled in the appropriate areas. Consider engaging the following:

- Heritage consultant
- Architect
- Services engineer
- Planning consultant

You may also wish to consider initiating discussions with Historic England and the City's conservation and planning team as early as possible.

Recent guidance from the BSI, *PAS2038:2021 Retrofitting non-domestic buildings* and *PAS2035:2019 Retrofitting domestic buildings*, require new roles (a Retrofit Lead Professional or a Retrofit Coordinator). If your project is required to comply with one of these standards, these roles will need to be appointed from the outset. Read the standards fully to find out more.

Start from a position of knowledge

Every heritage building is different, as are the needs and requirements of their occupants. As a result, every retrofit strategy will be different. It is vitally important to understand your building(s) fully in order to plan and deliver the most effective retrofit strategy.

With listed buildings, scheduled ancient monuments, and buildings in a conservation area, one of the most important things to identify is what makes the building significant. Heritage significance can derive from a number of different factors including a building's age, its importance to a community, its connection to an important historical figure or event, or its architectural design. However old your building is, it will help to assess the following:

- architectural and historic interest
- aesthetic qualities, design and character
- archaeological interest
- materials used, furnishings and fittings
- building form and layout
- spatial qualities and decorative features

Once you understand a buildings heritage significance, you will understand what is important about it and what might be sensitively altered, adapted or changed.

As well as this, you must understand the building's context, its surroundings and situation; its history, construction, and condition; its energy use and impact; its occupation and patterns of use; its current and future climatic context. Also consider the financial context, planned maintenance projects, and available funding.

It may also be useful to look beyond the boundary of the site to neighbouring developments and planned infrastructure upgrades, as it could highlight a mutually beneficial strategy that could serve the wider area.

Using the data gathered to establish a baseline, particularly in terms of carbon emissions and energy use, will help to benchmark improvements and set clear and realistic targets.

An initial assessment of the building *might* include...

The level of detail required at this stage should be commensurate to the complexity of the project. This list is not exhaustive and is intended as a guide. Not all information will be available initially, new information may be discovered during later stages.

Building context and situation

- ✓ Identification of constraints imposed by the site, e.g. elevation and exposure, access, adjoining properties etc
- ✓ Future climatic context including risk of flooding, overheating etc
- ✓ Identification of planned improvement, maintenance or upgrade projects associated with the building

Beyond the boundary

- ✓ Appraisal of local area plans for energy generation, distribution and future upgrades to National Grid
- ✓ Appraisal of neighbouring development plans where resources and infrastructure could be shared with the site

Significance and building history

- ✓ Appraisal of the building's heritage significance and architectural features, and how it has changed over time
- ✓ Appraisal of materials, structure and construction, including how this has changed over time

Building use and patterns of occupation

- ✓ Appraisal of existing occupancy, including the number of occupants and regular visitors; the hours of occupancy and business operations
- ✓ The types of occupants and their requirements and expectations for indoor environmental quality
- ✓ Any special considerations such as the presence of vulnerable persons

Existing building form and condition

- ✓ A measured survey to establish overall dimensions of building's heat loss envelope, and key elements including window and door openings
- ✓ Review of building condition, highlighting any defects, damp, leaks, moisture accumulation, needs for further investigation and remedial work
- ✓ Appraisal of the building's construction to establish the thermal and moisture properties of the main elements and any retrofit measures previously carried out
- ✓ Appraisal of any hazardous risks, including fire safety and asbestos

Existing services and energy use

- ✓ Appraisal of installed building services, systems and meters (ventilation, air conditioning, cooling, heating, hot water, lighting systems, power supply) including appraisal of efficiency, capacity and life expectancy
- ✓ Any installed LZC (low and zero carbon) systems (e.g. solar panels or heat pumps)
- ✓ Review of fuel bills and or/fuel meter readings (including sub-meters, covering a period of at least one year)
- ✓ Identification of building services control zones and the programmes and settings for each zone (e.g. times, temperatures, ventilation rates)

Regulatory context

- ✓ Identify requirements for energy efficiency, fire safety, planning permission, listed building consent, tree preservation orders or archaeological investigations etc

Available resources

- ✓ Acquisition of copies of any available fire safety assessment, asbestos surveys, building logbook, operation and maintenance manuals for the building fabric and building services

Financial context

- ✓ Identification of any allocated budgets, funding opportunities, financial incentives or grants

Useful resources and references

- *PAS2038:2021 Retrofitting non-domestic buildings for improved energy efficiency,* Department for Business, Energy & Industrial Strategy, BSI, August 2021
- *PAS2035:2019 Retrofitting domestic buildings for improved energy efficiency,* Department for Business, Energy & Industrial Strategy, BSI, February 2020
- *BS40104 Assessment of dwellings for retrofit, BSI, July 2021*

IDENTIFYING THE RISKS

A risk based approach

There are many risks when embarking on a building project, but projects involving heritage buildings often carry more risks than those that don't. Working with existing buildings involves greater uncertainty, often associated with unknown factors like building condition, historic boundaries and ill-defined land ownership. These things can have consequences when trying to develop robust cost plans. There are risks associated with gaining planning and listed building consent when trying to make changes to heritage buildings, and this can impact time frames and budgets.

Starting from a position of knowledge, as described in the previous section, is an important step in reducing the risk of unknowns to a minimum. Such risks can be minimised if their possibility is understood at the outset and a well thought out strategy is developed.

In addition to usual project risks, our changing climate is increasing the frequency and severity of many physical climate hazards that impact our built heritage, like extreme flood events, increased rainfall, warmer temperatures and severe draught. It is also introducing new hazards that could impact our built heritage, like the spread of new and invasive pest species.

Moreover, a rush to retrofit risks the potential maladaptation of our built heritage, with the insertion of fabric efficiency measures and renewable energy sources that could have unintended consequences if not considered and planned properly.

Adopting a risk-based approach to both carbon reduction and climate resilience, will facilitate proper planning and consideration. This ensures our heritage buildings are prepared for the known hazards and impacts likely experienced in our changing climate, whilst avoiding unintended consequences of ill-considered energy efficiency measures.

Climate hazards

CoLC has identified six climate hazards. These highlight key areas that need to be addressed within developments and other planning processes.

1 Flooding

A change in both the frequency, intensity and seasonal variability of rainfall in the future, as well as sea level rise, will put pressure on drainage system (see flood risk map shown on page 19).

2 Overheating

Increasing temperatures and the frequency and length of heat waves will be made worse due to the urban heat island effect (see overheating risk map shown on page 19).

3 Pests and diseases

Changing seasonal conditions and global patterns will influence the spread of new and emerging diseases, while pests and invasive non-native species may also increase in number.

4 Water stress

Changes in rainfall patterns and intensity will impact drainage systems, and London's capacity to meet its water demand, which can lead to drought. Droughts are expected to get longer and occur more frequently.

5 Trade, food and infrastructure

Weather-related impacts, geopolitical changes and altered climate conditions are likely to negatively impact upon major infrastructure, such as the power grid and transport network, as well as disrupting food production and trade.

6 Biodiversity losses

Changes to the climate can fundamentally alter natural trends and cause decline and loss within ecosystems. This includes disruption to ecological processes such as pollination, carbon storage capacity and our dependence on the natural environment for our wellbeing and resources.

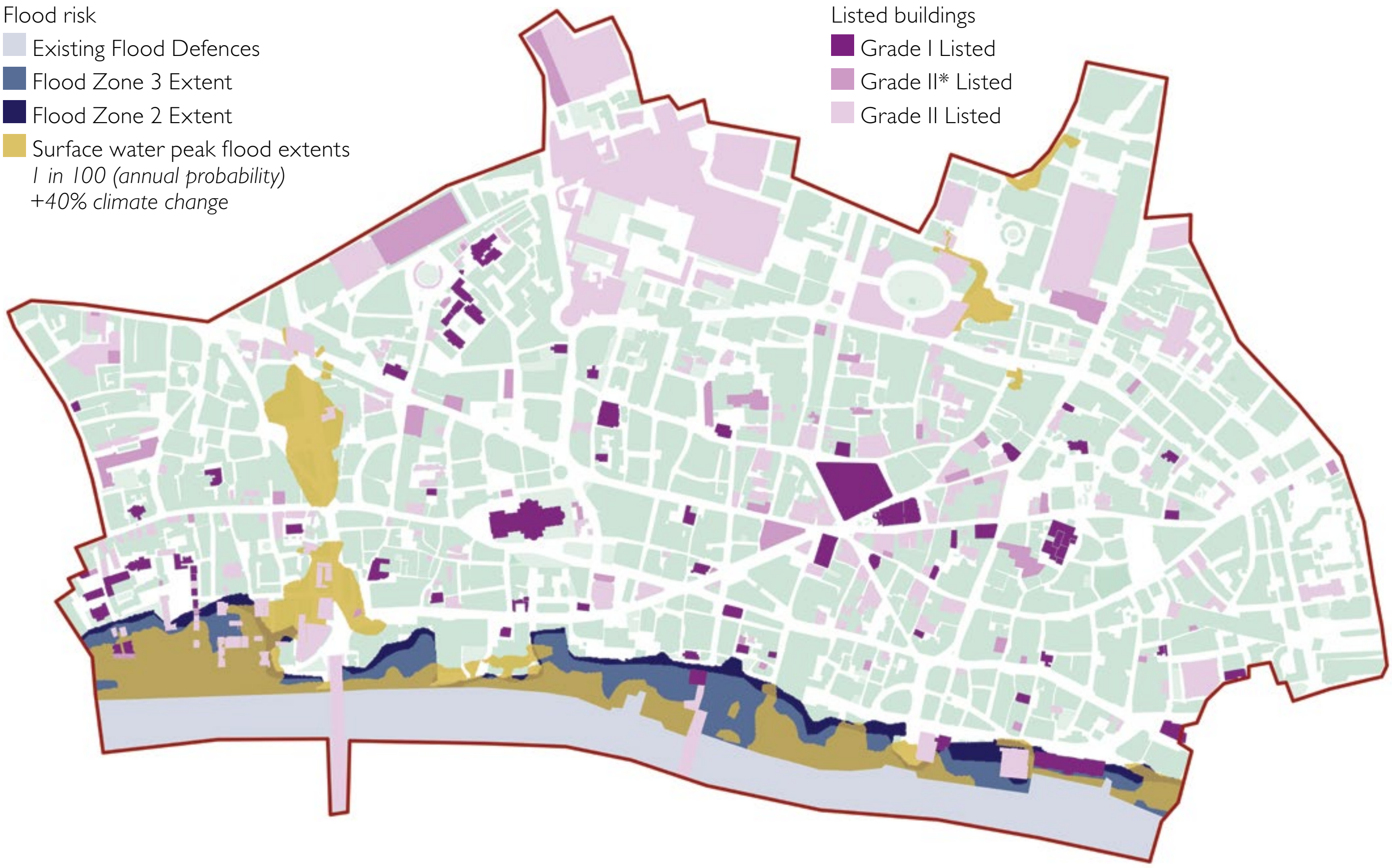


Fig. 6 **Flood risk in the Square Mile, with listed building distribution**
Adapted from *City of London Strategic Flood Risk Assessment (2017)*

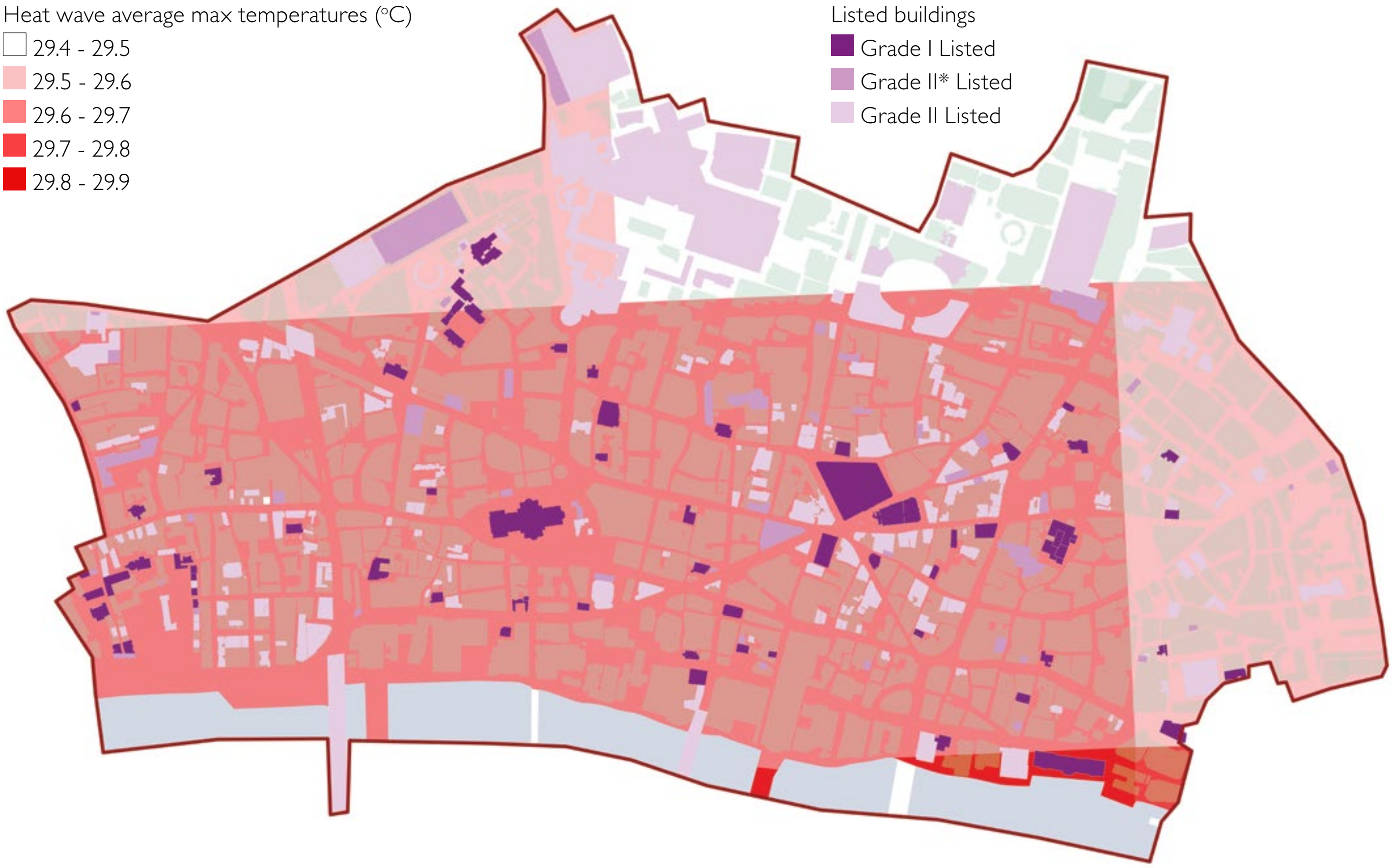


Fig. 7 **Urban heat island in the Square Mile, with listed building distribution**
Adapted from *Figure 6.1 Planning for sustainability supplementary planning document, City of London Corporation*

With climate change already visibly affecting historic buildings, landscapes and archaeological remains, there is an urgent need to consider the potential impacts of climate hazards holistically, and plan how best to reduce them.

The historic environment is highly diverse, and solutions will need to be tailored to specific situations. Many solutions will require wider consideration of adjacent assets, rather than viewing a specific asset in isolation.

A risk-based approach consists of the identification, understanding and assessment of known hazards, their potential consequences, and a thorough consideration of the necessary adaptations required and how these will be enacted.

Shown on page 21 are some general hazards and their potential impacts that might affect heritage buildings in the Square Mile. Alongside is a suggested way of analysing and prioritising each risk. This list is not exhaustive, and an example of a more extensive *Climate Hazard Impact Assessment* is provided in Appendix A (page 62).

There are undoubtedly other hazards (or combinations of hazards) and impacts, and it is important that a thorough assessment is carried out on a case-by-case basis.

Regardless of complexity, all heritage retrofit projects should consider the potential impact of hazards created by climate change. It is important to analysing their cause and effect, relative impact and likelihood of the event, and suggest adaptation measures that can be integrated into the whole building retrofit plan.

Useful resources and references

- *Appendix A Climate Hazard Impact Assessment,* Heritage Building Retrofit Toolkit
- *Climate Action: Climate Resilience,* City of London Corporation Website, July 2023
- *Climate Action: Flooding,* City of London Corporation Website, March 2023
- *Mapping Climate Hazards to Historic Sites,* Historic England, November 2021
- *Climate change adaptation guidance,* National Trust
- *A Guide to Climate Change Impacts,* Historic Environment Scotland, Octomber 2019

Fig. 8 **Climate Hazard Impact Assessment**
(abridged showing indicative impact vs. likelihood RAG rating)
Adapted from *A Guide to Climate Change Impacts on Scotland's Historic Environment, Built Environment Scotland*

	Climate hazard	Cause and effect	Impact	Likelihood	Risk level
				(indicative only)	
Buildings & infrastructure	Water stress	Increased rainfall causing more frequent and prolonged saturation of building fabric and **enhanced rates of building fabric decay**	2	5	10
Buildings & infrastructure	Flooding	Ground movement and associated structural instability/ movement of foundations causing **damage/loss of building fabric and engineered slopes**	4	2	8
Buildings & infrastructure	Flooding	Increased occurrence rates/severity of flood events causing **damage/loss to external building fabric/infrastructure**	3	4	12
Buildings & infrastructure	Flooding	Increased occurrence rates/severity of flood events causing **restricted or limited access to sites**	2	3	6
Buildings & infrastructure	Overheating	**Increased thermal stress** causing damage to external building fabric from **cracking of hard materials**	2	4	8
Buildings & infrastructure	Overheating	Increased temperatures increasing risk of fire, causing **physical damage and loss of fabric, and risk to life**	5	1	5
Buildings & infrastructure	Pests & invasive species	Increased rates of biological growth (mould) leading to **enhanced rates of fabric decay and poor environment**	2	5	10
Buildings & infrastructure	Biodiversity loss	Changing growing conditions leading to reduction or loss of **supply of natural materials for traditional construction**	1	3	3
Internal fabric & environment	Water stress Overheating	Fluctuating internal humidity levels as a result of more frequent wetting and drying cycles causing **cracking and warping of internal fabric.**	2	4	8
Internal fabric & environment	Overheating	Higher internal temperatures causing **overheating and uncomfortable internal environments**	2	5	10
Internal fabric & environment	Pests & invasive species	Increased rates of internal biological growth (e.g. mould) causing condition of **internal environment and fabric to be compromised**	2	4	8
Gardens & landscapes	Water stress and Flooding	Ground movement causing **damage to gardens, designed landscapes and localised destabilisation of trees and access pathways**	2	4	8
Gardens & landscapes	Water stress and Flooding	Saturation of ground, flash floods and run-off from adjacent areas causing **erosion of landscapes and damage/loss of planting**	1	4	4
Gardens & landscapes	Pests & invasive species	Changing climate conditions altering species of plant communities, **change of habitats/spread of invasive species**	1	3	3

Risks of maladaptation

Heritage buildings require a different approach to retrofit than non-heritage buildings. As an important part of our evolving cultural heritage, they reflect the nature and history of the communities that created them, and those that followed. They add distinctiveness, meaning and quality to a place. Whist carbon reduction and climate resilience measures present significant opportunities to ensure the continued enjoyment and relevance of these buildings, it is important to ensure these values are sustained for future generations.

In addition, historic and traditionally constructed buildings behave in a very different way to most modern buildings. Modern buildings depend on impermeable barriers to control the movement of moisture and air through the building fabric. In contrast, traditional forms of building construction, typically of solid wall construction, take up moisture from their surroundings and release it according to environmental conditions. They also tend to have greater thermal mass than their modern counterparts, meaning they heat up and cool down more slowly. This ability to passively regulate moisture and heat helps to even out fluctuations in humidity and temperature.

The interrelationship between heat and moisture in traditional buildings is complex. In a well-maintained building that is adequately heated and ventilated, the daily and seasonal cycles of wet, dry, hot and cold, balance out naturally. However, alterations to the building fabric that prevent this movement of air and moisture (for example through the application of impermeable materials, and excessively sealing the building up) can lead to problems of moisture accumulation, overheating, fabric damage and poor indoor environmental conditions.

Unfortunately, there have been many instances of bad energy efficiency retrofit projects that not only fail to improve a building's energy performance, but actually exacerbates issues or creates new problems where none existed previously, like poor indoor air quality and overheating.

No retrofit can be deemed successful, even if energy savings are achieved, if it results in an unhealthy, uncomfortable or unsafe environment for its occupants. Nor if it creates issues that cause building fabric damage, defects and decay, and subsequent loss or harm to a heritage building.

When planning energy efficiency improvements, particularly in a heritage building, it is important to understand the way the building is performing as an integrated environmental system in order to avoid unintended consequences, abortive work and unnecessary expense.

Furthermore, alterations to existing buildings also need to consider health and safety issues, like fire safety. Projects should ideally consider measures to improve fire safety as part of the planned works, considering any risks posed by new material choices, and new services.

Useful resources and references

- *Climate Emergency Retrofit Guide,* LETI, October 2021
- *Responsible Retrofit Knowledge Hub,* Sustainable Traditional Building Alliance Website

These risks should not be considered a barrier to retrofit. All risks can be minimised if an informed, well planned and whole building approach is taken. This is described in more detail in the next chapter.

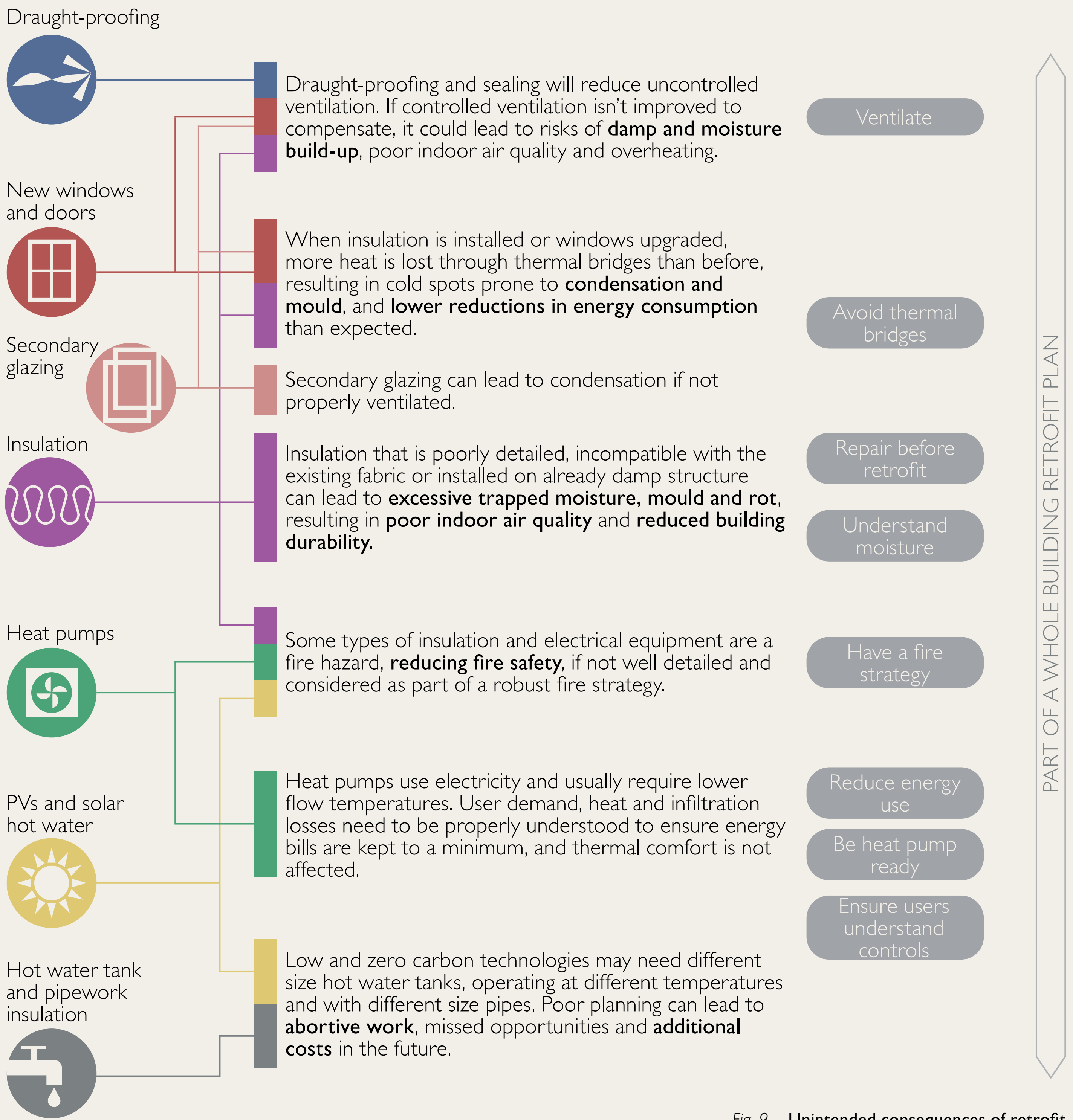


Fig. 9 **Unintended consequences of retrofit**
adapted from *Climate Emergency Retrofit Guide, LETI*

IDENTIFYING OPPORTUNITIES

Balancing heritage and sustainability

The roots of heritage conservation - the responsible stewardship of our inherited world - are inextricably linked with sustainability and climate adaptation. The continued use of existing buildings, coupled with measures to improve energy efficiency, is a global priority. Replacing an existing building with a new one requires a considerable investment of 'embodied' carbon in materials, transport and construction. Therefore prolonging the life of our existing buildings and safeguarding their future, is an inherently sustainable approach.

In order to reduce carbon emissions and build climate resilience, we must continue to allow our built heritage to adapt and change, as it has done for generations.

Proposals that look to tackle the climate emergency, in a measured and considered way, should be seen as a public benefit.

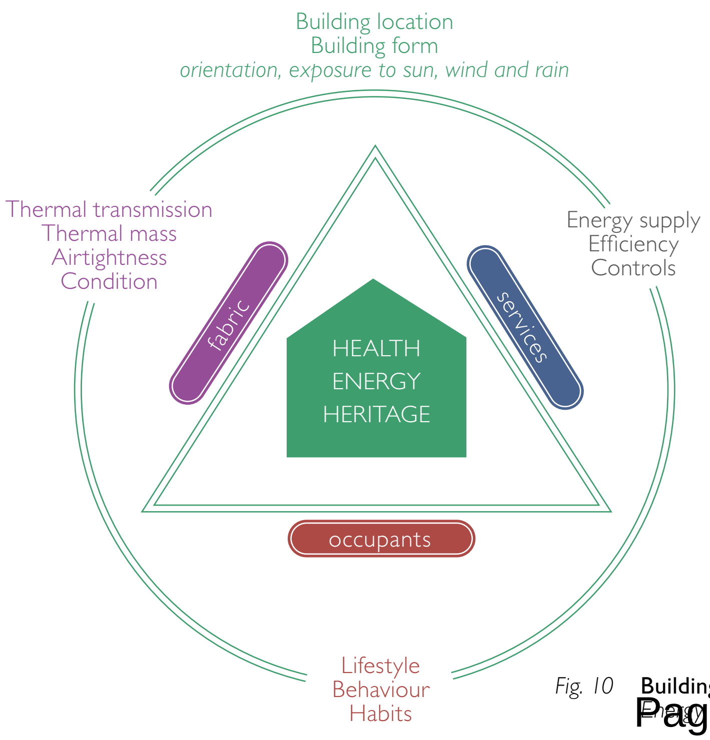


Fig. 10 **Building performance triangle**, adapted from *Energy Efficiency and Historic Buildings, Historic England*

Page 86

A whole building approach

A *whole building approach* uses an understanding of a building in its context, to find balanced solutions that save energy, sustain heritage significance, and maintain a comfortable and healthy indoor environment. It considers the building as a system of interconnected materials, functions, users and services, with interventions designed to work together to deliver the maximum benefits, as effectively as possible.

A conventional approach to refurbishment is to change each element individually without considering the building as a whole. Dealing with different parts of the building in a piecemeal way, can result in negligible energy and carbon savings, potentially damage the building fabric, and lead to abortive work. In order to successfully deliver energy savings and healthy, comfortable environments, a coordinated approach is needed for the whole building.

A *whole building approach* does not mean doing everything all at once, although this is certainly one option. Work can be carried out in phases, but a *whole building approach* ensures each phase is considered as part of the wider objectives and plan for the building, as well as taking into account potential risks, and ensuring one measure doesn't adversely effect the outcomes and performance of another measure.

Useful resources and references

Retrofit and Energy Efficiency in Historic Buildings, Historic England, September 2023

Responsible retrofit hierarchy

The greenest, and cheapest energy, is the energy you don't use. Whilst there are no one-size-fits-all solutions for making energy and carbon reductions in heritage buildings, priority should always be given to measures that eliminate unnecessary energy wastage, through behavioural change, good building maintenance, efficient controls and equipment, and managing the building to its optimum performance.

Implementing 'low hanging fruit' measures that mitigate the impact of unavoidable energy use are often low cost and easy to install, with limited impact on the heritage significance of a building, e.g., energy efficient lighting, basic heating controls, and better control settings.

Improving the building fabric by means of insulation, air-tightness measures, and by minimising thermal bridging is likely to reduce heat loss and heat demand, and thus reduce the required capacity of the heating system. These measures need to consider the movement of moisture and air, the permeability of the existing and proposed materials, and their impact on heritage significance.

Active systems (mechanical and electrical solutions that are zero carbon and renewable) are a vital part of achieving net zero carbon emissions. However, jumping to these measures without first seeking to reduce energy demand, could mean the new energy source will need to be larger and work harder, ultimately costing more to install and run.

The diagram to the right shows the hierarchy of a responsible retrofit. It is intended to act as a planning tool in the early stages of a project and help inform a *whole building approach*.

Measure impact and analyse

It is important to evaluate and compare all the viable options. As a starting point it is always better to have everything on the table. Then each measure can be assessed against it's impact on heritage significance, energy reduction, carbon emissions and climate resilience. Always consider the risks of inaction alongside the risks of any particular adaptation.

Consider carrying out computer modelling such as energy, heat transfer, and moisture risk to better understand the implications of different measures. Use modelling to understand the fabric and system upgrades needed to meet any energy targets set, and consider undertaking a whole life carbon assessment.

With each suite of measures, consider their individual and collective impact on heritage significance, seeking pre-application advice to understand what measures may and may not be appropriate.

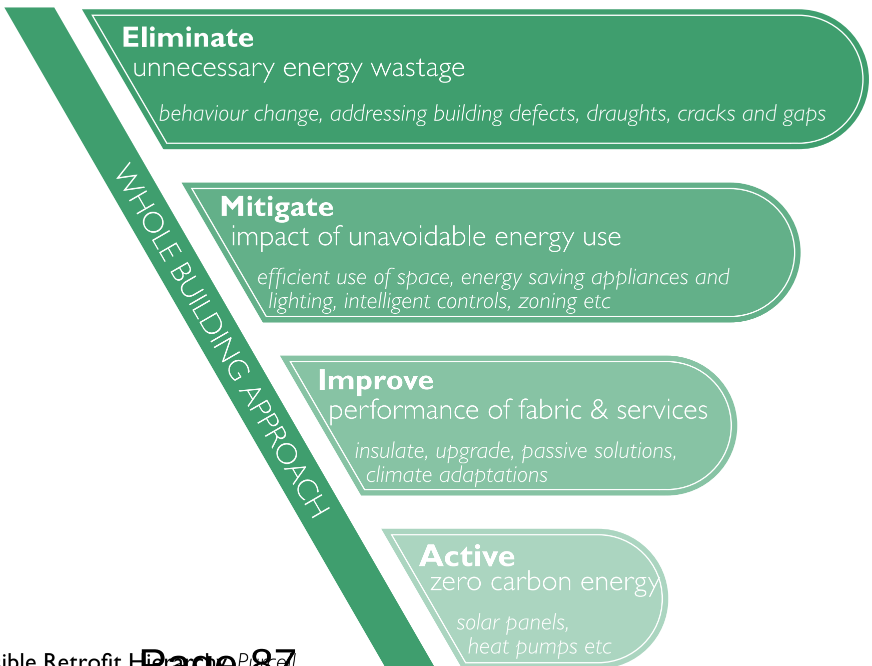


Fig. 11 **Responsible Retrofit Hierarchy** *Purcell*

Opportunities for energy efficiency

ELIMINATE

...unnecessary energy wastage

Encourage positive habits
Engage those using the building, discuss what positive habits they could adopt. Consider an information campaign to remind people how they can make a difference.

Occupant comfort
Expectations around occupant comfort vary. Engage occupants to understand what they need.

Shut windows and doors
Keeping windows and doors shut when heating is turned on will keep heat in and avoid energy wastage.

Eliminate areas of damp
Keeping the building in good condition and eliminating damp fabric, can reduce heat loss through external fabric by up to 30%.

Address gaps and cracks
Reducing uncontrolled infiltration of air through the building fabric will reduce heat loss.

Ensure all windows are fitted correctly
Properly fitted and sealed windows will reduce heat loss.

Reduce draughts
Eliminating draughts and reducing uncontrolled air infiltration will reduce heat loss and feelings of cold.

Turn off lights and electrical items
Reduce energy use by switching things off when not in use.

Reduce thermostats by 1°C
-1°C
Turning your thermostat down by 1°C can reduce energy use by 10%.

Ensure plant and equipment is operating as required

MITIGATE

...the impact of unavoidable energy use

Use spaces efficiently
Consider the environmental conditions of each space and how activities might be reorganised to suit those conditions.

Keep heat in
Consider curtains, shutters, rugs and wall hangings to reduce heat loss.

Efficient lighting
LED lights use 90% less energy than conventional halogen light bulbs. Switch all lights to energy efficient alternatives.

Switch to energy saving appliances
When appliances need replacing, always look to switch to an energy saving alternative.

Implement zoning strategy
Consider the use of each space and how the heating system operates. Avoid heating unused areas.

Intelligent controls
Installing light sensors, localised thermostats and metering systems can reduce energy use.

Building Management Systems
Good metering and BMS are a key part of improving energy efficiency of a building, providing ongoing performance data.

Insulate hot water pipes
Insulating services and hot water elements will reduce heat loss through pipe work, reducing energy used in heating.

Efficient sanitary fittings
Installing water saving sanitary fittings can reduce energy use.

...click on a building type to see common opportunities

This list is not exhaustive. **Each measure needs to be considered and analysed within the specific context of each heritage building**. Assess all opportunities in relation to their potential impact on carbon reduction, heritage significance and historic fabric.

OCCUPANTS

SERVICES

FABRIC

IMPROVE

...performance of fabric & services

Maximise natural daylight
Opportunities to improve natural daylight will reduce reliance on electrical lighting, and provide solar gains in winter, e.g. rooflights.

Install roof or loft insulation
Insulating loft spaces and roof voids will reduce heat loss.

Wall and floor insulation
In heritage settings, external walls might need to be insulated internally. Consider opportunities to insulate floors.

Thermal bridges
Address weak points in the building envelop that allow heat loss through the fabric more quickly.

Upgrade windows
Depending on their significance, age and condition, consider viability of replacement or upgrade to double, triple or secondary glazing.

Solar shading
Integrating solar shading like shutters or canopies can reduce overheating and reliance on air conditioning.

Upgrade heating system
Consider upgrading heating system with a low flow temperature system like underfloor heating.

ACTIVE

...zero carbon energy & systems

Beyond the boundary
Consider neighbouring development plans where resources and infrastructure can be shared with another site, as well as district heat networks, power purchase agreements etc.

Photovoltaics and solar hot water panels
Solar panels generate energy, reducing reliance on the national grid. Consider overshadowing of neighbouring properties.

Battery storage
Integrating batter storage alongside solar panels can store on-site generated energy for when you need it.

Ground source heat pump
These use heat from the earth to heat the building. Consider risks to localised archaeology.

Air source heat pump
These use heat from the air to heat the building. They can be less intrusive than gas boilers because they don't need a flue.

Mechanical ventilation system
Mechanical ventilation and heat recovery systems may need to be considered, especially if natural ventilation is being reduced.

Fig. 12 Common opportunities for energy efficiency in heritage buildings

How far should a retrofit go?

The more we reduce our demand for energy, the lower our emissions. But how far should a heritage retrofit go?

The answer is different for different buildings. Not all opportunities will be suitable for every building, and much depends on the function and requirements of the building.

Extensive retrofits (sometimes called a 'deep retrofit') which significantly improve the building fabric and reduce space heating demand by about 70%, may not be suitable in the most sensitive of settings. Equally, a shallow retrofit, resulting in a space heating demand reduction of around 30%, may not achieve the targeted emissions reduction.

All measures, particularly those involving changes to the fabric of the building, need to be considered alongside their impact on heritage significance and building performance. New work should be designed and executed in a way as to be valued now and in the future using materials compatible with, and not detrimental to, the original materials or construction and respecting the significance of the building in its settings.

The way in which a building is used and lived in will significantly affect energy use and the thermal performance of the building. This always needs to be considered alongside any changes to the building fabric and services.

Useful resources and references

- *Climate Emergency Retrofit Guide,* LETI, October 2021
- *Responsible Retrofit Knowledge Hub,* Sustainable Traditional Building Alliance Website

Building climate resilience

In order to secure the long-term resilience of our heritage buildings, it is important to take steps to prepare them for our changing climate. In addition, as we respond to the reality of climate change in new ways, we can take the opportunity to highlight how the historic environment demonstrates resilience and adaptability, as a lesson for the future.

The diagram on page 29 shows a number of measures that will help reduce the risks posed by the six climate hazards to the City of London, as set out in Section 2 of this document. Appendix A provides more detailed examples.

Many measures have the potential to reduce the risks associated with more than one climate hazard. For example, keeping the building in a good state of repair and increasing inspections and regular maintenance, will reduce the risk of damage caused by water ingress from flooding and extreme weather events, because rainwater goods will be kept clear, and leaks and other defects will be caught early. In addition, this measure will reduce reliance on global supply chains by prolonging the lifespan of the building's fabric, reducing demand for materials and pressure on resources, infrastructure and biodiversity.

Useful resources and references

- *Appendix A Climate Hazard Impact Assessment,* Heritage Building Retrofit Toolkit
- *Climate Action: Climate Resilience,* City of London Corporation Website, July 2023
- *Climate Action: Flooding,* City of London Corporation Website, March 2023
- *Mapping Climate Hazards to Historic Sites,* Historic England, November 2021
- *A Guide to Climate Change Impacts,* Historic Environment Scotland, October 2019

Many decisions are interconnected and should be considered in the round, revisited and refined as the project progresses. Once opportunities for carbon reduction and climate resilience are considered, revisit the risk analysis.

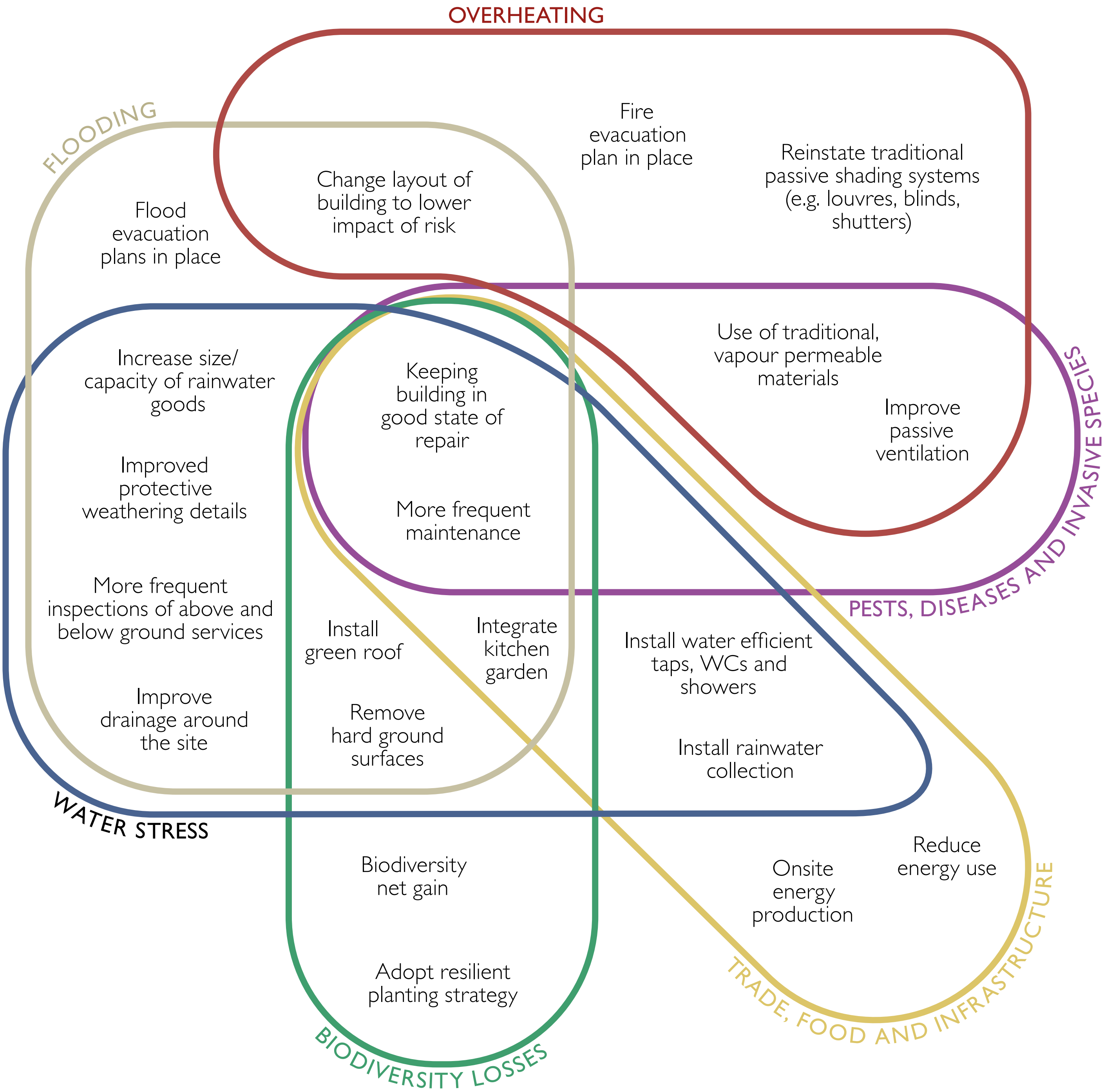


Fig. 13 **Opportunities to address climate resilience** considered in relation to the six identified climate hazards in the City of London. Many measures help reduce the risks of multiple hazards.

WHOLE BUILDING RETROFIT PLAN

What is a Retrofit Plan?

Before you start a heritage retrofit project it is critical to have completed a plan for the whole building, even if you are doing just a small piece of work at first.

A *retrofit plan* is a masterplan for all the individual pieces of work needed to improve the building, and how these interrelate. This means that when one piece of work is carried out, it considers the impact on future phases. The *retrofit plan* might change over time, but gives a snapshot of the intentions, and helps think through the consequences. A *retrofit plan* can be prepared by an architect competent in retrofit, a retrofit coordinator, retrofit lead professional, or a specialist builder.

A *retrofit plan* should include:

- the building's existing state including constraints, opportunities and performance
- future plans for the building
- future climatic context
- carbon reduction and climate resilience pathway and targets
- whole building retrofit strategy
- alignment with conservation management plan
- alignment with maintenance plan
- requirements for statutory approvals

The *retrofit plan* should be presented in a format that allows it to be updated as work proceeds, and revised as new knowledge and new materials, products or technologies for energy efficiency become available.

Useful resources and references

PAS2038:2021 Retrofitting non-domestic buildings for improved energy efficiency, Department for Business, Energy & Industrial Strategy, BSI, August 2021

PAS2035:2019 Retrofitting domestic buildings for improved energy efficiency, Department for Business, Energy & Industrial Strategy, BSI, February 2020

Alignment with planned maintenance

Maintenance and repair are needed to tackle the inevitable decay and deterioration of historic buildings, monuments, sites, or landscapes. Without maintenance and repair, the deterioration of a building can impact on building users, energy use, running costs, property value, and the appearance of the wider area.

Conservation management plans

These are a tool to help collate an understanding of what matters in a heritage building and why, and how to conserve and manage it. From this informed basis, plans are then used to develop programmes of repair, restoration or to draw up proposals for change.

Planned maintenance

This is the repairs required to restore a building to its original condition on a responsive, cyclical or planned basis. Not all planned maintenance will directly improve the appearance or performance of a building, although defects like damp can significantly reduce the energy efficiency of built fabric.

Considering urgent maintenance and replacement work (e.g. windows that need to be replaced this year), and future maintenance and replacements that will be required (e.g. a roof that needs replacing in 3 years), these are costs that will be incurred whether the building is retrofitted or not, and typically budgeted for as part of a long-term investment in capital expenditure. Understanding the replacement cycles for each building element is essential when planning step-by-step retrofit to avoid duplication and ensure that the 'anyway' maintenance cost is incorporated within each retrofit.

Some maintenance items will impact the work that can be completed and may need to be rectified in advance. Leaking gutters, blocked drains or air bricks should be sorted early to allow the building to dry as much as possible.

A retrofit plan should include...

Building information, constraints, risks and opportunities

- ✓ Set out all information gathered in *Step 1 - Starting from a position of knowledge* including:
  - building context, situation and future context
  - significance and history
  - form and condition
  - building use and patterns of occupation
  - existing services and energy use
  - regulatory context
  - available resources
  - financial context

Carbon reduction and climate resilience pathway

- ✓ Identify any repair or maintenance work that is a pre-requisite to retrofit
- ✓ Take into account all other planned maintenance and refurbishment work and identify scope for improving energy efficiency
- ✓ Confirm short, medium and long-term goals and energy performance target
- ✓ Identify ways of reducing energy use and eliminating fossil fuels in the building

Phasing and sequence of work

- ✓ Align work with planned maintenance and conservation management plans to ensure works are seen as part of a holistic approach to securing the building's long-term future
- ✓ Highlight opportunities to phase the works, ensuring that the design and package of measures for each part integrates with the complete retrofit, avoids obstructing future work phases, and functions in itself without causing issues with the internal conditions or structure

Requirements for statutory approvals

- ✓ Identify any aspects of the proposed work that might require statutory approvals, e.g. planning permission, Listed Building Consent, etc

Whole building retrofit strategy

A retrofit strategy for the building may include:

- ✓ rearranging the space within the building, and reconfiguring the building services, to improve energy efficiency
- ✓ the insulation and air tightness of the building fabric
- ✓ daylighting and solar gain control
- ✓ natural and mechanical ventilation
- ✓ moisture risk management
- ✓ heating, cooling and hot water services
- ✓ lighting and small power
- ✓ other services such as lifts, water and sewage pumping, and communications, safety and security systems
- ✓ building services controls
- ✓ metering and operational monitoring of energy performance
- ✓ identify potential interactions between measures that require further detail and investigation, e.g. to minimise thermal bridging

Plan for monitoring and reporting energy consumption

- ✓ This might include a predicted energy consumption calculation during design for comparing back to once complete, sub-metering, or simply upgrading to a smart meter

Notes:

The retrofit plan should be appropriate in its level of detail and intervention for the building size, context, use, owner and occupants, scope of work and heritage value.

It should be a live document that is updated as works are completed or more information is gathered. It should be handed over to future owners and revised with new proposed strategies and details.

BUILDING A BUSINESS CASE

Capturing the benefits of retrofit

The opportunities created by climate action go beyond reducing greenhouse gas emissions. Some of these are captured in fig. 14, considering benefits both to building and business owners, occupants, and the broader societal benefits like job creation.

Developing a strong business case that communicates these benefits formally will help bring others along on the journey, and set up the financial frameworks to ensure investments have the maximum impact.

A retrofit plan does not always require all work to be completed upfront. Work can be phased, spreading costs over a longer period.

For small projects, a simple budget and a description of the benefits may be enough; for larger projects a 30-40 year cash flow and Net Present Value calculation may be useful.

The business case should aim to cover the whole life cost (including energy and maintenance savings, increased asset value, etc.), the cost of alternatives, and the value in non-financial benefits. By modelling the savings identified in energy performance, against the cost of investment, there is a strong business case for retrofit.

Itemise the cost of any non-retrofit works separately e.g., maintenance, amenity improvements, replacing kitchen/bathrooms, fire safety improvements. This will help isolate the 'anyway' maintenance and upkeep costs that would need to happen regardless of any retrofit project.

Consider a long-term reinvestment strategy, where money saved through initial energy saving measures is reinvested back into subsequent phases of work.

Lower energy bills if buildings are substantially more energy efficient

Higher asset value as buildings are energy efficient, comfortable & durable

Energy security by reducing energy consumption, and integrating renewables

Reduced risk of stranded assets by ensuring they remain relevant and usable

Reduced rent arrears and void periods because tenants have lower bills

Reduced maintenance costs particularly where old systems can be upgrading

Reduced carbon offset/removal costs for the long-term

Greater resilience against the impact of changing climatic conditions

Delivering on green business commitments and net zero pledges

Attracting climate conscious workforce or clientèle through green delivery

Healthier, more comfortable buildings, improving productivity and wellbeing

Lower health-care costs with occupants living and working in healthier buildings

Lower infrastructure costs with energy demand and peak loads reduced

Jobs creation and skills development as retrofit is a labour intensive activity

Ensuring the long-term security and relevance of our built heritage

Fig. 14 **Some of the benefits of heritage retrofit**

Grant funding support

Financing retrofit and climate resilience measures can often incur significant costs. Developing a business plan will mean drawing on a range of available funding and investment sources for different stages of the work.

The City of London provides grant funding to support a range of community development initiatives in the Square Mile and beyond. Several of these schemes are relevant to supporting the sustainability of the historic environment and are particularly appropriate for charities and voluntary groups.

The Corporation is the sole trustee of the City Bridge Trust, London's largest independent funder. It has an 'Environment and Sustainability' scheme to support a greener London. It provides revenue funding for three areas of intervention:

- **Making London a greener city for all:** encouraging local projects to mitigate and/or adapt to climate change.
- **Eco-Audit:** to assess the potential for reducing the carbon footprint of your spaces and operations. They are free and available to all eligible organisations wherever the building is owned or with a lease over two years.
- **Capital funding:** for building works identified through Eco-Audits. You can apply for capital funding of up to £150,000 to carry out its recommendations to reduce that building's carbon footprint. Works could include (but are not necessarily limited to) insulation, solar panels, heat pumps, on-site biodiversity schemes, and energy efficient lighting systems.

The Community Infrastructure Levy Neighbourhood Fund (CILNF) supports the provision, improvement, replacement, operation or maintenance of infrastructure in the City. The scope of projects that can be funded by the CILNF is wider than that for general Community Infrastructure Levy funds and includes:

- The provision, improvement, replacement, operation or maintenance of infrastructure.
- Anything else that is concerned with addressing the demands that development places on an area.

This definition is deliberately wide to allow local communities to determine their priorities and how the CILNF should be used. An application should normally not be for more than £500,000.

The City of London Corporation manages a Central Grants Programme which has 'Stronger Communities' and 'Inspiring London through Culture' as priority themes.

Useful resources and references

- *City Bridge Trust,* City Bridge Trust Website
- *Community Infrastructure Levy Neighbourhood Fund,* City of London Corporation Website
- *Central Grants Programme,* City of London Corporation Website

DETAILED DESIGN AND SPECIFICATION

Developing the detail

All changes, whether small-scale repairs or larger alterations, require an appropriate level of detailed consideration. Seek professional advice and request drawn information and a written specification as a minimum. These should be coordinated accordingly between all disciplines, and consider the following:

Compatibility with future phases

It will not always be possible to carry out all the necessary work at the same time, and any phasing strategy should be clearly communicated in the *retrofit plan* to ensure that the detailed design and specification of each phase considers work required in subsequent phases. For example, the installation of new windows in a way that does not prohibit the installation of internal wall insulation in the future, or structural repairs to a roof that accommodates for the additional weight of solar panels at a later date.

Whole life carbon

The embodied carbon of retrofit projects can be significant, and if not properly considered could outweigh the long-term operational carbon savings. Measures that improve the thermal performance of a building (like adding insulation) have the potential to increase embodied carbon, therefore whole life carbon should be a key factor in any decision making around materials and services specification. Embodied carbon emissions can be minimised through the elimination of new materials where not needed, reusing existing materials as much as possible, specifying durable, long lasting, low embodied carbon materials, and avoiding over specification of services.

Usability

Aim to keep systems, services and controls as simple as possible, with easy to use and familiar controls. Consider maintenance access, cleaning requirements and implications on operability, particularly around things like new services, but also new window design and specification.

Vapour permeability and moisture movement

New materials and finishes should work with the existing building fabric. For example in traditionally constructed buildings (usually pre-1919) vapour permeable materials that allow the movement of moisture through the building fabric, should be specified. It may be necessary to remove previous inadequate work and vapour impermeable materials.

Air tightness and adequate ventilation

Older buildings suffer from excessive uncontrolled ventilation (infiltration), but this also contributes to how the building naturally regulates moisture. If ventilation of a heritage building is reduced too much, condensation, mould and fungal growth may occur, leading to deterioration of the fabric and poor internal air quality. Therefore ventilation must be an important consideration of any phase of works.

Thermal performance

When improving the thermal performance of a building, thermal bridges must also be considered. These are areas in the building envelope which allow heat to pass through more easily. Areas to consider include floor-wall junctions, door and window surrounds, complex windows (bay windows, mullions etc) and joints between insulation.

Services, controls and metering

Careful design of new mechanical and electrical systems are an important part of improving energy efficiency and the operation of a building. New systems should be designed to ensure usability, with accessible controls and interfaces. Integrating feedback mechanisms will help monitor performance over time. A building management system (BMS) can be an effective way of monitoring and controlling building services.

Useful resources and references

Retrofit and Energy Efficiency in Historic Buildings, Historic England, September 2023

Best practice retrofit to reduce moisture risk

In order to avoid any unintended consequences it is crucial to consider how the introduction of new materials will affect the building's ability to deal with moisture. Specifically, the interconnected relationships between moisture, ventilation, thermal performance and indoor air quality.

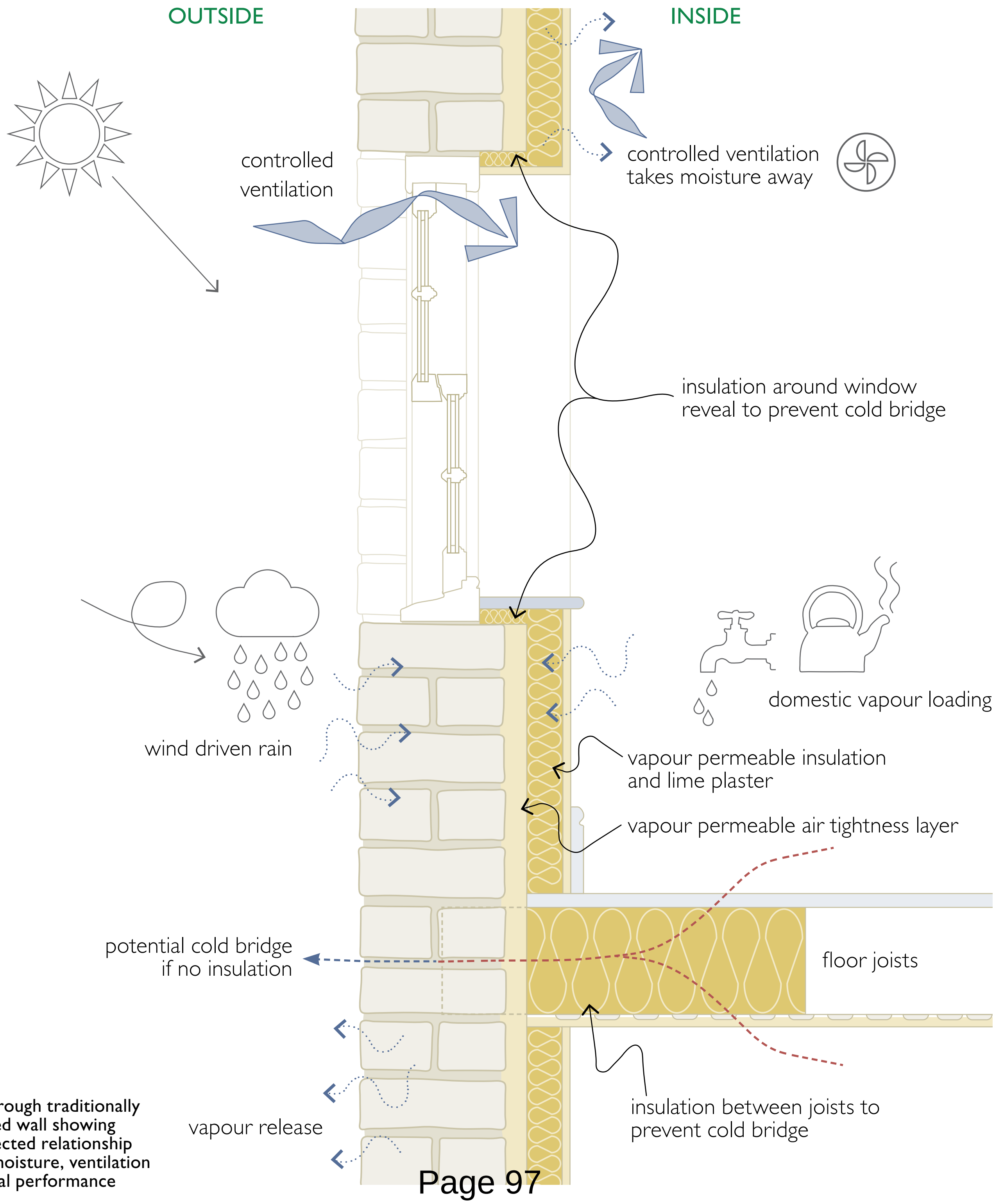


Fig. 15
Section through traditionally constructed wall showing interconnected relationship between moisture, ventilation and thermal performance

OBTAINING STATUTORY APPROVALS

With some retrofit work, particularly involving a listed building, or buildings in a conservation area, certain statutory approvals will need to be obtained prior to starting the work. The project team should advise on the need for statutory approvals, and the time frames involved in this process.

Listed building consent

Alterations, demolition or extension of a listed building requires listed building consent from the local planning authority. Common works requiring Listed Building Consent might include the replacement of windows or doors, knocking down internal walls, painting over brickwork or altering fireplaces. It is important to engage with local conservation officers early to understand what work will and will not require listed building consent.

Planning permission

Planning permission is needed for changes which are defined as development. This includes building works, some kinds of demolition, and changes of use to existing buildings. In conservation areas, some minor works such as replacing windows or insulating front walls might need planning permission as they could affect the appearance of a conservation area.

Scheduled monument consent

Written consent must always be obtained before any work on a scheduled monument can begin which might affect the monument either above or below ground level. Applications are made to the Secretary of State for Culture, Media and Sport.

Consent for registered parks, gardens & battlefields

Although there is no separate consent system for Registered Parks, Gardens & Battlefields, their significance is a "material consideration" for the local planning authority when considering any proposed development affecting these sites or their setting.

Ecclesiastical exemption

Some religious groups are exempt from certain provisions of the planning acts, including the need to apply for listed building consent for ecclesiastical buildings. These groups have their own arrangements for handling changes to historic buildings which provide the same standards of protection as the secular system operated by local planning authorities.

Building regulations

Building regulations are a legal requirement which set standards for how buildings should be constructed to achieve a minimum level of performance. They are intended to protect people's safety, health and welfare, they also set standards for accessibility, water use, energy use and security. Existing buildings undergoing upgrades and refurbishments, may be subject to certain buildings regulations.

Party wall awards

Party wall awards are required in order to inform your neighbours if you want to carry out any building work near or on your shared boundary, or 'party wall'.

Historic England

Historic England are a statutory consultee who may be consulted by the local authority for applications that effect Grade I or II* listed buildings, or the character and appearance of a Conservation Area.

Applications for listed building consent and planning permission where designated heritage assets are concerned, will be required to provide a heritage statement with their application. In these cases the involvement of expert conservation consultants should be engaged from the beginning of a project to help shape proposals.

Useful resources and references

- *Heritage Consents,* Historic England Website
- *Historic Environment Listed Buildings,* City of London Corporation Planning Guidance, April 2023

When you should consider statutory approvals

1. Start from a position of knowledge

Identify the statutory constraints of the building and its setting, e.g. conservation area, listed building etc.

Engage relevant experts (e.g. heritage consultant)

2. Identify the risks

Understand that obtaining consent for some work will be a risk and set out how this might be mitigated through early engagement.

3. Evaluate the opportunities

Set out the statutory requirements of each opportunity considered and what the implications of this are, e.g. whether listed building consent or building regulations need to be obtained and how that might effect programme.

Seek pre app advice to inform options

4. Develop a retrofit plan

Ensure obtaining statutory approvals is integrated into retrofit plan, allowing suitable timescales for engagement, consent and sign off.

5. Build a business case

Include costs for obtaining statutory approvals in business case

6. Detail design and specification

Develop design in line with requirements of statutory consents

Engage building control

Seek additional pre app advice for complex projects

7. Seek relevant approvals

Submit all information necessary to obtain statutory approvals

8. Installation and work on site

Ensure works are carried out in line with the approved design. Sometimes conditions will be attached to a consent, make sure these are submitted when requested, sometimes this is before work commences.

9. Testing evaluation and feedback

Submit final planning conditions for approval (if relevant)

Obtain a 'final certificate' from the building control body or approved inspector

Fig. 16 Flow chart to show when you should consider statutory approvals.

INSTALLATION AND COMMISSIONING

Carrying out work on site

Before any retrofit work is commenced, repairs identified during the assessment of the building as essential pre-requisites to retrofit should be carried out.

It is important to find a competent contractor who is familiar with your building type and construction, and shows interest in what you are trying to achieve. Seek professional advice if appropriate.

Site operations can have a significant impact on the effectiveness of any building retrofit. Quality control is essential if the performance requirements of the brief are to be achieved.

Consider how the phases of work should be procured and delivered. How will the procurement deliver construction quality? What checks or oversight will be in place? Will building users need to be decanted for some or all of the phases?

Contract documents should clearly set out what the aspirations of the project are, particularly in terms of performance and quality. Consider building contracts which include performance and value linked incentives based on monitoring.

When works are being carried out the contractor typically takes ownership of the site, and is responsible both for delivering the employer's requirements and maintaining the health and safety of all people who may be affected by the works under CDM regulations. A clear understanding of performance requirements, roles and responsibilities with clear communication is always required to avoid performance conflict, confusion and delay.

Projects that are to comply with PAS2035:2019 or PAS2038:2021 need to be carried out in accordance with PAS2030:2019. Refer to these documents for further detail.

Selecting the right contractor

- Be specific and set out a clear, detailed brief.
- Request quotes from at least three businesses.
- Seek references, speak to previous customers and if possible, visit previous jobs.
- Research each company.
- Don't just select the cheapest, make sure selection criteria is fair and based on relevant experience, and quality of work.
- Consider how you will communicate with the business representatives, who are the individuals involved and how will they report to you?
- Always use a written contract as it offers you protection if anything does go wrong and a dispute arises.
- Set out the requirements for commissioning, monitoring and handover in the contract documents.
- Only pay for work that has been completed, unless otherwise agreed.
- Agree in writing on any changes to the agreed contract value before the work is compete.

Fig. 17 **Checklist for selecting the right contractor**

Commissioning and monitoring

Where new plant or services are being installed, especially ventilation, heating and hot water, commissioning and handover will be a key factor in the success of any heritage retrofit. This will typically involve the testing of key systems to ensure they are operating in an efficient and integrated way, providing a comfortable, safe and secure indoor environment. Commissioning should demonstrate that all metering and monitoring equipment are functioning properly. Thoroughly testing and adjusting this equipment will ensure that the whole system uses no more fuel and power than is reasonable, and make sure it is operating as designed.

Some low energy systems, like Air Source Heat Pumps and Mechanical Ventilation Heat Recovery (MVHR), are complex and require expert design and commissioning to ensure correct operation. MVHR systems must be commissioned by an independent engineer including measuring supply and extract flow rates through room terminals, and balancing the air flow through each MVHR. More complex systems, particularly communal heat pump systems, should be commissioned again after the first winter.

Any commissioning should be carried out with those who will be responsible for the long-term operation and maintenance of the system, e.g., facilities managers.

It is essential that building users know how to operate any new equipment and controls. Plan to engage building occupiers in the hand over process. And provide building users with access to a simple guide, in plain English, on how to use their building most efficiently.

Update the Retrofit Plan to record the changes that have been made. Add any further detail that might have been discovered during the work, for example construction build ups. Include information on what the next phase should be and any key considerations for integrating it with the work that has been completed. Include or update a maintenance plan that provides details of the new finishes and systems.

FEEDBACK LOOP

Post occupancy evaluation

The continuous monitoring and long-term oversight of any project outcomes will be key to understanding the impacts of any carbon reduction and climate resilience interventions, helping ensure their long-term success. This is an important part of the process and should be considered from the outset, factored into budgeting and programme considerations.

Post-occupancy evaluation should be carried out to verify the building is performing as intended, for a minimum of one year (including one full heating season). The evaluation should assess whether the building owners and occupiers are happy with the internal environment and project outcomes, and all new equipment is operating as intended.

Compare the actual, monitored performance with the initial brief targets. On a small project this might be meter readings, a review meeting with the team, and short user interviews. Where possible, install monitoring devices to gain additional information, for example energy sub meters, CO_2 or humidity sensors.

This type of ongoing evaluation of a project will help ensure the building is performing as intended, with building users operating the building in a way that ensures its optimum energy efficiency.

Sharing lessons

Addressing the climate crisis involves a collaborative effort. We are much more likely to reach our collective net zero targets if we share openly and honestly the challenges, processes and lessons that we come across when retrofitting our heritage buildings.

Some case studies are showcased within this document and these are intended to demonstrate what action others, within the Square Mile, have been able to achieve. We would like to extend this, and provide an ongoing resource of case studies, sharing best practice examples and helping others who are embarking on their net zero journeys.

Please share your stories with the City of London Corporation at:

climateaction@cityoflondon.gov.uk

Please share your stories with us at **climateaction@cityoflondon.gov.uk** so we can continue to promote best practice climate action across the Square Mile.

Fig. 18 **Historic Building Challenge stakeholder engagement event held in January 2023.** *Photographer: James Gifford-Mead*

TYPOLOGIES

A diverse heritage

The City of London is the ancient core from which the rest of London developed and is governed by the oldest local authority in the country, with origins pre-dating parliament. It has been a centre for settlement, commerce and ceremony since the Roman period, accumulating a unique historic environment of exceptional richness and significance. The City's history is easily seen in its townscape and makes a significant contribution to its commercial and cultural vibrancy.

There are many designated heritage assets in the City; more than 600 listed buildings (covering an area of about 500,000m^2), 27 conservation areas, 48 scheduled ancient monuments and four historic parks and gardens.

In 2017, the City of London Corporation's Department of the Built Environment published a report on the *Land Use of Listed Buildings in the City of London*. This document notes the prime land use of listed buildings in the Square Mile as commercial, which was 41% of the listed buildings, representing 35% of land area of all listed buildings. Other prime land uses for listed buildings and the relevant site area were mixed use and places of worship. 21% of all listed Buildings were statues and monuments but such listings covered a small land area.

There are significant spatial concentrations of listed buildings in conservation areas, with a high concentration in the conservation areas of Bank and Finsbury Circus in the east of the City, and Temples, Fleet Street and Whitefriars in the southwest. The 27 conservation areas of the City of London are shown on the page 44.

When considering carbon reduction and climate resilience, heritage typologies need to consider more than just use class and listing. Other factors include significance, age, construction, materials, and opportunities for energy efficiency measures.

Within the City of London, eight core typologies have been identified. These are described in detail in this chapter. This list is not exhaustive but is intended to identify commonalities between listed buildings within the Square Mile, through which to understand, compare and develop an approach to heritage retrofit.

Useful resources and references

- *Historic Environment,* City of London Corporation Website, April 2023
- *Conservation Areas in the City of London,* City of London Corporation, December 1994

Typical typologies within the Square Mile

Places of worship

Often stand alone buildings, providing a focal point for the surrounding area. Spatially they commonly include a single large volume. Usage patterns are unique with limited consistent occupation throughout the week. User expectations also vary, with many user groups only visiting for relatively short periods of time.

Liveries and guildhalls

The classic form was often a first-floor meeting room, raised on arcades, incorporating an open-sided market hall on the ground floor. Primarily large function room spaces, often elaborately decorated to reflect the success of the livery company, with administrative offices and meeting rooms. Use patterns primarily dictated by events programme.

Municipal buildings

Official buildings which were designed for a specific public or state use. Dates of construction vary, and many are no longer used in the way they were originally intended, often having seen substantial reconfiguration over the years.

Large public structures

Usually consist of large unheated spaces, includes market halls, railway stations etc. with subdivided spaces used for commercial activities. Multi-occupancy spaces with challenging lease agreements and varying environmental requirements.

18th century townhouses

Typically constructed to modest classical proportions with less ornamentation. Simplistic facades that are architecturally uniform and recognisably Georgian. Originally constructed as homes, now mostly commercial. Predominant use of London stock brick with rendered window reveals, and classical porches.

19th & early 20th century commercial

Includes:

- large scale commercial, where institutions occupied a 'city block' with multiple facades
- small scale commercial, usually occupying narrow plots with a single significant street frontage

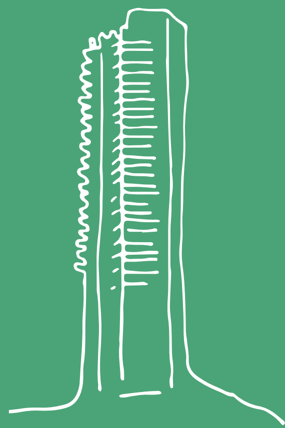
Predominant use of Portland stone with classical detailing.

Industrial

Includes historic warehouses, breweries and other industrial buildings. Dating from 18th and 19th centuries, most have been converted to commercial uses. Incorporate large floor to ceiling heights and significant structural spans, large windows, and features relating to industrial use.

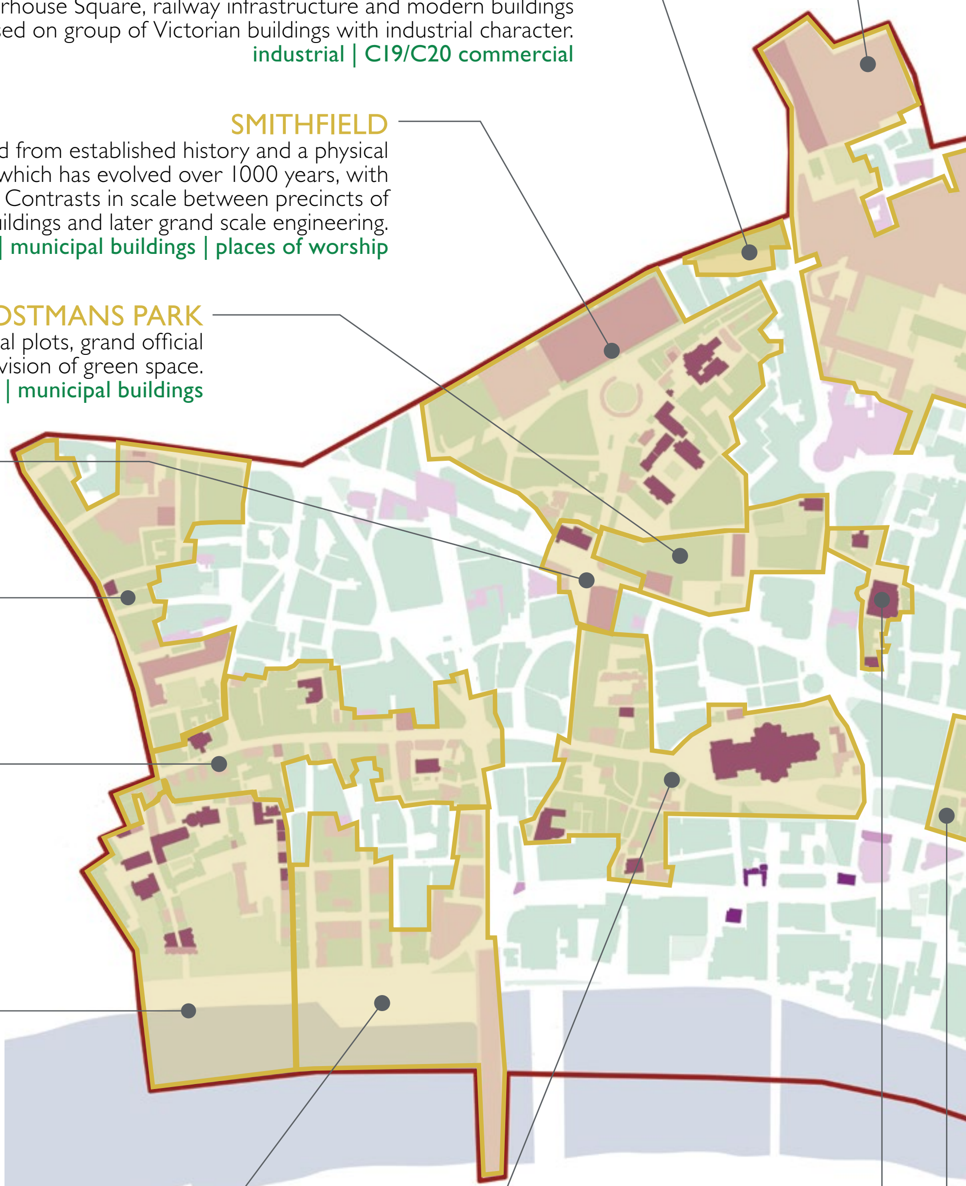
20th century modern

Includes housing, mixed use and commercial buildings constructed in the mid to late 20th century. Often concrete frame buildings with likely poor performing fabric as they were constructed at a time when energy was considered abundant.



Character areas and predominant typologies

Key:
- Grade I Listed
- Grade II* Listed
- Grade II Listed
- Conservation area



BARBICAN AND GOLDEN LANE
Characterised by two distinct developments Golden Lane Estate and Barbican Estate, post-war housing schemes reflecting the development of both Modernism and Brutalism.
C20 modern

CHARTERHOUSE SQUARE
Transition between Charterhouse Square, railway infrastructure and modern buildings to the south. Focused on group of Victorian buildings with industrial character.
industrial | C19/C20 commercial

SMITHFIELD
Unique character derived from established history and a physical fabric and street pattern which has evolved over 1000 years, with market use pre-dating this. Contrasts in scale between precincts of the former priory, hospital buildings and later grand scale engineering.
large public structure | municipal buildings | places of worship

POSTMANS PARK
Ruins, churches, medieval plots, grand official architecture and generous provision of green space.
places of worship | municipal buildings

NEWGATE
Characterised by Holy Church of Sepulchre and the Central Criminal Court.
municipal buildings | places of worship

CHANCERY LANE
Span of building ages and styles, from the collegiate surroundings of Staple Inn and Barnard's Inn, to monumental C19 public buildings.
municipal buildings | C18 townhouses

FLEET STREET
Ceremonial grandeur and commercial bustle of Fleet Street, variable urban grain, richness in architectural styles, including C17, narrow Victorian eclecticism, understated Georgian domestic frontages, dignified commercial architecture, and C20 newspaper buildings.
C19/C20 commercial | C18 townhouses

TEMPLES
Characterised by private quality, with buildings designed to face interior of the Temple. Influenced by the legal profession which has evolved and continues to carry on there.
places of worship | C18 townhouses

WHITEFRIARS
High-quality late Victorian and Edwardian commercial and institutional buildings. Planned street layout set against the evolutionary pattern of adjacent areas. Varied land use, including Whitefriars friary, domestic tenements, industrial glass and gasworks and corporate headquarters.
municipal buildings | C19/C20 commercial
industrial

ST PAUL'S CATHEDRAL
A building of international architectural and cultural significance. Area of international significance, focal point of the City, part of a major processional route. One of the largest concentrations in the City of London of listed buildings.
places of worship | liveries & guildhalls
C19/C20 commercial

FOSTER LANE
A massing, rhythm, material and architectural detailing reflect the neo-classical style. Concentration of Livery Halls in the area.
places of worship | liveries & guildhalls

BOW LANE
Retains a dense street pattern of lanes, alleys and courts. Includes two Grade I listed churches of exceptional significance, as well as numerous other listed and unlisted buildings of quality.
places of worship

Fig. 19 City of London character areas and common typologies

BREWERY
A close-grained townscape, small number of modestly scaled, C18 and C19 buildings set around a paved court.
industrial

FINSBURY CIRCUS
Part of a planned development and Registered Historic Park and Garden surrounded by impressive C19 and C20 commercial buildings.
C19/C20 commercial

GUILDHALL
Guildhall dating from early C15 and associated municipal buildings on the site of Roman amphitheatre, arranged around Guildhall Yard.
C20 modern
liveries & guildhalls
municipal buildings
C19/C20 commercial

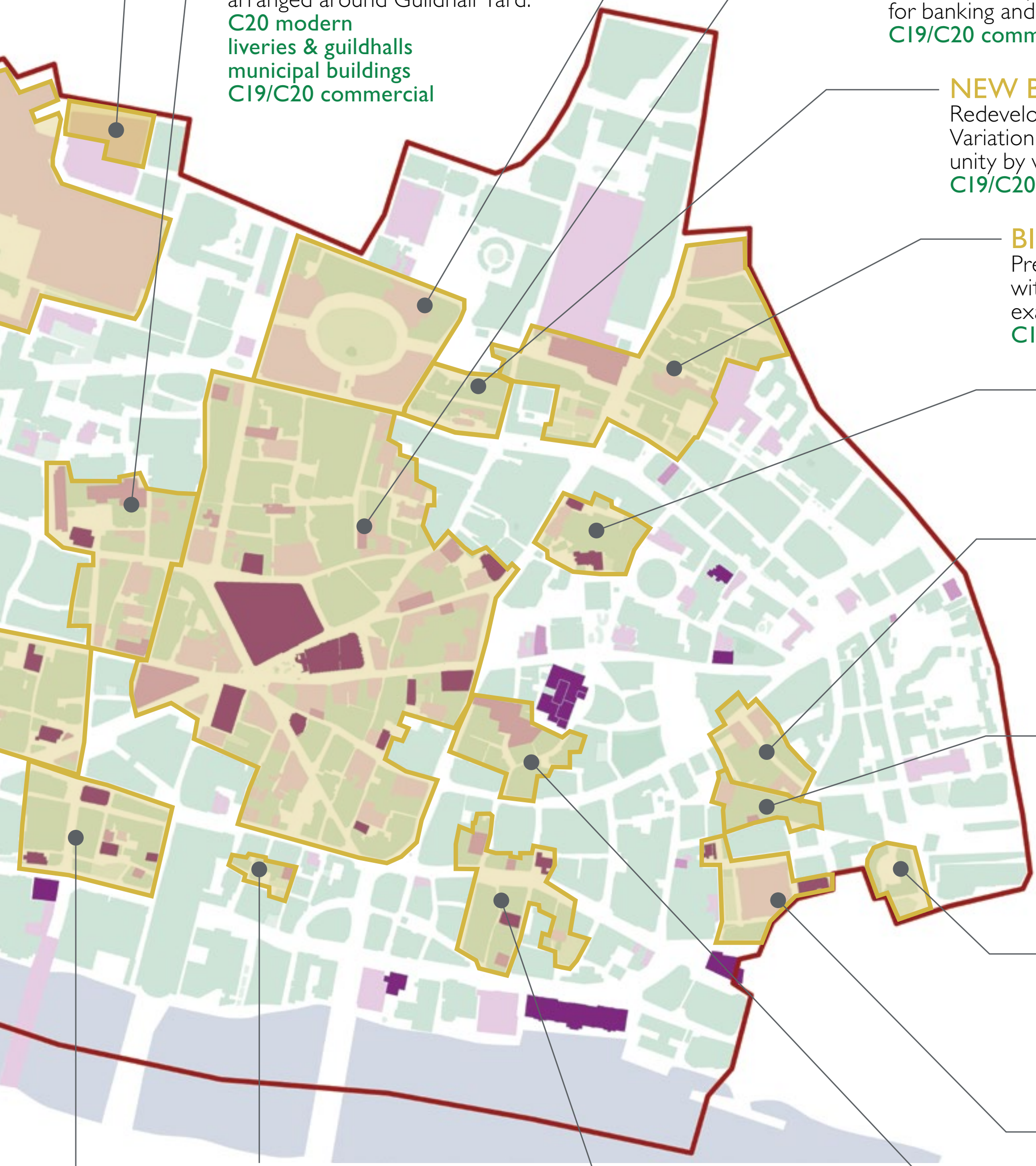
BANK
Commercial heart of the City and largest concentration in the listed buildings. Solid masonry facades with regular punched openings, enriched by classical modelling and surface detail. Includes headquarters of major corporations, churches, buildings for banking and associated commercial activities.
C19/C20 commercial

NEW BROAD STREET
Redeveloped between the 1880s and 1920s. Variation in style and materials, but with a sense of unity by virtue of their scale and massing.
C19/C20 commercial

BISHOPSGATE
Predominantly Victorian and Edwardian buildings with small-scale commercial uses, alongside notable examples of the City's Georgian townscape.
C19/C20 commercial | C18 townhouses

ST HELEN'S PLACE
A small, tightly defined area focused primarily on those buildings which enclose and define the space of St Helen's Place.
places of worship | C19/C20 commercial

LLOYD'S AVENUE
Rich history relating to the medieval church of St Katherine Coleman, the East India Trading Company, and Lloyd's Register of Shipping. Buildings mainly Edwardian with high level of conformity.
C19/C20 commercial



FENCHURCH STREET
First railway station to be built within the boundaries of the City of London. Townscape with significant C18, C19 and C20 buildings and structures. Use of brick buildings and structures and historic features and materials.
C18 townhouses | C19/C20 commercial

CRESCENT
C18 street plan incorporating Crescent and Circus. Rebuilt and replicated Georgian houses set the character and appearance of the area.
C18 townhouses

TRINITY SQUARE
Dominance of the former Port of London Authority building, Trinity House and the Church of St Olave. Intact group of mostly early C20 buildings with distinctive Imperial character.
municipal buildings

LAURENCE POUNTNEY LANE
Small-scale buildings with predominant use of brick, and consistency of small-scale detail.
C18 townhouses

QUEEN STREET
Notable grouping of Livery Company Halls, Wren churches, listed buildings and unlisted buildings of quality. Buildings faced with brick, Portland stone or stucco. Retains its C19 industrial character with numerous surviving warehouses.
places of worship | liveries & guildhalls | industrial

EASTCHEAP
Irregular layout of medieval streets either side of Eastcheap. Includes three Wren churches, commercial and warehouse buildings.
places of worship | industrial

LEADENHALL MARKET
Outstanding example of a Victorian market. Vibrant mix of uses and activity, strongly complimenting predominantly financial and insurance activities.
large public structures

Places of worship

Heritage protections
>80% are listed Grade I

Common features
Often stand alone buildings, places of worship provide a focal point for the surrounding area and community. Collectively, within the Square Mile, they illustrate an extraordinary breadth of architectural history of exceptional significance.

Spatially, they commonly include a single large volume for congregations of varying sizes. Patterns of use are unique, often catering to large groups of people for short periods of time, with limited consistent occupation throughout the week.

Generally, they may be used for conventional worship, however they are increasingly facilitating other community activities such as creches, cafes and events. Therefore user expectations will vary.

Typical construction
Typically solid masonry walls, lead or slate roofs on timber construction, solid floor construction. Windows are often a significant feature.

Challenges
Usually places of worship are of great significance and are more sensitive to change. Heating large internal volumes for relatively short periods of time is energy intensive. In addition, catering to different comfort requirements, often making allowances for more vulnerable members of society, can be onerous operationally. Funding opportunities will need to be considered early, with grant funding applications programmed into the processes.

Useful resources and references

- *Eco Church award scheme,* Eco Church Website
- *Net Zero Carbon and Environmental case studies,* The Church of England Website

Fig. 20 Church of St Martin
Grade I | Late C17

Fig. 21 St Botolph's Algate
Grade I | Mid C18

Fig. 22 Church of Sepulchre
Grade I | Mid C15/C17

Fig. 23 Bevis Marks Synagogue
Grade I | Early C18

Fig. 24 All Hallows London Wall
Grade I | Late C18

Fig. 25 Church of St Benet
Grade I | Late C17

Fig. 26 Cathedral Church of St Paul
Grade I | Late C17/C18

Examples of buildings within this typology

OPPORTUNITIES

All opportunities must be considered within the specific context of each building, and assessed against their potential impact on heritage significance and historic fabric.

The list shown here is not exhaustive. Click here to see a list of other common opportunities that could be considered as part of a whole building approach.

Carbon reduction opportunities

The Church of England has set an ambitious target to reach net zero by 2030. This has given a huge amount of focus and as such, there are a number of useful resources and great case studies from across the country. The Eco Church Award Scheme also offers useful advice and guidance, as well as providing a network to share lessons and facilitate action.

Occupant comfort

Expectations around occupant comfort will vary depending on the space, who is using it, and for how long. Analyse key user groups and what they require from the spaces they occupy.

Good controls and zoning

Breaking the building into smaller zones depending on use and comfort requirement will help inform any heating or zoning strategy.

Localised heat source

Consider how the building is used and how to heat people not the space, for example, electric pew heaters or under floor heating.

Installing insulation to building fabric

Opportunities to insulate may be limited, due to the significance of the fabric and the presence of carvings, murals and inscriptions. Insulate roof voids wherever possible, and if considering work to the floors, perhaps for accessibility reasons, combine this with under floor insulation (and heating).

Window upgrades and improvements

Windows are often significant features in places of worship. Consider secondary glazing internally or externally, but be aware of condensation risks. Where windows are not original or in poor condition, consideration may be given to upgrading these to sensitively designed and technically considered slim-line double glazed windows.

Heat pumps

The installation of heat pumps (particularly air source) in places of worship is a viable alternative to fossil fuels, and there are several examples of their installation across the country. They require careful consideration and expert advice to avoid any negative impacts.

Climate resilience opportunities

A full Climate Hazard Impact Assessment should be completed, as per the example in Appendix A. Key opportunities to consider are:

Photovoltaics and solar panels

Places of worship are often stand alone buildings, with an east west orientation and a large roof area. They are therefore well situated to the siting of solar panels, provided the benefits are weighed against any negative impacts on the historic fabric and surrounding area. For places of worship that do not have consistent energy loads, battery storage might also be an important consideration.

Upgrade rainwater goods

Many places of worship will have old gutters and downpipes that are inadequate for the anticipated flow capacities of current and projected weather events. Take opportunities to sensitively upgrade these where possible.

Case study	St Andrew by the Wardrobe
Listing	Grade I
Age	Original building circa 1685-95

Key measures implemented

- New, fully electric heating system powered by 6 air source heat pumps installed within the roof of the building and supplementary 'rapid response' radiators and pew heaters across the nave.
- Insulation fitted in roof cavity
- Renewed electrical circuits
- LED lighting

Key lessons

The need to engage sound engineers in relation to heat pump installation.

Liveries and guildhalls

Heritage protections

Predominantly Grade II* and Grade I, some also have Scheduled Monument status

Common features

The classic form was often a first-floor meeting room, raised on arcades, incorporating an open-sided market hall on the ground floor. During the eighteenth century increasing architectural elaboration was given to halls, reflecting the success of livery companies.

Primarily large function room spaces often elaborately decorated with administrative offices and meeting rooms. Usage patterns are primarily dictated by events programme, with large spaces needing to accommodate a large number of guests. Administrative officers often have a more consistent weekly use pattern.

Typical construction

Solid masonry walls, lead or slate roofs on timber construction, solid floor construction at ground floor, timber intermediate floors.

Challenges

Elaborate interiors will be sensitive to change. Heating large internal volumes for events is energy intensive. Catering comfort requirements to a number of different building users, including those who work in the building on a daily basis, and those who visit for events, results in complexity in how the building is managed and operated.

Useful resources and references

LCAG Website, Livery Climate Action Group

Fig. 27 Fishmongers' Hall
Sch Monument & Grade II | Early C19*

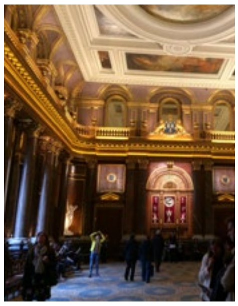


Fig. 28 Drapers' Hall
Grade II | C19*

Fig. 29 Armourers' and Braziers' Hall
Grade II | Mid C19*

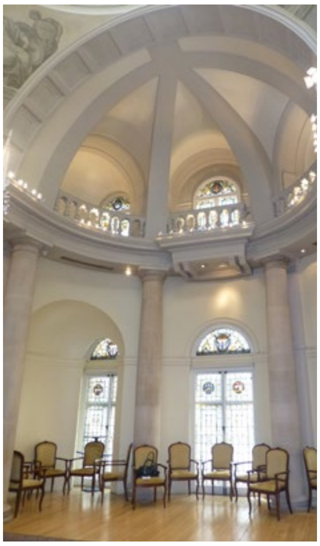


Fig. 30 Chartered Accountants' Hall
Grade I | C19*

Fig. 31 Guildhall
Grade I | Early C15, C17, C19

Examples of buildings within this typology

OPPORTUNITIES

All opportunities must be considered within the specific context of each building, and assessed against their potential impact on heritage significance and historic fabric.

The list shown here is not exhaustive. Click here to see a list of other common opportunities that could be considered as part of a whole building approach.

Carbon reduction opportunities

Given the presence of highly decorative interiors, and often ancient fabric, one of the greatest opportunities in liveries and guildhalls will be in systems and controls. The Livery Climate Action Group has published a series of guidance notes and example climate actions plans which provide a useful resource, helping to share knowledge and upskill members.

Encourage positive habits
Given the range of different people using the building, engage with those who use the spaces on a regular basis and help them understand how they can make a difference. Consider turning the thermostat down by 1°C.

Intelligent controls
Incorporating intelligent controls and sensors will help reduce energy use. Isolate unused spaces and consider incorporating a Building Management System that could be set up to efficiently manage the different patterns of occupation.

Window upgrades and improvements
Sometimes livery companies will occupy a number of adjacent buildings of differing ages. Not all windows will have the same heritage significance. Look for opportunities to upgrade window performance, considering a range of solutions to suit the age and condition of the window in question.

Installing insulation to building fabric
Although many areas will be of high significance, not all spaces will carry equal significance. Look for opportunities in the less significant areas. Insulating roof voids where possible should be considered, as well as between floors.

Beyond the boundary
Heat pumps may be viable, but if not, consider neighbouring development plans where resources and infrastructure can be shared with another site, as well as district heat networks, power purchase agreements etc.

Climate resilience opportunities

A full Climate Hazard Impact Assessment should be completed, as per the example in Appendix A. Key opportunities to consider are:

Biodiversity and landscaping
Liveries and guildhalls often have external spaces. Look for opportunities to reduce hard landscaping where possible, increase biodiversity and manage rainwater runoff.

Photovoltaics and solar panels
Depending on roof area, orientation and overshadowing from neighbouring buildings, solar panels could help reduce reliance on the grid for the high energy loads in this typology.

Upgrade rainwater goods
Take opportunities to sensitively upgrade rainwater goods where possible, and attenuate the water for reuse within the building or the landscape.

Case study	Merchant Taylors' Hall
Listing	Scheduled Monument & Grade II*
Age	Buildings range from C17, C19 and C20

Key measures implemented

- Since 2012, annual Scope 1 and 2 emissions have been reduced by 305 tonsCO_2e through a long-term energy reduction strategy.
- Installation of condensing boilers and LED lights in 2012 (79 tonsCO_2e reduction).
- Installation of power optimisers in 2014 (28 tonsCO_2e reduction).
- Installation of solar panels to livery hall roof in 2019 generating 28,140 kWh annually (14 tonsCO_2e reduction).
- Switching to certified renewable sources for remaining electricity.

Municipal buildings

Heritage protections

Mostly Grade II & II*, some Grade I

Common features

Municipal buildings include official buildings which were designed for a specific public or state use. Dates of construction vary, and many are no longer used in the way they were originally intended.

Their significance might derive from the building's age, its architectural design, or its original civic purpose. Ranging from hospital buildings, post offices and administrative offices of state this typology has varying functions and occupational constraints which cannot easily be generalised.

Typical construction

Varies, mostly solid masonry construction, some more recent examples may incorporate steel frames.

Challenges

Due to the diversity of buildings within this typology, there is no one-size-fits-all solution. Municipal buildings are likely to have complex ownership and leaseholder agreements due to their historic ownership patterns. Building occupation and use varies. Sequencing of work to avoid disrupting the everyday functioning of the building will be challenging. Fabric improvements to more significant buildings will need careful detail and consideration.

Fig. 32 Medical School St Bartholemew's Hospital
Grade II | Late C19

Fig. 33 Mansion House
Grade I | Mid C18

Fig. 34 Snowhill Police Station
Grade II | Early C20

Fig. 35 Bishopsgate Institute and Library
Grade II | Late C19*

Fig. 36 King Edwards Buildings Post Office
Grade II | Early C20*

Fig. 37 The Mayor's and the City of London Court
Grade II | Late C19

Examples of buildings within this typology

OPPORTUNITIES

All opportunities must be considered within the specific context of each building, and assessed against their potential impact on heritage significance and historic fabric.

The list shown here is not exhaustive. Click here to see a list of other common opportunities that could be considered as part of a whole building approach.

Carbon reduction opportunities

Many municipal buildings will have altered significantly overtime, with many changing use and occupants. The presence of original fabric internally might be limited and/or heavily altered. This could present an opportunity to put forward a case for change in relation to climate adaptation measures. Many of these buildings will be operating as administrative buildings, with regular patterns of occupation and comfort requirements, improvements to internal environments may be welcomed, and could help inform a long term business plan.

Encourage positive habits

Take time to understand how occupants are experiencing the building currently and look for solutions that might address energy reduction whilst improving occupant comfort. Discussing this openly could help people understand their impact.

Zoning

Given the complexity and scale of many municipal buildings, consider the use of each space and how the heating and energy system operates. Isolate unused spaces and avoid heating unused areas.

Intelligent and efficient controls

Incorporating intelligent controls and sensors will help reduce energy use. Consider incorporating a Building Management System that could be set up to efficiently manage the different patterns of occupation.

Fabric enhancements

Depending on the significance, age and condition, the integration of double, triple or secondary glazing should be considered. Similarly, floor, roof and in some instances, internal wall insulation, could facilitate a reduction in energy use, and improved comfort levels in the winter months.

Heat pumps

The integration of heat pumps within municipal buildings is feasible but requires specialist and expert advice. The required loads might involve a large amount of equipment, which impacts structural loads, and background noise levels.

Climate resilience opportunities

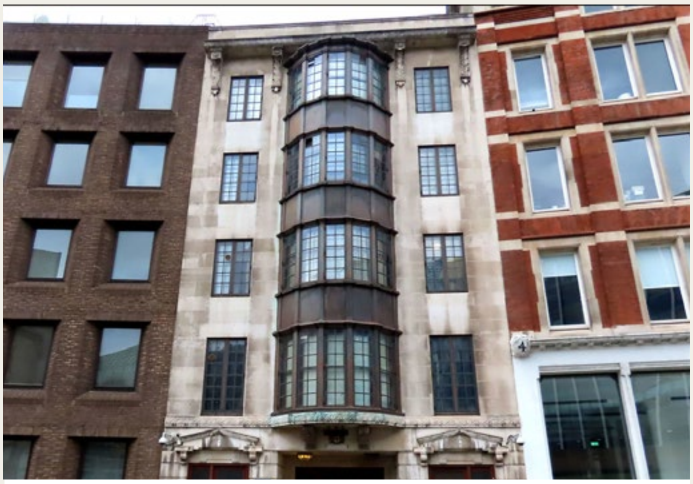
A full Climate Hazard Impact Assessment should be completed, as per the example in Appendix A. Key opportunities to consider are:

Photovoltaics and solar panels

Municipal buildings may have large expanses of roof space. The installation of photovoltaics and solar panels may be acceptable in certain circumstances, provided the long term benefits of the installation are clearly set out and weighed against any negative impacts the installation might have on the historic fabric and surrounding area.

Install water efficient fittings

Depending on the use of the municipal building, there may be a high amount of water use (hospitals etc). When upgrading new water fittings, always specify efficient taps, toilets and showers.



Case study Snowhill Police Station

Listing Grade II

Age 1926

Key measures implemented

- Planning granted in 2020 to convert building into a 219 room hotel targeting BREEAM 'Excellent'.
- Signficicant parts of the building retained, and fabric improvements include secondary glazing.
- Low energy services, with occupancy and daylight sensors throughout.
- Mechanical ventilation and heat recovery.
- Air source heat pumps supply all space heating and domestic hot water demands.
- Extensive green roof will deliver biodiversity net gain, with photovoltaic array on the roof.

Large public structures

Heritage protections
Predominantly Grade II* and II

Common features
Large public structures includes market halls and railway stations, and other covered public spaces. They usually consist of a single large unheated space, with multiple subdivided spaces used for commercial activities.

These multi-occupancy spaces may have challenging lease agreements and varying environmental requirements. User comfort expectations will vary, with more transient visitors dressed for the outdoors, and others sitting for a meal, or working in an office, requiring a more controlled internal environment.

Typical construction
Typically large span steel construction

Challenges
The requirements of different tenants will vary, for example restaurants will have very different requirements to a retail establishment, which will be very different to a workspace. Fabric improvements will be challenging given the different uses and levels of significance. With catering establishments the use of gas for cooking is still the dominant energy source. Markets might have high electrical loads for refrigeration.

Fig. 38 Spitalfields Market
Grade II | Late C19*

Fig. 39 Liverpool Street Station
Grade II | Late C19

Examples of buildings within this typology

Fig. 40 Billingsgate Market
Grade II | Late C19

Fig. 41 Leadenhall Market
Grade II | Late C19*

OPPORTUNITIES

All opportunities must be considered within the specific context of each building, and assessed against their potential impact on heritage significance and historic fabric.

The list shown here is not exhaustive. Click here to see a list of other common opportunities that could be considered as part of a whole building approach.

Carbon reduction opportunities

Large public structures like market halls and railway stations will often have large amounts of unheated space, or space that doesn't need to be heated on account of it's more exterior qualities. Increased zoning and controls could help manage energy use across different use requirements. The also typically have large roof areas for potential energy generation and plant.

Encourage positive habits
Analysing key user groups and what they require from the spaces they occupy, and breaking the building into smaller zones depending on use and comfort requirement will help inform any heating or zoning strategy.

Zoning
Zoning is crucial in this typology. Breaking the building into smaller zones defined by use, and thermal comfort requirements can help manage energy use across the different spaces.

Insulating building fabric
Opportunities to insulate the building fabric might be restricted to smaller zones within the main building. For example, you might not need to insulate the roof of a market hall, if the individual, enclosed commercial units within the main space, present opportunities to improve the fabric.

Window upgrades and improvements
This typology will typically have lots of glazing. Make sure windows are fitted correctly in good repair. Where windows are not original, in poor state of repair and in need of replacement, consideration may be given to upgrading these to sensitively designed and technically considered slim-line double glazed windows.

Beyond the boundary
Consider neighbouring development plans and opportunities to utilise and share resources with other sites. For example, projects on or around tube lines, could utilise waste heat from the underground for space heating within the buildings. Also consider district heat networks, power purchase agreements etc.

Climate resilience opportunities

A full Climate Hazard Impact Assessment should be completed, as per the example in Appendix A. Key opportunities to consider are:

Photovoltaics and solar panels
Large public structures present big expanses of roof space. The installation of photovoltaics or solar panels on these roofs may be acceptable provided the long term benefits of the installation are clearly set out and weighed against any negative impacts the installation might have on the historic fabric and surrounding area.

Reducing overheating
The large expanses of glazing common on this typology will have implications on comfort levels as temperatures increase. Consider integration of internal or external blinds to reduce solar gains in summer.

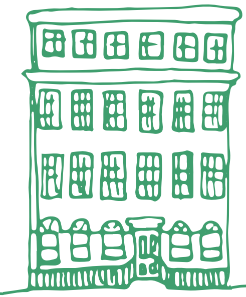
Case study Smithfield Poultry Market
Listing Grade II, Smithfield Conservation Area
Age 1960s

Key measures implemented

- Planning granted to convert Smithfield Market into a new location for the Museum of London.
- Includes repairs to historic Grade II listed concrete shell structure designed by Ove Arup to extend the life of the structure.
- Targeting BREEAM 'Excellent' rating
- Addition of new higher-performing insulation to improve the building's EPC rating
- Re-cladding of dome roof in copper.
- Photovoltaics on adjacent building.

Key lessons

The concrete shell roof required specialist engineering input from the outset. To maintain the form, the loads from the workforce and plant during construction were controlled.



18th Century townhouses

Heritage protections
Predominantly Grade II and Grade II* listed

Common features
The buildings in this typology were typically constructed in the 18th century, to modest classical proportions though with less ornamentation. Implementing an axial symmetry, the more simplistic facades are architecturally uniform and recognisably Georgian.

Originally constructed as homes, these buildings are now mostly used for commercial properties, with a large number of excellent examples in the west of the Square Mile. They are typified by the use of London stock brick with rendered window reveals, classical porches, and timber framed sash windows, decreasing in proportions up the building.

Typical construction
Solid masonry brick walls. Timber roof trusses, mostly slate finish. Some vaulted basements, and timber floor construction above basement level.

Challenges
This typology has a visual uniformity which contributes significantly to the character of the area, particularly around areas such as Temple. Original interiors will remain in some properties, with features like timber panelling contributing to the character of the building.

Fig. 42 36 St Andrew's Hill
Grade II | Late C18

Fig. 43 9-10 Staple Inn
Grade II | Early C18

Fig. 44 6 Fredrick's Place
Grade II | Late C18

Fig. 45 The Rectory
Grade II | Late C18

Fig. 46 15 Took's Court
Grade II | Early C18*

Fig. 47 King's Bench Walk
Grade II | Early C18*

Examples of buildings within this typology

OPPORTUNITIES

All opportunities must be considered within the specific context of each building, and assessed against their potential impact on heritage significance and historic fabric.

The list shown here is not exhaustive. Click here to see a list of other common opportunities that could be considered as part of a whole building approach.

Carbon reduction opportunities

These buildings often have a distinctly different front and back, with the back elevation sometimes being of lesser significance. More extensive fabric improvements could be acceptable on rear elevations in some instances.

Given the uniformed nature of the elevations on to some streets, there is an opportunity for a consistent approach to fabric upgrades, for example, a common window detail that is acceptable on a particular street.

Encourage positive habits
Engage with those who use the spaces on a regular basis and help them understand how they can make a difference. Consider turning the thermostat down by 1°C.

Window upgrades and improvements
Windows make up a significant area of the elevations, and a significant source of heat loss. Consider the contribution windows make to the character of the surrounding area in this typology. Where windows are not original, in poor state of repair and in need of replacement, consideration may be given to upgrading these to sensitively designed and technically considered slim-line double glazed windows.

Installing insulation to building fabric
Opportunities to sensitively upgrade the building fabric should consider roof and floor insulation. Wall insulation to the inside face of the external walls could be considered subject to a thorough risk analysis and if substantial energy savings are possible. Opportunities to insulate the less significant rear elevations either internally or externally, might also be considered appropriate subject to thorough investigation and detailing.

Heat pumps
The integration of heat pumps, particularly air source, within this typology is likely to be feasible but requires specialist and expert advice. They should be sized and programmed specifically to suit the required loads of the building.

Climate resilience opportunities

A full Climate Hazard Impact Assessment should be completed, as per the example in Appendix A. Key opportunities to consider are:

Reducing overheating
The large windows common on this typology will have implications on comfort levels as temperatures increase. Consider integration of internal or (where appropriate) external shutters to reduce solar gains in summer.

Upgrade rainwater goods
Take opportunities to sensitively upgrade rainwater goods where possible, and attenuate the water for reuse within the building.

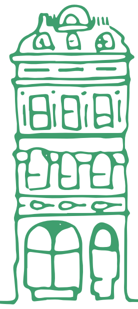
Create healthy environments
Given many of these buildings are now used as office spaces, look for opportunities to improve user comfort and health. For example, installing a shower as part of the project might encourage people to cycle to work, encouraging active forms of travel, and reducing pressure on infrastructure.

Install water efficient fittings
When upgrading new water fittings, always specify efficient taps, toilets and showers.

Case study	6 Frederick's Place
Listing	Grade II
Age	18th Century

Key measures implemented

- Permission has been granted for the installation of solar panels on this grade II listed 18th century building in the Guildhall Conservation Area.



C19/C20 commercial

Heritage protections

Predominantly Grade II listed, but with a handful of Grade II* or I.

Common features

This typology includes two key sub groups. *Large-scale commercial*, where institutions occupied a 'city block' with multiple facades, and *small-scale commercial*, usually occupying narrow plots with a single significant street frontage.

Both sub groups were typically constructed as commercial properties, many with specific occupiers in mind, particularly large financial institutions. The predominant use of Portland stone with classical detailing is typical in this typology, and internal spacial arrangements will be predominantly based around administrative activities.

Typical construction

Varies significantly but predominantly solid masonry construction or steel framed clad in masonry.

Challenges

The requirements of different tenants or occupiers will vary, and there may be complex lease agreements with some of these properties. Therefore phasing work to avoid disruption could be a challenge. Identifying renewable energy sources on constrained sites needs careful planning, as does ensuring adequate ventilation in commercial settings.

Fig. 48 Finsbury House
Grade II | Late C19

Fig. 49 29 Fleet Street
Grade II | Late C19

Fig. 50 13 & 15 Moorgate
Grade II | Late C19*

Fig. 51 65 Cornhill
Grade II | Late C19

Fig. 52 Former Great Eastern Hotel
Grade II | Late C19*

Fig. 53 4 Abchurch Yard
Grade II | Late C19

Fig. 54 162 Bishopsgate
Grade II | Late C19

Fig. 55 48 Bishopsgate
Grade II | Late C19

Examples of buildings within this typology

OPPORTUNITIES

All opportunities must be considered within the specific context of each building, and assessed against their potential impact on heritage significance and historic fabric.

The list shown here is not exhaustive. Click here to see a list of other common opportunities that could be considered as part of a whole building approach.

Carbon reduction opportunities

The opportunities to improve comfort levels for occupants could save energy and carbon, as well as providing better indoor environments. The limited uniformity between buildings of this typology could help with the justification of a unique approach to thermal enhancements, particularly windows. Where internal spaces have already undergone significant alterations, deeper retrofits could be considered.

Where buildings have a clear front and back, different strategies could be adopted to improve fabric performance.

Occupant comfort
Understand how occupants are experiencing the building and look for solutions that might address energy reduction whilst improving occupant comfort. Discussing this openly will help people understand their impact.

Intelligent controls
Incorporating intelligent controls and sensors will help reduce energy use. Isolate unused spaces and consider incorporating a Building Management System that could be set up to efficiently manage the different patterns of occupation.

Installing insulation to building fabric
Opportunities to sensitively upgrade the building fabric should consider roof, floor and wall insulation. Consider the heritage significance of different elevations to help inform a strategic approach.

Window upgrades and improvements
Where windows are not original, in poor state of repair and in need of replacement, consideration may be given to upgrading these to sensitively designed and technically considered slim-line double glazed windows.

Heat pumps
With small-scale commercial, heat pumps, particularly air source, could be an appropriate measure. With larger buildings consdier opportunities beyond the boundary. All heating systems require expert advice and should be sized and specifically to suit the required loads of the building.

Climate resilience opportunities

A full Climate Hazard Impact Assessment should be completed, as per the example in Appendix A. Key opportunities to consider are:

Photovoltaics and solar panels
Large scale commercial buildings may have large expanses of roof space. The installation of photovoltaics and solar panels may be acceptable in certain circumstances.

Create healthy environments
With office spaces, look for opportunities to improve user comfort and health. For example, installing a shower as part of the project might encourage people to cycle to work, encouraging active forms of travel, and reducing pressure on infrastructure.

Install water efficient fittings
When upgrading new water fittings, always specify efficient taps, toilets and showers, and make sure they are operating properly.

Case study	23 Finsbury Circus
Listing	Grade II
Age	1893-4

Key measures implemented

- Planning permission granted for the refurbishment and development of 23 Finsbury Circus.
- Targeting BREEAM Excellent rating.
- Air source heat pumps to provide 100% of heating and cooling load, supplemented by photovoltaics.
- Design enables future adaptability without major embodied carbon impacts
- Cyclist facilities, including cycle parking, showers and lockers provided
- Low flow sanitary fittings with monitoring and leak detection to reduce water consumption
- Accessible roof terrace with biodiverse planting

Industrial

Heritage protections
Predominantly Grade II listed

Common features
Industrial buildings include historic warehouses, breweries and other similar buildings originally designed for an industrial use. Mostly dating from the 18th and 19th centuries, many have since been converted to commercial uses, often office spaces which have very different performance requirements.

Typically they incorporate large floor to ceiling heights, significant structural spans, large windows, and recognisable features relating to their industrial past.

Typical construction
Steel frame and/or solid masonry construction.

Challenges
Different uses will have different requirements. Some may have been subdivided and have complex lease arrangements. The large amounts of glazing could be contributing to significant heat loss in winter and solar gain in summer. The warehouse character is very unique and recognisable in this part of London and fabric upgrades could impact on this.

Fig. 56 Port of London Authority Warehouses
Grade II | Late C18

Fig. 57 Whitbread's Brewery
Grade II | Late C19

Fig. 58 1-3 Ludgate Street
Grade II | Late C19

Fig. 59 31-32 St Andrew's Hill
Grade II | Late C19

Fig. 60 Former Porter Tun Room
Grade II | Late C18

Examples of buildings within this typology

OPPORTUNITIES

All opportunities must be considered within the specific context of each building, and assessed against their potential impact on heritage significance and historic fabric.

The list shown here is not exhaustive. Click here to see a list of other common opportunities that could be considered as part of a whole building approach.

Carbon reduction opportunities

This typology is mostly Grade II listed, and due to the original use of these types of buildings, they are likely to have been significantly altered over the years with multiple changes of use, resulting in loss or significantly altered original fabric. Upgrades to the performance of the fabric could be justifiable in some instances. Large amounts of roof space on some of the larger examples could locate new services and renewable energy production.

Understand user requirements
Given the range of different people using the building, engage with those who use the spaces on a regular basis and help them understand how they can make a difference. Look for opportunities to improve the indoor environment as well as reduce carbon.

Intelligent controls
Depending on how the building is used, incorporating intelligent controls and sensors will help reduce energy use. Isolate unused spaces and consider incorporating a Building Management System that could efficiently manage the different patterns of occupation.

Installing insulation to building fabric
Insulating roof voids where possible should be considered as a minimum. Depending on the significance of the building, opportunities that seek to improve the performance of the external walls (internally) and the ground floor should also be considered, combined with improvements to air tightness and a suitable ventilation strategy to avoid moisture accumulation.

Window upgrades and improvements
Windows are often a significant feature of industrial heritage buildings, taking up a large area of the elevation and contributing to heat loss. Consideration should be given to upgrading windows with double, triple or secondary glazing, depending on detail design

Heat pumps
Large roof areas could be a good location for services. Including, if appropriate, air source heat pumps. The design and installation needs expert advice.

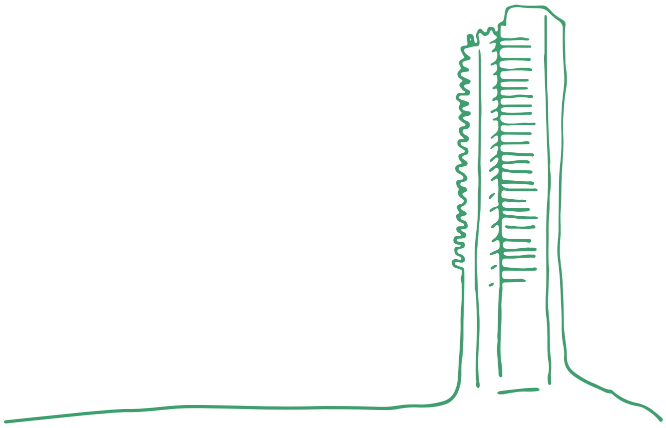
Climate resilience opportunities

A full Climate Hazard Impact Assessment should be completed, as per the example in Appendix A. Key opportunities to consider are:

Photovoltaics and solar panels
Larger scale industrial buildings may have large expanses of roof space. The installation of photovoltaics and solar panels may be acceptable in certain circumstances, provided the long-term benefits of the installation are clearly set out and weighed against any negative impacts the installation might have on the historic fabric and surrounding area.

Install water efficient fittings
Depending on the use of the industrial building, there may be a high amount of water use. When upgrading new water fittings, always specify efficient taps, toilets and showers.

Reducing overheating
The large windows common on this typology will have implications on comfort levels as temperatures increase. Consider integration of internal or (where appropriate) external shutters to reduce solar gains in summer.



C20 Modern

Heritage protections
80% are listed Grade II

Common features
This typology includes housing, mixed-use and commercial buildings constructed in the mid to late twentieth century, including a number of seminal examples of ambitious post-war regeneration projects reflecting the development of both Modernism and Brutalism.

There is a big range of ages in this typology. Earlier examples were constructed at a time when energy was considered abundant, and so energy efficiency was not seen as a priority. However, more recent examples completed in the last 20 years, may have better performing fabric, but could still need retrofitting to eliminate fossil fuel use.

Typical construction
Varies but predominantly concrete frame buildings often with limited to no insulation, large amounts glazing, and thermal bridges.

Challenges
Large amounts of glazing and poor performing fabric will mean maintaining internal comfort levels will be energy intensive, particularly with increase in summer temperatures. A large number of different stakeholders could make developing and delivering the work complex.

Construction methods and material specification often favoured materials that typically have low thermal performance. Concrete frames can present significant issues with thermal bridges.

C20 buildings may have complex mechanical and electrical systems, like ventilation, comfort cooling, refrigeration, plant etc.

Fig. 61 Barbican
Grade II | Mid C20

Fig. 62 Crescent House
Grade II | Mid C20*

Fig. 63 Bayer House
Grade II | Mid C20

Fig. 64 No 1 Poultry
Grade II | Late C20*

Fig. 65 30 Cannon Street
Grade II | Late C20

Examples of buildings within this typology

OPPORTUNITIES

All opportunities must be considered within the specific context of each building, and assessed against their potential impact on heritage significance and historic fabric.

The list shown here is not exhaustive. Click here to see a list of other common opportunities that could be considered as part of a whole building approach.

Carbon reduction opportunities

These buildings were listed for their architectural significance, rather than because they contain any historically significant fabric. This may mean that replacing materials with higher performing but visually similar alternatives, is less challenging than in the much older buildings. There is also an opportunity to significantly improve the internal environment for occupants, in the worst performing buildings, helping bring various stakeholders along on the journey. Depending on when they were completed, some C20 buildings may already be quite energy efficient, and so alterations are less invasive.

Occupant comfort
Take time to understand how occupants are experiencing the building currently, both in summer and winter. Discuss openly what expectations they have of the spaces.

Ensure services are operating efficiently
Many C20 buildings may have complex mechanical and electrical systems. Consider engaging a services engineer to review the performance and where energy efficiency can be improved.

Installing insulation to building fabric
Opportunities to sensitively upgrade the building fabric should include roof and floor insulation. Wall insulation to cavities where possible, or the inside face of the external walls could be considered subject to a thorough risk analysis and if substantial energy savings are possible.

Window upgrades and improvements
Windows can make up a significant proportion of the elevations and should be assessed for their age, condition and significance, with consideration given to upgrading them to double or triple glazing where appropriate.

District heating
Depending on the existing heating strategy, it may be viable to consider heat pumps as an electrified solution to heating. Otherwise consider opportunities beyond the boundary like district heat networks.

Climate resilience opportunities

A full Climate Hazard Impact Assessment should be completed, as per the example in Appendix A. Key opportunities to consider are:

Reducing overheating
The large expanses of glazing, and light weight fabric, common with this typology will have implications on comfort levels as temperatures increase. Consider appointing a specialist to carry out overheating analysis, coupled with a daylighting study, to understand the benefits of integrating passive solar shading whilst maximising natural daylight.

Biodiversity and landscaping
Often with large areas of flat roofs, it could be possible to integrate biodiverse green roofs, improving thermal performance, increasing biodiversity, reducing rainwater run off, as well as helping mitigate the heat island effect.

Case study	Ibex House
Listing	Grade II
Age	1937

Key measures implemented

- 35.9% reduction over Building Regulations Part L emissions targets (exceeding GLA 35% target).
- Internal refurbishment with side and top floor extension.
- Original fabric retained and restored.
- Window replacement
- Gradual phase out of gas boilers, to be replaced with high performing, efficient electric plant

APPENDIX A

Climate Hazard Impact Assessment (example only)

	Climate hazard	Impact *- cause and effect*	Details of hazard		
			Type	*Weather drivers*	*Climate change*
BUILDINGS AND INFRASTRUCTURE	Water stress	**Increased rainfall** causing more frequent and prolonged saturation of building fabric and **enhanced rates of building fabric decay**	Water Penetration: Wind-driven rain; Overflow of drainage systems; Splash back from hard surfaces	Intense rainfall in isolated events and as a cluster of events; High winds	Increased frequency of prolonged rainfall in winter months, Short, intense periods of rainfall in summer months
	Flooding; Water stress	**Ground movement** and associated structural instability/movement of foundations causing **damage/loss of building fabric and engineered slopes**	Ground instability (e.g. shrink-swell, landslide)	Heavy, prolonged rainfall leading to ground saturation; alternating saturation and drying of ground	Changing frequency/ intensity of rainfall; Increasing annual temperatures; Increasing occurrence rates of extreme weather events such as heatwaves
	Pests and invasive species	**Increased rates of biological growth** (e.g. moss, algae and higher plant colonisation) leading to **enhanced rates of fabric decay**	Ecological (Increase in plant species distribution and number of growing days)	Rainfall; Humidity; Hours of sunshine and cloud cover	Increased temperatures; Increased frequency of prolonged rainfall in winter; Short, intense rainfall in summer
	Overheating	**Increased thermal stress** causing damage to external building fabric from **cracking of hard materials**	High temperatures; Heatwaves; Fluctuating temperatures	Rapidly fluctuating temperatures over hours/ days	Increasing temps. across all seasons; More extreme variations in temps.
	Flooding	Increased occurrence rates/severity of flood events causing **damage/loss to external building fabric/infrastructure**	Fluvial flooding	Prolonged periods of rainfall over days/weeks; Short, intense periods of rainfall over hours	Increase frequency of prolonged rainfall in winter months; Increased occurrence of intense summer rainfall events
		Increased occurrence rates/severity of flood events causing **restricted or limited access to sites**	Pluvial / Surface water	Short intense periods of rainfall over hours	
		Increased occurrence rates/severity of flood events causing **damage and disruption to subsurface services and infrastructure**	Groundwater flooding	Prolonged periods of rainfall over weeks/ months	
	Overheating	**Increase temperatures** leading to greater risk of fire, causing **physical damage and loss of fabric, and risk to life**	Fire	Prolonged dry spells over days/weeks; High (and above normal) temperatures over weeks/ months	Increasing temperatures across all seasons; Changing patterns and intensities of rainfall; particularly drier summers
	Biodiversity loss; Trade, food and infrastructure	Changing growing conditions leading to reduction or loss of **supply of natural materials for traditional construction**	Ecological (increase in plant species distribution and number of growing days)	Rainfall; Humidity; Temperature; Hours of sunshine and cloud cover	Increasing annual temperatures; Increase frequency of prolonged rainfall in winter months; Short, intense periods of rainfall in summer months
	Extreme weather events	**High winds/storms** and potential changes in frequency/intensity resulting in increased disruption/ **damage caused by falling trees/ branches**	High wind; Storms	High winds; Low pressure systems; Storm events	Changing patterns of extreme weather events
		High winds/storms and potential changes in frequency/intensity resulting in increased **physical damage to external building fabric**			

The following list is an example only and is not exhaustive. There are undoubtedly other hazards (or combinations of hazards) and impacts. It is important that a thorough assessment is carried out on a case by case basis.

Exposure considerations	Vulnerability / sensitivity	Adaptation	
		Resistance	*Acceptance*
Local geology and superficial deposits and their influence on drainage systems; Presence/absence of hard surfaces; Site exposure to prevailing weather systems	Structural integrity of the building fabric/materials; State of maintenance/repair; Materials used; Exposure of building/structure	Increase size/capacity of rainwater systems at critical points; More frequent maintenance; Remove hard-ground surfaces adjacent to walls; Improve drainage around site	-
Topography; Local geology and soil types; Proximity to water sources, such as springs	Structural integrity of building fabric or engineered slop or materials; State of maintenance/repair; Local drainage; Susceptibility of building materials used	More frequent below-ground drainage maintenance/checks; Adapt surface drainage and landscaping/planting; Ground investigations to identify vulnerable areas	-
Topography; Soil types; Site exposure to prevailing weather systems	Building materials used; Aspects of building; State of maintenance/repair	Improved protective weathering details; Repointing of masonry; Appropriate traditional external coatings	-
Topography, site aspect (certain aspects more exposed to solar radiation)	Structural integrity of building fabric; Materials used; State of maintenance/repair	Repair with traditional materials such as lime mortars, traditional paints	-
Topography; Proximity to watercourse	Structural integrity of the building fabric; State of maintenance/ repair; Materials used; State of maintenance/repair of local drains/ water management systems; Presence/absence of people/ staff on site	Attend culverts and adjacent burns; Route for surge water flows around buildings; Flood plans in place; Change to layout of buildings to lower impact (e.g. moving sensitive services high off ground)	-
Topography. Presence/absence of hard-ground surfaces			
Topography; Local geology and superficial deposits			
Topography; Site aspect (certain aspects more exposed to solar radiation, e.g. south facing); Neighbouring context	Structural integrity of building; State of maintenance/repair; Building layout and escape strategy; Building materials	Install fire protection and fire-resistant materials; Remove/control potential hazards; Ensure emergency evacuation procedures and formalised agreements with local Fire Services are in place	Install fire detection systems; Ensure doors and windows are shut when premises are unattended; Maintain a hazard-free environment
Topography; Soil types; Site exposure to prevailing weather systems	Building materials used; Aspect of building; State of maintenance/repair	Increase frequency of inspection, maintenance and repair cycles to prolong lifespan of existing materials where possible, lowering demand	Consider alternative materials
Topography; Soil types; Exposure to prevailing weather systems; Tree species used and their tolerance of extreme weather events	Type of plant/tree species and its inherent resilience or vulnerability to high wins; Season in which storm events occur (trees in full leaf more prone to damage); Proximity to trees/woodland areas	More regular condition checking and maintenance; Use of more tolerant species when planting new trees	Regular monitoring and condition checking of vulnerable/at risk trees, which can be replaced with more tolerant species if felled
Location (e.g. promontory, height in landscape),; Exposure to prevailing weather systems	State of repair/maintenance; Presence/absence of people/staff on site	Additional fastenings to ridges and slates; Higher codes of lead; Improved weathering details; Increased frequency of inspection, maintenance and repair cycles	-

...continued on next page

	Climate hazard	Impact *- cause and effect*	Details of hazard *Type*	 *Weather drivers*	 *Climate change*
INTERNAL FABRIC AND ENVIRONMENT	**Overheating; Water stress**	Fluctuating internal humidity levels as a result of more frequent wetting and drying cycles causing **cracking, splitting and warping of objects and internal fabric.**	Wetting and drying cycles	Alternating wet and dry spells; Temperature change	Increased rainfall over weeks/months; Changing frequency/ intensity of rainfall; Increased annual temperatures; Increased occurrence rates of extreme weather events such as heatwaves
	Overheating	**Increased fire risk** caused by extreme heat, causing **physical damage and loss of internal fabric, and risk to life**	Fire	Prolonged dry spells over days/weeks; High (and above normal) temperatures over weeks/ months	Increasing temperatures across all seasons; Changing patterns and intensities of rainfall; particularly drier summers
	Overheating	Higher internal temperatures causing **drying out and thermal stress on internal fabric and objects**	High temperatures; Heatwaves; Fluctuating temperatures	Rapidly fluctuating temperatures over hours/ days	Increasing temperatures. across all seasons; More extreme variations in temperatures.
	Overheating	Higher internal temperatures causing **overheating and uncomfortable internal environments**			
	Pests and invasive species	**Increased rates of internal biological growth** (e.g. mould) causing condition of **internal environment and fabric to be compromised**	Ecological (Increase in plant species distribution, spread of pests (plant/ animal/insect), increase in number of growing days etc.)	Rainfall; Humidity; Temperature; Hours of sunshine and cloud cover	Increasing annual temperatures; Increased frequency of prolonged rainfall in winter months; Short, intense periods of rainfall in summer months

	Climate hazard	Impact *- cause and effect*	Details of hazard *Type*	 *Weather drivers*	 *Climate change*
GARDENS AND DESIGNED LANDSCAPES	**Pests and invasive species**	Spread of pests and diseases causing damage/loss of existing tree and plant species	Ecological (increase in plant species distribution, spread of pests, increase in number of growing days etc.	Rainfall; Humidity; Temperature; Hours of sunshine and cloud cover	Increasing annual temperatures; Increased frequency of prolonged rainfall in winter months; Short intense periods of rainfall in summer months
	Biodiversity loss; Pests and invasive species	Changing climate conditions altering species of plant communities; Change of habitats/spread of invasive species			
	Flooding; Water stress	Saturation of ground, flash floods and run-off from adjacent areas causing erosion of landscapes and damage/ loss of planting	Fluvial Flooding	Prolonged periods of rainfall over days/ weeks; Short, intense periods of rainfall over hours	Increased frequency of prolonged rainfall in winter months; Increased occurrence of intense summer rainfall events
			Pluvial/Surface Water Flooding	Short, intense periods of rainfall over hours	
			Groundwater Flooding	Prolonged periods of rainfall over weeks/ months	
	Water stress	Ground movement causing damage to gardens, designed landscapes and localised destabilisation of trees and access pathways	Ground Instability (e.g. landslide/shrink-swell)	Heavy, prolonged rainfall over days/weeks leading to ground saturation; alternative saturation and drying of ground	Increased rainfall over weeks/months; Changing frequency/intensity of rainfall; Increasing annual temperatures; Increasing occurrence rates of extreme weather events such as heatwaves

Climate Hazard Impact Assessment
Adapted from *A Guide to Climate Change Impacts on Scotland's Historic Environment, Built Environment Scotland*

Exposure considerations	Vulnerability / sensitivity	Adaptation	
		Resistance	*Acceptance*
Topography; Proximity to watercourse or poorly drained surfaces; Exposure to prevailing weather systems	Structural integrity of the building fabric/materials; State of maintenance/repair; Materials used; Exposure of building/structure	Regular object inspection and monitoring of internal environment and modify as required; Improved external weathering details; More frequent maintenance/repair	-
Topography; Site aspect (certain aspects more exposed to solar radiation, e.g. south facing); Neighbouring context	Structural integrity of building; State of maintenance/repair; Building layout and escape strategy; Building materials	Install fire protection and fire-resistant materials; Remove/control potential hazards' Ensure that emergency evacuation procedures and formalised agreements with local Fire Services are in place	Install fire detection systems; Ensure doors and windows are shut when premises are unattended; Maintain a hazard-free environment
Topography, site aspect (certain aspects more exposed to solar radiation)	Structural integrity of the building fabric; Materials used; State of maintenance/repair	Regular inspection of internal environment/fabric and modification of environment as required. Reinstate traditional passive systems (i.e. install traditional blinds, canopies); Improve passive cooling and ventilation	-
	Access to ventilation; Amount of fenestration; Materials used; State of maintenance/repair		Arrange building layout to suit occupant comfort requirements
Topography; Soil types; Site exposure to prevailing weather systems	Access to ventilation; Materials used; State of maintenance/repair; Vulnerability of occupants to poor indoor air quality	Improved protective weathering details; Repointing of masonry; Apply appropriate external coatings; Use of traditional materials to dissipate moisture;	Ensure adequate ventilation

Exposure considerations	Vulnerability / sensitivity	Adaptation	
		Resistance	*Acceptance*
Topography; Soil types; Site exposure to prevailing weather systems	Type of plant species; Tolerance or vulnerability to pests and diseases; Proximity to neighbouring plant communities	Consider use of disease-resistant modern hybrids of plant species after conducting an impact assessment; Ongoing skilled horticultural husbandry (healthy plants are more resilient)	-
Topography; Proximity to watercourse	Type of plant species; Tolerance or vulnerability to saturation of ground	Consideration given to surfaces used/ size of any drains/frequency of repair/ maintenance; Use of tolerant plant species to ground saturation; Improve drainage of nearby hard surfaces; modify and maintain accessibility routes, footpaths, etc.	Plan and arrange sites within conservation landscape management plans, to allow for larger areas to be specifically designed for flood Pluvial/Surface alleviation
Topography; Presence/ absence of hard ground surfaces			
Topography; Local geology and superficial deposits			
Local geology; topography; Proximity to water sources (springs, rivers etc.); Type and depth of superficial deposits	State of maintenance/repair of surrounding surfaces, local drainage systems; Presence/ absence of people/staff on site; Type of plant species and its tolerance or vulnerability to alternating wetting and drying cycles	Adapt surface drainage and landscaping/ planting; Investigate use of more resilient plant species; Change of tree species planted to those more suited to the changing climatic and ground conditions.	Relocation of sensitive plants/ planting schemes; Individual trees removed as and when they become unsafe, replaced with more tolerant species

APPENDIX B

Glossary

Active systems The incorporation of mechanical systems that use or produce energy.

Adaptation In relation to climate change, this is the process of adjusting to the effects of a changing climate. These can be both current or expected impacts.

Air source heat pump An energy efficient heating or cooling system that transfers heat to or from the air, typically to generate hot water and space heating or cooling.

Airtightness A measure of the permeability of a building - i.e., how much external air enters or leaves the building in an uncontrolled fashion. Also called infiltration. This is measured either in $m^3/m^2.h$ - i.e., what volume of air escapes per hour for every m^2 of external envelope, or in Air Changes per Hour (ACH) i.e., what proportion of the volume of air in the building escapes every hour.

Approved inspector Individuals or organisations, who are licensed to carry out the duties given by the Building Act 1984 and regulations made under it. They provide an alternative to obtaining building regulations approval from a local authority and have the role of checking that the Building Regulations are, as far as can reasonably be determined, being complied with.

Battery storage Systems designed to store the excess energy from photovoltaic cells.

Below ground services All underground pipes, cables and equipment associated with electricity, gas, water (including piped sewage) and telecommunications.

Biodiversity net gain A way of measuring, monitoring and mitigating the impact of a development on biodiversity. From November 2023, the UK government will be introducing mandatory biodiversity net gains for developments in the Town and Country Planning Act 1990 (unless exempt), of 10% maintained for 30 years. This can be delivered on-site, off-site or via a new statutory credits scheme.

Building contract An agreement between a client or employer and a contractor or other supplier, to carry out works in relation to a construction project.

Building control Applications must be made to building control to ensure that building work complies with the building regulations.

Building Management System A computer-based system installed to control and monitor a building's electrical equipment such as ventilation, lighting, energy, fire systems, and security systems.

Building regulations Building regulations are a legal requirement which set standards for how buildings should be constructed to achieve a minimum level of performance. They are intended to protect people's safety, health and welfare, they also set standards for accessibility, water use, energy use and security. Existing buildings undergoing upgrades and refurbishments, may be subject to certain buildings regulations.

Carbon Refers to carbon dioxide and other greenhouse gases released into the atmosphere, associated with climate change.

Construction (Design and Management) (CDM) Regulations Regulations managing the health, safety and welfare of construction projects. CDM applies to all building and construction work and includes new build, demolition, refurbishment, extensions, conversions, repair and maintenance.

Central Grants Programme A funding initiative managed by the City of London Corporation that funds four priority programmes: Stronger communities, Enjoying green spaces and the natural environment, Inspiring London through culture, Education and employment support.

City Bridge Trust London's largest independent funder providing financial support to London's communities.

Climate resilience The ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances relating to climate. Improving climate resilience involves assessing how climate change will create new, or alter current, climate-related risks, and taking steps to better cope with these risks.

Community Infrastructure Levy Neighbourhood Fund Supports the provision, improvement, replacement, operation or maintenance of infrastructure in the City.

Conservation The process of maintaining and managing change to a heritage asset in a way that sustains, and where appropriate, enhances its significance.

Conservation area Conservation areas exist to manage and protect the special architectural and historic interest of a place.

Conservation management plan Plans which collate an understanding of what matters in a heritage building and why, and how to conserve and manage it. From this informed basis, plans are then used to develop programmes of repair, restoration or to draw up proposals for change.

Contract documents See Building Contract.

Deep retrofit A retrofit which has included work to the vast majority of the building fabric as well as changes to the building's heat source and ventilation systems. This type of retrofit would typically occur at the same time as a major renovation or extension and could be expected to realise around a 70% reduction in energy demand.

District heat network Heat networks (also known as district heating) supply heat from a central source to consumers, via a network of underground pipes carrying hot water. Heat networks can cover a large area or even an entire city, or be fairly local, supplying a small cluster of buildings.

Ecclesiastical exemption Some religious groups are exempt from certain provisions of the planning acts, including the need to apply for listed building consent for ecclesiastical buildings. These groups have their own arrangements for handling changes to historic buildings which provide the same standards of protection as the secular system operated by local planning authorities.

Eco-Audit Assess the potential for reducing the carbon footprint of a building and its operations. They are free and available to all eligible organisations wherever the building is owned or with a lease over two years.

Embodied carbon The total greenhouse gas emissions of an asset associated with materials and construction processes throughout the whole life cycle of an asset. This includes emissions associated with the extraction and processing of materials and the energy and water consumption used by the factory in producing products and constructing the building. It also includes the 'in-use' stage (maintenance, replacement, and emissions associated with refrigerant leakage) and 'end of life' stage (demolition, disassembly, and disposal of any parts of product or building) and any transportation relating to the above.

Final certificate A final certificate, or completion certificate, is issued by the building control body, or approved inspector, providing formal evidence that the building works have been approved and that, in so far as it is reasonable to determine, the works have been carried out in accordance with the building regulations.

Flood zone There are three flood zones as defined by the Environment Agency: Flood Zone 1, 2 and 3. These areas have been defined following a national scale modelling project for the EA and are regularly updated using recorded flood extents and local detailed modelling. The flood zones are based on the likelihood of an area flooding, with flood zone 1 areas least likely to flood and flood zone 3 areas more likely to flood.

Grade I Indicates that a building or site is of exceptional interest.

Grade II Indicates that a building or site is of special interest, warranting every effort to preserve it.

Grade II* Indicates that a building or site is of particular importance, of more than special interest.

Green roof A roof of a building that has been designed to be partially or completely covered with plants, vegetation and a growing medium.

Ground source heat pump An energy efficient heating or cooling system that transfers heat to or from the ground, typically to generate hot water and space heating or cooling.

Hazard A hazard is something that has the potential to cause harm. Whereas a risk is a combination of the chance that hazard will cause harm, and how serious that harm could be.

Heat pump Heat pumps transfer heat from a lower temperature source to one of a higher temperature. This is the opposite of the natural flow of heat. Heat pumps can be used to provide space heating, cooling and hot water. A refrigerant fluid is run through the lower temperature source (ambient air, ground, water etc). The fluid 'absorbs' heat and boils, even at temperatures below 0°C (although the coefficient of performance (COP) decreases with lower temperature). The resulting gas is then compressed, which further increases its temperature. The gas is passed into heat exchanger coils, where it condenses, releasing its latent heat. The process then repeats.

Heritage "All inherited resources which people value for reasons beyond mere utility" Conservation Principles, English Heritage, 2008. For the purposes of this document the word heritage is used in relation to a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its special interest.

Heritage significance The value of a heritage asset to this and future generations because of its special interest.

Historic England Historic England are a statutory consultee who may be consulted by the local authority for applications that effect Grade I or II* listed buildings, or the character and appearance of a Conservation Area.

Historic park and garden Parks and Gardens of special historic interest which are included on the Register of Historic Parks and Gardens.

Iterative process Many decisions are interconnected and should be considered in the round, revisited and refined as the project progresses. An iterative process is not linear. It allows for the reanalysis of information and decisions, in order to develop well informed and holistic solutions.

Listed building Buildings and structures defined by the Secretary of State as being of special architectural or historic interest, requiring special consideration so that it can be protected for future generations.

Listed building consent Alterations, demolition or extension of a listed building requires listed building consent from the local planning authority. Common works requiring listed building consent might include the replacement of windows or doors, knocking down internal walls, painting over brickwork or altering fireplaces. It is important to engage with local conservation officers early to understand what work will and will not require listed building consent.

Low Energy Transformation initiative (LETI) A network of over 1,000 built environment professionals, producing industry leading guidance and benchmarking on net zero. The voluntary group is made up of developers, engineers, housing associations, architects, planners, academics, sustainability professionals, contractors and facilities managers.

Low and zero carbon technologies (LZCs) Technologies which provide heat and/or energy whilst producing no or little carbon emissions.

Maladaptation Poor or insufficient adaptation. In a climate change context, maladaptation refers to actions intended to reduce the impacts of climate change that actually create more risk and vulnerability.

Mechanical ventilation and heat recovery (MVHR) MVHR, heat recovery ventilation (HVR) or ventilation heat recovery (VHR) uses a heat exchanger to recover heat from extract air that would otherwise be rejected to the outside and uses this heat to pre-heat the 'fresh' supply air.

Net Present Value How much an investment is worth throughout its lifetime, discounted to today's value. It is the difference between the present value of cash inflows and the present value of cash outflows over a period of time. NPV is used in capital budgeting and investment planning to analyse the profitability of a projected investment or project.

Overheating The condition where the internal temperature of a space, typically in summer, spends a certain amount of time above what is considered comfortable. Exact limits vary depending on the standard, but typically anything above 25°C could be considered overheating.

Party wall awards Party wall awards are required in order to inform your neighbours if you want to carry out any building work near or on your shared boundary, or 'party wall'.

PAS2030:2019 A British Standards Institute (BSI) standard which sets out the requirements for installing, commissioning, and handing over energy efficiency measures (EEMs) in domestic retrofit projects.

PAS2035:2019 A British Standards Institute (BSI) standard which sets out a framework for evaluating, designing and delivering energy efficiency measures (EEMs) in domestic retrofit projects.

PAS2038:2021 A British Standards Institute (BSI) standard which sets out a framework for evaluating, designing and delivering energy efficiency measures (EEMs) in non-domestic retrofit projects.

Passive design Strategies which take advantage of building features such as orientation, thermal mass, insulation and glazing to utilise natural sources of heating and cooling, such as sun and air movement, minimising unwanted heat gain and loss.

Photovoltaics Is the conversion of light into electricity using semiconducting materials.

Planned maintenance The repairs required to restore a building to its original condition on a responsive, cyclical or planned basis. Not all planned maintenance will directly improve the appearance or performance of a building, although defects like damp can significantly reduce the energy efficiency of built fabric.

Planning condition Conditions that are imposed on approved planning applications that require the submission of additional detail and information. Conditions must be discharged as required in order to comply with the planning approval.

Planning permission Planning permission is needed for changes which are defined as development. This includes building works, some kinds of demolition, and changes of use to existing buildings. In conservation areas, some minor works such as replacing windows or front walls might need planning permission as they could affect the appearance of a conservation area.

Post occupancy evaluation (POE) The process of obtaining feedback on a building's performance in use after it has been built and occupied. POE collects information on building and energy use and user satisfaction.

Power purchase agreement (PPA) A long-term contract between an electricity generator and a customer. PPAs may last anywhere between 5 and 20 years, during which time the power purchaser buys energy at a pre-negotiated price. Such agreements play a key role in the financing of independently owned (i.e., not owned by a utility) electricity generators, especially producers of renewable energy like solar or wind farms.

Pre application (pre app) advice Advice provided by planning officers which allows early feedback on proposals and the likely determination of any subsequent application.

Retrofit The upgrading of a building to enable it to respond to the imperative of climate change. Retrofit may involve repair, renovation, refurbishment and/or restoration of the building, providing the aim is to mitigate against climate change and ensure the building is well adapted for our changing climate.

Retrofit Coordinator A role required by PAS2035:2019. Every domestic retrofit project compliant with PAS2035:2019 should be coordinated by a Retrofit Coordinator.

Retrofit Lead Professional A role required by PAS2038:2021. Every retrofit project compliant with PAS2038:2021 should be overseen by a Retrofit Lead Professional.

Scheduled monument Nationally important archaeological sites. Any work to a scheduled monument requires prior written permission from the Secretary of State for Culture, Media and Sport. This is called a Scheduled Monument Consent.

Services The systems installed in buildings to make them comfortable, functional, efficient and safe. Building services might include energy distribution, fire safety, heating, ventilation and cooling, water and plumbing.

Shallow retrofit A retrofit involving several, relatively minor interventions (e.g. loft insulation, cavity wall insulation) which may also include a change to the heat source and ventilation systems. This type of retrofit could be expected to realise no more than a 30% reduction in energy demand.

Solar hot water panels Absorb the heat of the sun and transfer it to the water used in a building. Not to be confused with photovoltaic panels which convert sunlight into electricity.

Solar shading Diffuse and block direct sunlight to reduce heat gain and glare while maintaining natural light and views.

Space heating demand A metric used to describing the amount of heat required to heat a building, maintaining the inside environment to a particular heating profile for a given set of weather conditions. Usually expressed in kWh/m2/yr.

Statutory approvals Statutory applications for building projects including planning permission and building regulations, listed building consent, approval of conditions etc.

Stranded asset Assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities. In recent years, the issue of stranded assets caused by environmental factors, such as climate change and society's attitudes towards it, has become increasingly high profile. Changes to the physical environment driven by climate change, and society's response to these changes, could potentially strand entire regions and global industries within a short timeframe, leading to direct and indirect impacts on investment strategies and liabilities.

Sustainable Traditional Building Alliance (STBA) An alliance of the UK's leading organisations associated with the conservation and improvement of traditional buildings.

Thermal bridge Also known as cold bridges, are weak points (or areas) in the building envelope which allow heat to pass through more easily. They occur where materials which are better conductors of heat are allowed to form a 'bridge' between the inner and outer face of a construction. This commonly happens where there is a gap in the insulation layer, or where an element such as a joist penetrates through the construction.

Thermal bypass Heat loss that bypasses the thermal insulation layer between two areas of the construction. This is caused by a combination of conductive and radiative heat loss mechanisms which result in uncontrolled air movement.

Thermal performance The efficiency with which something retains, or prevents the passage of heat.

Typologies A classification based on general type of building. For the purposes of this document typologies are based on use, age and significance, as well as suitability for energy efficient measures.

Urban heat island effect This is when dense urban areas remain significantly warmer than the surrounding countryside, due to roads and buildings absorbing and retaining heat in the day and re-emitting it at night.

Vapour permeable Describes a material's ability to allow water vapour to pass through it. Often referred to as breathability.

Water source heat pump An energy efficient heating or cooling system that transfers heat to or from a body of water, typically to generate hot water and space heating or cooling.

Water stress When the demand for water exceeds the available amount during a certain period.

Whole building approach Best practice retrofit takes a whole building approach, where the consequence of every retrofit measure is fully understood, and the building is considered as a whole.

Whole building retrofit plan A coherent plan which sets out the proposed retrofit measures for a particular building. In creating the plan, the effect and interaction of the measures will have been considered to ensure there is no adverse effect on the building fabric or the internal living environment. The plan could be staged over several years.

Whole life carbon The amount of green house gas emissions associated with a building's embodied and operational impacts, over the whole life of the building.

Whole life cost An assessment of the total cost of an asset over its whole life.

APPENDIX C

External Links

Legislative Context

National Planning Policy Framework, Department for Levelling Up, Housing & Communities UK Government, 5 September 2023
https://gov.uk/government/publications/national-planning-policy-framework--2

Legal requirements for listed buildings and other consents, Historic England Website
https://historicengland.org.uk/advice/hpg/decisionmaking/legalrequirements/

Planning (Listed Building and Conservation Areas) Act 1990, UK Government
https://legislation.gov.uk/ukpga/1990/9/contents

The London Plan: The Spatial Development Strategy for Greater London, Mayor of London, March 2021
https://london.gov.uk/programmes-strategies/planning/london-plan

Climate Action Strategy 2020-2027, City of London Corporation, September 2023
https://cityoflondon.gov.uk/services/environmental-health/climate-action/climate-action-strategy

Getting started

PAS2038:2021 Retrofitting non-domestic buildings for improved energy efficiency, Department for Business, Energy & Industrial Strategy, BSI, August 2021
https://www.bsigroup.com/en-GB/standards/pas-20382021/

PAS2035:2019 Retrofitting domestic buildings for improved energy efficiency, Department for Business, Energy & Industrial Strategy, BSI, February 2020
https://www.bsigroup.com/en-GB/standards/pas-2035-2030/

BS40104 Assessment of dwellings for retrofit, BSI, July 2021
https://standardsdevelopment.bsigroup.com/projects/9021-05901

Identifying the risks

Climate Action: Climate Resilience, City of London Corporation Website, July 2023
https://www.cityoflondon.gov.uk/services/environmental-health/climate-action/climate-resilience

Climate Action: Flooding, City of London Corporation Website, March 2023
https://www.cityoflondon.gov.uk/services/environmental-health/climate-action/flooding

Mapping Climate Hazards to Historic Sites, Historic England, November 2021
https://historicengland.org.uk/whats-new/research/back-issues/mapping-climate-hazards-to-historic-sites/

Climate change adaptation guidance, National Trust
https://www.into.org/new-national-trust-climate-change-adaptation-guidance/

A Guide to Climate Change Impacts, Historic Environment Scotland, October 2019
https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=843d0c97-d3f4-4510-acd3-aadf0118bf82%23:~:text=The%20guide%20identifies%20many%20of%2Cenhance%20resilience%20to%20climate%20change.

Climate Emergency Retrofit Guide, LETI, October 2021
https://www.leti.uk/retrofit

Responsible Retrofit Knowledge Hub, Sustainable Traditional Building Alliance Website
https://responsible-retrofit.org/

Identifying Opportunities

Retrofit and Energy Efficiency in Historic Buildings, Historic England, September 2023
https://historicengland.org.uk/advice/technical-advice/retrofit-and-energy-efficiency-in-historic-buildings/

Climate Emergency Retrofit Guide, LETI, October 2021
https://www.leti.uk/retrofit

Responsible Retrofit Knowledge Hub, Sustainable Traditional Building Alliance Website
https://responsible-retrofit.org/

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Climate Action: Flooding, City of London Corporation Website, March 2023
https://www.cityoflondon.gov.uk/services/environmental-health/climate-action/flooding
Mapping Climate Hazards to Historic Sites, Historic England, November 2021
https://historicengland.org.uk/whats-new/research/back-issues/mapping-climate-hazards-to-historic-sites/
A Guide to Climate Change Impacts, Historic Environment Scotland, October 2019
https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=843d0c97-d3f4-4510-acd3-aadf0118bf82%23:~:text=The%20guide%20identifies%20many%20of%2Cenhance%20resilience%20to%20climate%20change

Whole Building Retrofit Plan

PAS2038:2021 Retrofitting non-domestic buildings for improved energy efficiency, Department for Business, Energy & Industrial Strategy, BSI, August 2021
https://www.bsigroup.com/en-GB/standards/pas-20382021/
PAS2035:2019 Retrofitting domestic buildings for improved energy efficiency, Department for Business, Energy & Industrial Strategy, BSI, February 2020
https://www.bsigroup.com/en-GB/standards/pas-2035-2030/

Building a Business Case

City Bridge Trust, City Bridge Trust Website
https://www.citybridgetrust.org.uk/funding
Community Infrastructure Levy Neighbourhood Fund, City of London Corporation Website
https://www.cityoflondon.gov.uk/about-us/working-with-community/community-infrastructure-levy-neighbourhood-fund
Central Grants Programme, City of London Corporation Website
https://www.cityoflondon.gov.uk/about-us/working-with-community/central-grants-programme

Detailed Design and Specification

Retrofit and Energy Efficiency in Historic Buildings, Historic England, September 2023
https://historicengland.org.uk/advice/technical-advice/retrofit-and-energy-efficiency-in-historic-buildings/

Obtaining Statutory Approvals

Heritage Consents, Historic England Website
https://historicengland.org.uk/advice/planning/consents/
Historic Environment Listed Buildings, City of London Corporation Planning Guidance, April 2023
https://www.cityoflondon.gov.uk/services/planning/historic-environment/listed-buildings

Typologies

Historic Environment, City of London Corporation Website, April 2023
https://www.cityoflondon.gov.uk/services/planning/historic-environment
Conservation Areas in the City of London, City of London Corporation, December 1994
https://www.cityoflondon.gov.uk/services/planning/historic-environment/conservation-areas
Eco Church awards scheme, Eco Church Website
https://ecochurch.arocha.org.uk/
Net Zero Carbon and Environmental case studies, The Church of England Website
https://www.churchofengland.org/about/environment-and-climate-change/towards-net-zero-carbon-case-studies
LCAG Website, Livery Climate Action Group
https://liverycag.org.uk/

APPENDIX D

Figure numbers

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Issue 01
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City of London Corporation

PURCELL

Job number: 242195

DOMINE DIRIGE NOS

CITY OF LONDON

PURCELL

Committee(s): Planning & Transport Committee	**Dated:** 05/03/2024
Subject: Report – ‘Refurbishing the City – insights from current best practice’	**Public**
Which outcomes in the City Corporation’s Corporate Plan does this proposal aim to impact directly?	4. Communities are cohesive and have the facilities they need. 5. Businesses are trusted and are socially and environmentally responsible. 10. We inspire enterprise, excellence, creativity and collaboration. 11. We have clean air, land and water and a thriving and sustainable natural environment.
Does this proposal require extra revenue and/or capital spending?	**N**
If so, how much?	**N/A**
What is the source of Funding?	**N/A**
Has this Funding Source been agreed with the Chamberlain’s Department?	**N/A**
Report of: Director for the Environment	**For Decision**
Report author: Aled Thomas, Department for the Environment	

Summary

The ‘Refurbishing the City – insights from current best practice’ report is one of the actions in the Climate Action Strategy’s Square Mile project plan for 2023/24. It draws together evidence of current policy and practice in the refurbishment and retrofit of commercial buildings in the City, London and beyond.

The report includes a portfolio of case studies which provide a summary of innovative refurbishment schemes and their carbon performance. The report draws on these case studies to provide practice-based recommendations for the built environment sector, setting out key insights, risks and opportunities. The report also sets current refurbishment practices within existing and emerging policy and industry frameworks for reducing whole lifecycle carbon in the built environment.

It is a further contribution towards understanding the role building refurbishment can play in reducing carbon emissions as well as providing wider economic and social value. The intention is to publish the report and to promote it through relevant networks and a dedicated event. It will inform on-going work related to planning policy and guidance, notably the ‘Planning for Sustainability’ Supplementary Planning

Document which was approved by committee for consultation in December 2023 and the new City Plan 2040.

Recommendation(s)

Members are asked to:

- Approve the report for publication
- Note the intention to develop a series of Square Mile refurbishment case studies, drawing on the template set out in the attached documents.
- Note the proposal to share and discuss the finding through a dedicated event.

Main Report

Background

1. The City Corporation's Climate Action Strategy has set an ambition of a net-zero Square Mile by 2040. A key aspect of achieving this goal is to better understand the whole lifecycle carbon impact of building refurbishment and retrofit, particularly for commercial buildings.

2. Commercial offices in the UK account for circa 11% of energy consumption from non-domestic buildings. While only 7% of non-domestic buildings are over 1000 sqm in size, these large buildings account for over half of all total energy consumption. Decarbonising large buildings will, therefore, have a more significant impact on total energy consumption per building retrofitted.

3. The '**Refurbishing the City – insights from current best practice**' report is one of the actions in the Climate Action Strategy and draws together current policy and practice in the refurbishment and retrofit of commercial buildings in the City, London and beyond. It builds a substantial evidence base to support key stakeholders across the construction industry to develop their own business case for retrofit and refurbishment.

4. This shift towards retention of buildings or building elements is increasingly evident in the construction sector. Landlords, developers, tenants and investors are adopting their own ambitious sustainability goals which are shaping their decisions. Deloitte's Winter 2023 Crane Survey reported that the volume of new starts (470,000 sqm), was the highest seen across the seven central London submarkets since 2005. Of the new starts, 65% (306,000 sqm) were refurbishments, the highest on record. These trends are supported by a policy and regulatory framework which increasingly encourages the retrofitting of existing buildings, such as the 'Retrofit First' policy set out in the new City Plan 2040.

5. The report has produced 18 case studies of leading refurbishment schemes. Most of the case studies are from the City of London and other London boroughs with a few additional examples from other parts of the UK and beyond. The schemes

themselves range across different typologies, buildings size, time periods and locations, to provide a rich evidence-base of current best practice.

6. Each case study provides a deep-dive into key aspects of the scheme - the refurbishment work undertaken; scope of the works; retained elements; key carbon performance data; building certification; and key insights into the opportunities and challenges of each development.

7. The report draws on these case studies to provide practice-based recommendations for the built environment sector, setting out key insights, risks and opportunities. The report also places current refurbishment practice within existing and emerging policy and industry frameworks for reducing whole lifecycle carbon in the built environment.

Current Position

Case studies and key insights

8. From a ‘carbon’ perspective, the case studies demonstrate that retrofit and refurbishment often result in lower whole-life carbon emissions when compared to a new build equivalent and are a key lower carbon solution to meet our climate goals.

9. The carbon performance of the case studies was also compared to voluntary industry benchmarks. As set out in Table 1 below, 8 of the projects are currently in line with the LETI 2030 metric for upfront carbon. Given several of the projects have had little to no structural intervention, the case studies illustrate how challenging these metrics are to achieve. 10 projects perform in line with RIBA benchmark Challenge 2025, and the remaining 7 fall within RIBA benchmark Challenge 2030. Whilst these metrics are voluntary, the case studies do reflect how current practice compares against emerging industry ambitions.

Table 1: Summary of Carbon Performance data of Case Studies

Total Case Study Projects: **18** Total with A1-A5 (upfront carbon) provided: **15** Total with A1-A5, B1-B5, C1-C4 life cycle embodied carbon provided: **13**	**Metric ($kgCO_{2e}$ /m^2 /GIA)**	**Number achieving LETI / RIBA 'Metric'***
LETI 2020 (Band C) (A1-A5)	600	12
LETI 2030 (Band A) (A1-A5)	350	8
RIBA 2030 Challenge 2025 (A1-A5, B1-B5, C1-C4)	970	10
RIBA 2030 Challenge 2030 (A1-A5, B1-B5, C1-C4)	750	7

**at the current time and based on information provided relative to project stage.*

10. In terms of carbon from energy in use, it is more challenging to compare projects with accuracy. This is due to the methods used from evaluating operational energy

in the design and construction phases. Most case studies have carried out estimations or are in earlier stages based of NABERS Energy for Offices rating.

11. While the data related to building and carbon performance is difficult to compare on a like-to-like basis, the case studies show that data, evaluation and transparency is improving over time. Key metrics are now being collected at all stages of development which is key for any assessment and learning.

12. Data relating to the cost, business case and returns have proved more difficult to collect given commercial considerations. This is an area which needs further work to develop clear and consistent metrics for considering aspects of sustainability in market and investment value. However, these case studies demonstrate the viability of refurbishment schemes which combine economic, social and environmental benefits within a long-term framework.

Policy and regulatory landscape

13. The report includes a review of international policy and regulation and policy within the built environment which shows a general movement towards reducing the whole lifecycle carbon of buildings, with significant innovation and variation across countries and cities.

14. As set out by the Climate Change Committee, the UK does not yet have a clear policy framework for reducing carbon emissions from the built environment in line with its legal targets. To date, policy has focused entirely on operational emissions of running a property rather than a whole lifecycle carbon perspective. There is currently a high degree of uncertainty as to when and how this policy framework will evolve.

15. The report and case studies underline the pioneering work underway in London in both whole lifecycle carbon policy and refurbishment practice. This real-world evidence from the City and others is critical to informing any future London-wide or UK policy in this area.

Market trends

16. The case studies show both the complexity of retrofit/ refurbishment as well as the benefits, often resulting in innovative and successful ‘products.’ Some remarkable architectural and engineering solutions have been developed and implemented.

17. These include aspects of high-quality data collection (1 Appold St case study); building retention (100 New Bridge St case study); reusing materials at their highest value and use of lightweight materials; material passporting; the integration of low carbon technologies (100 New Bridge St case study); and optimising design for adaptability and flexibility.

18. These solutions have also resulted in co-benefits beyond carbon savings, such as potentially cheaper costs, less use of intensive resources and potentially shorter build programmes. These refurbishment schemes are also driving industry

transformation by creating green jobs and upskilling workers, as recognised by the Skills for the Sustainable Skyline Taskforce.

19. There is increasing collaboration across industry to improve data and transparency. The forthcoming UK Net Zero Carbon Buildings Standard is a cross-industry initiative that aims to reach consensus around key principles that define net zero for different building typologies. Due to launch in 2024, it is expected to encompass operational energy performance, upfront embodied carbon, and whole life carbon limits.

20. From a commercial perspective, there is emerging evidence that buildings can attract a premium on rents due to its green credentials e.g. buildings with lower EPC or high sustainable certification and potentially lower operational costs. However, this is focused on the operation of the building rather than a whole lifecycle carbon perspective.

Recommendations

21. The report draws on the insights from the case studies and policy landscape to recommend several key best practice recommendations for building owners and developers. These include:

- Collect and analyse existing building data.
- Ensure the business case also accounts for carbon impact.
- Evaluate risks and opportunities for the site.
- Establish a clear strategy for decarbonisation, accounting for comparisons of building types and regulation considerations.
- Use consistent reporting metrics and review against targets (peer reviewed data is recommended)
- Consider market maturity – i.e. can lower whole life carbon buildings attract a premium if demand rises?
- If refurbishment / retrofit is not possible and demolition is required, ensure a justification and plan is in place to have rationalised the demolition and maximise reuse potential of existing materials.
- Report on as built upfront carbon performance and operational energy in use.

22. These insights and recommendations will feed into the draft ‘Planning for Sustainability’ SPD which is currently subject to consultation and is the main guidance for applicants on all matters of sustainability.

Proposals

23. The case studies provide a template for building a wider series of best practice refurbishment schemes in the City which capture both carbon performance and wider economic and social value. This would also provide key evidence of the way schemes are aligning with emerging industry metrics and ambitions. This series will engage directly with the construction industry and draw on the increasing quality and transparency of data available. The committee will be updated on progress.

24. The case studies and report will be published to highlight current policy and best practice in the refurbishment of commercial buildings. This will be shared widely through the City Corporation's networks. A follow-up event will also be organised to share and discuss the findings and draw on other important and relevant publications e.g. 'Retrofit first, not Retrofit only' (London Property Association, 2023) and 'Building the Case for Net Zero: Retrofitting Office Buildings' (UKGBC, 2024).

25. The report and its recommendations will contribute to the evidence base for planning policy and guidance, notably the 'Planning for Sustainability' Supplementary Planning Document which was approved by committee for consultation in December 2023.

Corporate & Strategic Implications

26. Buildings are the largest source of greenhouse gas emissions in the Square Mile. The report and case studies are part of a package of initiatives within the City Corporation's Climate Action Strategy which seek to incentivise action to reduce emissions from the built environment in the Square Mile.

27. The report forms part of a wider package of policy work on building refurbishment in the City. These include the Carbon Options Guidance (March 2023), Whole Lifecycle Carbon monitoring data (July 2023), 'Planning for Sustainability' Supplementary Planning Document (December 2023) and the new City Plan 2040.

Financial implications

28. None

Resource implications

29. Any resourcing requirements for follow-on actions will be sought from existing budgets.

Legal implications

30. None

Risk implications

31. None

Climate Implications

32. The Guidance and Case studies form part of the actions of the City Corporation's Climate Action Strategy's Square Mile project plan. Reducing the carbon emissions from buildings is the main challenge for achieving a net-zero Square Mile.

Equalities, Resource and Security implications

33. None

Conclusion

34. The case studies and report underline the transformational shift underway within the built environment industry in London and beyond towards the retention, refurbishment and retrofit of buildings. They draw on a series of leading, real-world schemes which have taken ambitious action in terms of decarbonisation, innovation and value-creation.

35. The documents provide further evidence of what can be achieved through the refurbishment of commercial buildings and provide key insights into the challenges and opportunities involved.

Appendices

Background Papers

- Appendix 1 - Refurbishing the City – insights from current best practice
- Appendix 2 - Commercial Building Refurbishment Case Studies

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2024

Refurbishing the City – insights into current best practice

CITY OF LONDON
HILSON MORAN

Contents

Acknowledgments

This report has been complied by Hilson Moran in collaboration with the City of London Corporation's Environment Department.

Several stakeholders have contributed information to this report, and we are grateful for their time and efforts in helping with information and compiling the case studies of their commercial office developments.

British Land

Great Portland Estates

Bluebutton Properties UK Limited

Piercy & Co

U&I

Morris and Company

Doone Silver Kerr

Helical

Pilbrow & Partners

Gensler

ORMS

Barr Gazetas

Permodalan Nasional Berhad PNB and LaSalle Investment Management

Bruntwood

Sheppard Robson

Brookfield Office Property Management

Stiff + Trevillion

DSDHA

Ashby Capital and Janson Urban

King's Cross Central Limited Partnership (KCCLP)

Heatherwick Studio & BAM Design

Fletcher Priest Architects

AMP Capital

3XN

Quadrant and Oaktree Capital

Buckley Gray Yeoman

Rolfe Judd Architects

Royal Sun Alliance Insurance

Landsec

KPF

Orion Capital Managers

Foreword – Climate Policy Lead (DRAFT)

At the City of London Corporation, we are passionate about doing our part to tackle the climate emergency. Our Climate Action Strategy commits us to supporting the achievement of net zero for the Square Mile by 2040, ten years ahead of UK Government plans.

Commercial buildings make up 65% of greenhouse gas emissions in the City of London and is a key focus area in our Strategy. As highlighted in our 'Taking Climate Action: Our Progress 2023', the Square Mile's carbon footprint has reduced by 40% between 2017 (our baseline year) and 2020 (the latest available data). While these figures suggest positive progress, we should recognise the decarbonisation of the grid and the COVID pandemic's social restrictions have contributed significantly to this development.

To maintain this positive trajectory, there is an urgent need to increase the pace at which we are refurbishing and retrofit our commercial real estate, not just in the City but across London, the UK and globally. Doing so will enable us to meet our net zero targets whilst simultaneously supporting the Paris Climate Agreement's commitment to limiting global temperature increase to 1.5 degrees Celsius.

As a City Corporation, we are using our influence to shape and accelerate action:

- We have adopted a ground-breaking Planning Advice Note on Carbon Options Guidance which requires developers to carry out a detailed review of the carbon impact of development options before submitting a planning application, including refurbishing existing buildings rather than demolishing and replacing them.
- We are currently consulting on a 'Planning for Sustainability' Supplementary Planning Document to drive forward best practice in sustainable development in the Square Mile.
- Our new City Plan 2040 will take a 'Retrofit First' approach to development to support the ambition for a net-zero Square Mile

I welcome the case studies and recommendations set out in this report as another important contribution to current discussions on the whole lifecycle carbon of our commercial buildings and the role refurbishment can play in improving the energy-efficiency of buildings and reducing embodied carbon. It underlines the need for more reliable and standardised data, examples of leading practice and collective action across the built environment value chain.

Alderman Alison Gowman

City of London Corporation

Executive Summary:

In 2023 the Climate Change Committee (CCC)[1] stated "*Progress remains broadly insufficient to ensure that the buildings sector reaches zero emissions by 2050*" and "*the UK meeting its goals from 2030 onwards is now markedly less than it was in our previous assessment a year ago. A key opportunity to push a faster pace of progress has been missed*".

The built environment sector needs to do more to effectively reduce its emissions and to progress towards the UK's legally binding commitment to reach net zero by 2050. The industry is being judged on its outcomes, in relation to the built embodied 'upfront carbon' as well as in use performance of materials and energy consumption within buildings. It is, therefore, imperative to act now and progress toward the achievement of the net zero target by 2050.

Case studies and insights

This report, 'Refurbishing the City – insight into current best practice', has collected a series of case studies to provide a deep-dive into key aspects of commercial building refurbishment in the City, London and beyond. The case studies show that retrofit and refurbishment schemes can make a key contribution to sustainability goals, both in terms of reducing the use of new resources and their associated impacts, including carbon emissions.

The 18 case studies collected range across different typologies and sizes of buildings as well as time periods. At the time of collecting the data some of the case studies were at an early design stage, where the embodied carbon analysis had not yet been concluded. Nevertheless, these examples still have an important part to play in demonstrating what retrofit measures can be achieved with existing building stock.

The carbon performance of the case studies was also compared to voluntary industry benchmarks. As set out in Table 1 below, 8 of the projects are currently in line with the LETI 2030 metric for upfront carbon. Given several of the projects have had little to no structural intervention, the case studies illustrate how challenging these metrics are to achieve. 10 projects perform in line with RIBA benchmark Challenge 2025, and the remaining 7 fall within RIBA benchmark Challenge 2030. Whilst these metrics are voluntary, the case studies do reflect how current practice compares against emerging industry ambitions.

Table 1: Summary of Carbon Performance data of Case Studies

Total Case Study Projects: **18** Total with A1-A5 (upfront carbon) provided: **15** Total with A1-A5, B1-B5, C1-C4 life cycle embodied carbon provided: **13**	**Metric ($kgCO_{2e}$ /m^2 /GIA)**	**Number achieving LETI / RIBA 'Metric'***
LETI 2020 (Band C) (A1-A5)	600	12
LETI 2030 (Band A) (A1-A5)	350	8
RIBA 2030 Challenge 2025 (A1-A5, B1-B5, C1-C4)	970	10

[1] CCC – The independent body set up to advise and monitor the UK's progress in reducing greenhouse gas emissions

RIBA 2030 Challenge 2030 (A1-A5, B1-B5, C1-C4)	750	7

The information gathered from the portfolio of case studies also provides other key insights and lessons learned. The following provides a summary – further details are set out in section 7:

Data availability: historically, data surrounding both embodied carbon and in use operational energy is scarce. This is correlated to the feedback provided by designers in terms of how the building operates in use, from an energy perspective. Nevertheless, positive change is taking place as policy evolves, and developers seek to report on their actual emissions.

A more comprehensive approach to whole lifecycle carbon assessment: the case studies show that data, evaluation, and transparency is improving over time, and key metrics are now being looked at all stages of development. Improved and consistent data is predominant in more recent projects, indicating that as performance-based parameters become a mandatory requirement, the knowledge, data, and reporting related to carbon is expected to become more accurate and standardised.

Consistency of data is key for evaluation and learning from best practice. Estimations should be developed to reflect an outcome closer to the reality. Initiatives like the Built Environment Carbon Database (BECD)[2] should assist with this data collection and evaluation. The industry requires a national approach, with clear and consistent calculation methodology, scopes, evaluation, and reporting transparency, to address this issue.

The challenges of benchmarking: the data related to building and carbon performance is difficult to compare on a like-to-like basis. This is because design teams have followed varying methodologies and used differing carbon factors across projects. Benchmarking and analysis for carbon impacts has been evolving at a fast pace, making historical comparison challenging. Without a development's wider context and/or good understanding of the calculation methodologies, comparisons are difficult or at times unfeasible.

Schemes, such as the NABERS UK rating for office buildings, and in-use energy reporting requirements under the London Plan are helping with this standardisation, particularly the disclosure of a Display Energy Certificate (DEC) after full occupation for at least 11 months.

Policy and regulatory landscape

A review of international regulation and policy within the built environment (set out in section with further detail in Appendix B) shows a general movement towards reducing

[2] Developed in partnership BRE and other major organisations operating across every part of the construction sector, the Built Environment Carbon Database (BECD) is free-to-access and is designed to become the main source of carbon estimating and benchmarking for the industry.

the whole lifecycle carbon of buildings, with significant innovation and variation across countries and cities.

At a UK level, such requirements are not in place yet. New policy frameworks need to be created, allowing for some regional adaptions, to allow consistent approaches to be adopted. The industry understands the need for change but requires consistency to be able to invest in effective and viables solutions.

In London, policy is developing at pace around operational energy and embodied carbon data, particularly in relation to retrofit first approaches. These are reflected in the London and in the City of London's own policy and guidance framework. It is expected that over the next few years, building in-use reporting will become a regular occurrence and more data will be available to designers due to mandated planning requirements. However, this will only apply for GLA referable schemes and some Boroughs requirements.

Market trends

The case studies compiled in this report show both the complexity in retrofit/ refurbishment as well as the benefits, often resulting in innovative and successful 'products.' Some remarkable architectural and engineering solutions have been developed and implemented. These include aspects of:

- building retention;
- value retention within used material;
- material passporting;
- the integration of low carbon technologies; and
- optimising design for adaptability and flexibility.

These solutions have also resulted in co-benefits beyond carbon savings, such as potentially cheaper costs, less use of intensive resources and potentially shorter programmes. However, there is no golden rule or silver bullet. Refurbishment and retrofit need careful consideration, the availability of good building records, viable business models, high expertise, and good design.

An increased body of evidence demonstrates that refurbishment and retrofit form an important part of achieving low Whole Life Carbon performance as well as 'Circular Economy' goals. These refurbishment schemes are also driving industry transformation by creating green jobs and upskilling workers, as recognised by the Skills for the Sustainable Skyline Taskforce.

Data relating to the business case of the schemes have proved more difficult to collect given commercial considerations. This is an area which needs further work to develop clear and consistent metrics for considering aspects of sustainability in market and investment value. However, these case studies demonstrate the viability of refurbishment schemes which combine economic, social, and environmental benefits within a long-term framework.

From a commercial perspective, there is emerging evidence (e.g. JLL, 2023) that buildings can attract a premium on rents due to its green credentials e.g. buildings with lower EPC or high sustainable certification and potentially lower operational costs. Currently, this is primarily focused on the operation of the building rather than a whole lifecycle carbon perspective.

Recommendations

Overall, this report aims to take insights from real refurbishment projects and summaries several key best practice recommendations. These include:

1. Collect and analyse existing building data.
2. Ensure the business case also accounts for carbon impact.
3. Evaluate risks and opportunities for the site.
4. Establish a clear strategy for decarbonisation, accounting for comparisons of building types and regulation considerations.
5. Use consistent reporting metrics and review against targets (peer reviewed data is recommended)
6. Consider market maturity – i.e. can lower whole life carbon buildings attract a premium if demand rises?
7. If refurbishment / retrofit is not possible and demolition is required, ensure a justification and plan is in place to have rationalized the demolition and maximise reuse potential of existing materials. This should be communicated to the planners.
8. Report on as built upfront carbon performance and operational energy in use.

Further details on each of these aspects is set out in chapter 8.

The case studies and report underline the transformational shift underway within the built environment industry in London and beyond towards the retention, refurbishment and retrofit of buildings. They draw on a series of leading, real-world schemes which have taken ambitious action in terms of decarbonisation, innovation, and value-creation.

They provide further evidence of what can be achieved through the refurbishment of commercial buildings and provide key insights into the challenges and opportunities involved.

Introduction to the document

Purpose of the report

This report is aimed at individuals and actors across the built environment value chain interested in the move towards commercial building refurbishment.

It seeks to capture current policy and practice on commercial building retrofit and draws on a range of real-word case studies with input from across the built environment industry. It highlights some of the innovative approaches to adapting our existing building stock to deliver successful outcomes.

The publication is a contribution to current discussions on the drive towards net zero carbon in our existing building stock. It includes retrofit definitions, key considerations and supporting case studies - outlining a method for approaching retrofit projects and setting out clear definitions to help give clarity to the industry in establishing best practice approaches.

Case Studies: Methodology & Approach

In March 2023, a case study request was initiated and issued by the City of London, supported by Hilson Moran, to several organisations actively working within the retrofit arena.

A case study template form was independently completed by the design team with the available quantitative and qualitative data related to the project brought forward. The data was reviewed with regards to suitability, quality, and quantity.

The selected case studies aim to provide a spectrum of different measures, approaches related to retrofit, redevelopment and retention of building elements across different typologies of buildings that vary in ages and architecture style.

A series of insights have emerged from the case studies which aim to highlight the multitude of drivers that the design team must consider, effective interventions and retrofit/refurbishment methodologies, as well as typical challenges that are worth considering during design stage. All such insights aim to provide key learnings for future projects.

The case studies illustrated are projects that are either in design or construction or have been completed relatively recently (in the last decade) and therefore were not subject to the same level of regulation or reporting standards that is perhaps mandated today.

It is worth noting that more recent developer requirements/ standards, as well as policy and regulation at national and regional scale, have developed considerably in relation to whole life carbon targets, measures, and assessment methodologies.

For this reason, more recent data is more detailed and complete today compared to project assessments that have been conducted in the past. Some case studies collected within this report do not have clearly broken down and available data due to the standards and requirements at the time of completion.

The performance data included in the case studies should not be compared like-to-like as there are several varying factors, contextual conditions, carbon factors and differing methodologies of data calculation. In addition, the data illustrated for each case study has been retrieved by design teams and have not been verified by a third-party or been peer reviewed. This underlines the need for better, more transparent, and standardised data collection, which is likely to improve over time as both policy and client requirements evolve,

1. Introduction

The Climate Emergency and impact of the built environment

As set out in Figure 1 below, the built environment (buildings and infrastructure, excluding surface transport) is currently responsible for 25% of the UK's total greenhouse gas emissions (177 MtCO2e). This is one of the main sources of emissions resulting from human activities (UKGBC, 2021). It is also an area for which the UK has direct control and therefore has the potential to reduce effectively, in line with its net-zero commitments.

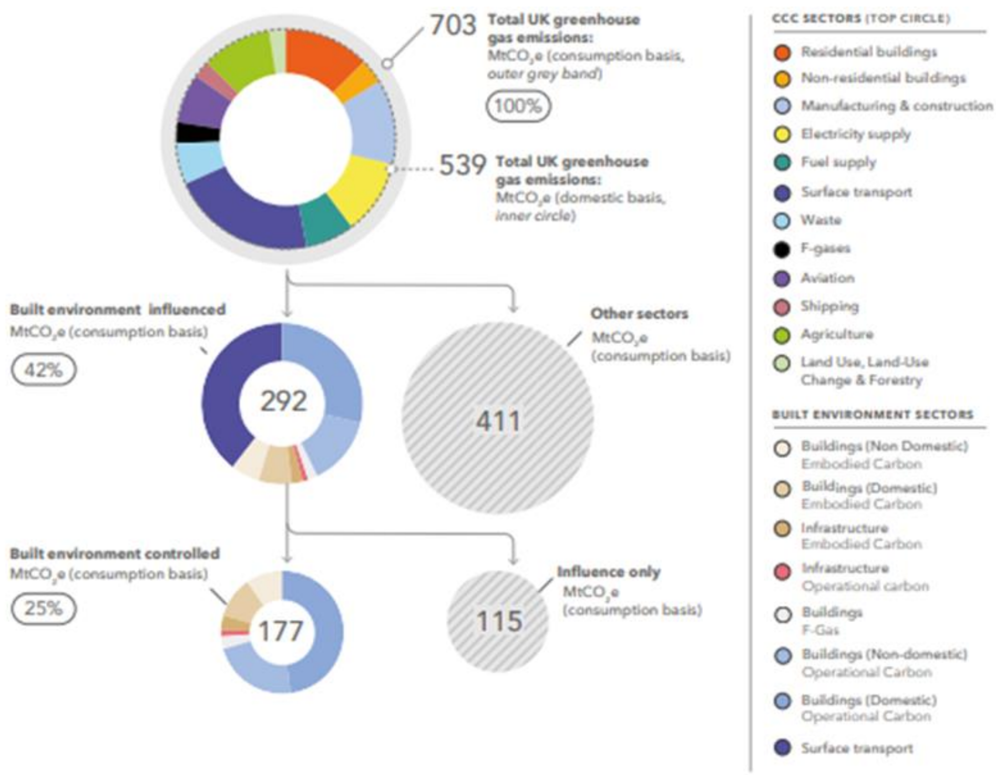


Figure 1: Total UK GHG Emissions (2018 CCC Data) showing proportion of Built Environment emissions.

In London 78% of emissions are generated from buildings (JLL, 2022). Specifically, within the Square Mile 65% emissions arises from all commercial building (GLA, 2020)

UK Policy framework

The UK has mandated a legally binding target to reach net zero by 2050 under the Climate Change Act 2008. At COP26 the Government committed to achieving 68% reductions in carbon emissions by 2030. Therefore, there is an urgent need for decarbonisation strategies and actions for energy and material efficiency improvements in buildings as well as adopting a circular economy model to the design of the built environment to truly achieve the national carbon reduction targets (EMF, 2021).

Despite this overarching policy there are insufficient policies and guidance on effective energy efficient retrofitting and net zero carbon strategies. As a result, the industry may struggle to reach net zero aspirations. Business as usual (BAU) projections, informed by the existing government policy framework, indicate that the sector will fall well short of 2050 net zero targets. Only a 60% reduction will be achieved compared to 1990 emission levels.

The UK's 2020 Energy white paper confirmed that the future trajectory for the non-residential minimum energy efficiency standards (MEES) will be EPC 'B' by 203010 (EPC 'C' by 2027), creating a clear regulatory driver for commercial building retrofits. However, in November 2023 the Government announced an intention to 'update' these minimum energy efficiency timelines to allow 'sufficient lead in time for landlords and the supply chain'. No further details of the Government's plans are yet available, but it appears that an increase in the minimum energy rating may be delayed.

In 2023 the Climate Change Committee (the independent body set up to advise and monitor the UK's progress in reducing greenhouse gas emissions) stated '*Progress remains broadly insufficient to ensure that the buildings sector reaches zero emissions by 2050'* and that the '*UK meeting its goals from 2030 onwards is now markedly less than it was in our previous assessment a year ago. A key opportunity to push a faster pace of progress has been missed.'*

Market drivers

The demand for sustainable urban development is growing in line with increased market expectations and potentially forthcoming regulations. Net zero and ESG targets have shifted investors' focus to more sustainable real estate properties. Regulation has become more stringent in recent years, with solutions requiring for more energy efficient buildings and electrification of heat and transport.

New buildings coming forward need to be equipped to deliver the energy performance levels required for net zero and should eliminate the need for future retrofitting, which would cause future occupant disruption, cost, and embodied carbon emissions. Opportunities exist in tackling embodied carbon from construction and refurbishment, which accounts for 20% of built environment emissions, as well as improve utilisation of existing building stock and reducing operational carbon by decreasing energy demand (UKGBC, 2021).

The UK has the potential to lead on innovation for net zero and more needs to be done to achieve this in the non-domestic sector. Policy and sector collaboration is key for addressing the UK's commitment for 'net zero by 2050' and Paris Climate Agreement to limiting global temperature increase of 1.5 ^{0}C.

The UK must increase and mobilise efforts, policy and capital towards low embodied carbon structures, greater energy efficiency buildings, retrofitting, enabling infrastructure for the electrification of heat and transport and installation of low carbon and renewable energy technologies.

Towards a Net Zero Built Environment

Over the last couple of decades, Building & Infrastructure emissions have dropped by 30% (against 1990 baseline). Most of the decline has been due to operational emissions and decarbonisation of the grid as opposed to improvement in energy efficiency or reducing 'embodied' carbon (UKGBC, 2021).

There are big opportunities to help push emissions down further by retrofitting existing buildings to reduce energy demand, reduce embodied carbon emissions (versus new build equivalents) and enable adaption to climate change.

80% of UK's 2050 building stock has already been built (UKGBC, 2021). There is therefore an urgent need to accelerate and focus the priority on decarbonising existing stock (but also to ensure new / updated stock is fit for purpose).

Whilst there are overarching policies on carbon performance there is little policy, especially over the long term, to enable improvements in emissions, both upfront embodied carbon (form the materials used) and in use.

In terms of in-use or operational emissions, grid decarbonisation relies heavily on electrification which will require significant grid upgrades and for buildings to become more energy efficient to maximise their effectiveness.

It is critical that the built environment increases its pace in adapting to the everchanging climatic environment to deliver low carbon and energy efficiency performance.

Retrofitting is necessary to enable millions of properties in the UK to become more resilient and address the risk of flooding and overheating that will be exacerbated by climate change, whilst also maintaining and maximising materials use to a highest value in the 'Circular Economy'.

In addition to focusing on reducing operational emissions, which has been given most attention up until recent years, there is now a recognition for an urgent need to move further and consider the whole lifecycle including embodied carbon. As operational carbon is reduced, embodied carbon will be the largest portion of carbon left unaddressed. A focus on the buildings' embodied is paramount as generally it has the biggest share of carbon across the buildings'/ developments' lifespan. Embodied carbon must be measured and reduced to effectively reach real net zero carbon target (WGBC, 2022).

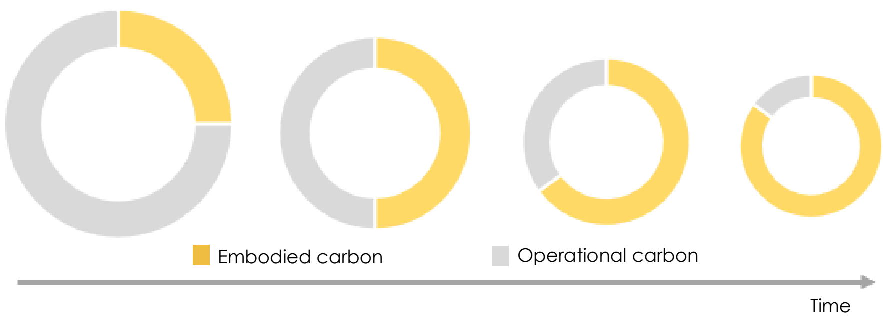


Figure 2: Illustration of growing importance of embodied carbon in time (as operational energy decarbonises)

The Government is yet to publish a consistent plan and guidance to support the built environment to transition towards a net zero future, and the commercial sector is seemingly leading the market to influence change along with local policies.

2. Net Zero Carbon Buildings & Whole Life Carbon

To understand the benefits of retrofit and refurbishment versus new build it is important to understand key terminology. This section aims to define different types of carbon emissions, what a net zero carbon building or development is and how this can be evaluated by a whole life carbon assessment (WLCA).

Introduction

Over the course of a development's lifetime, carbon emissions are emitted during construction, in use, maintenance and decommissioning stages. For simplicity, carbon emissions can be split into two categories (see Figure 3):

1. **Embodied Carbon**, the carbon emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.

2. **Operational Carbon**, carbon emissions emitted during the operational or in-use phase of a building through consumption of resources, fuel, and electricity.

The combination of both the above (plus the carbon from operational water use), is the Whole Life Carbon of the development.

Generally, most embodied carbon emissions take place at the beginning and end of developments lifespan. These can amount to between 35% and 70% of the whole life carbon emissions from buildings depending on the use class, as illustrated in figure 3 below, and other factors.

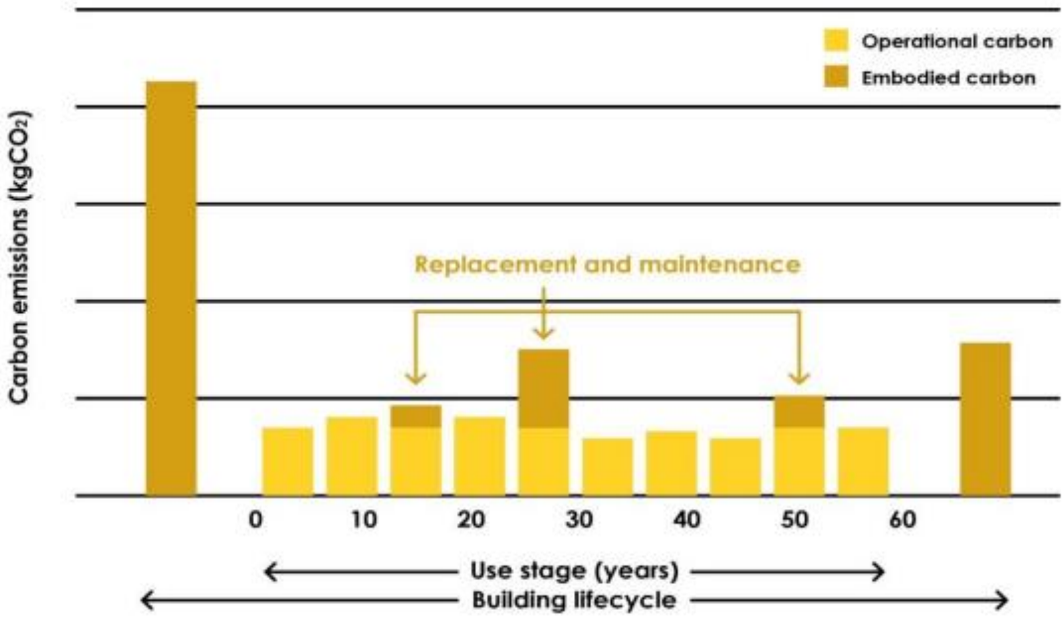


Figure 3: Indicative building lifecycle carbon emissions (operational and embodied) – note replacement phases and timings of them can vary considerably and are challenging to predict, they can in realty mount up over a buildings life time (they will also vary on use type).

In simple terms, embodied carbon emissions in new construction can outweigh operational emissions (especially as the grid decarbonises). Crucially, a major component of this embodied carbon is the upfront carbon associated with the initial construction process and hence reaching the atmosphere at the very outset. For this reason, retrofit / refurbishment projects which have the potential to retain foundations, superstructure and/or external elements of a building and effectively eliminate the need for intensive new materials, thus reducing the upfront carbon emissions when compared to a new build equivalent. It should be noted that replacement can mount up over a building's lifetime reference period (which is typically cited as 60 years in the UK). In the commercial sector this can be heavily dictated by tenancy length.

Whole Life Carbon Assessment (WLCA)

The embodied carbon emissions generated across a building's lifetime can be estimated by undertaking a whole life cycle assessment. This study provides an overview of the carbon footprint (in $kgCO_2$) associated with each of the building's lifecycle stages. As illustrated in Figure 4, the stages are namely:

- A1-A3: extraction and manufacturing,
- A4 materials transportation,
- A5 construction processes,
- B1-B5 replacement, repair, or maintenance of materials/building elements,
- B6-B7 operational carbon (energy and water consumption),
- C1-C4 end-of-life,
- D use in the next 'life cycle' recycling, reusing or disposal.

A carbon assessment can highlight the most carbon-intensive areas to focus on and help make informed carbon decisions in both design of the building and procurement material.

The scope of WLCA may differ across different Councils in the UK. The City of London Corporation follow the adoption of the London Plan WLCA guidance (Policy SI2) for all major development. Typically, this GLA approach applicable and a requirement of all referable schemes within the Greater London Authority (GLA) and follows the RICS WLCA professional Statement (RICS, 2017) with a few additional features / requirements.

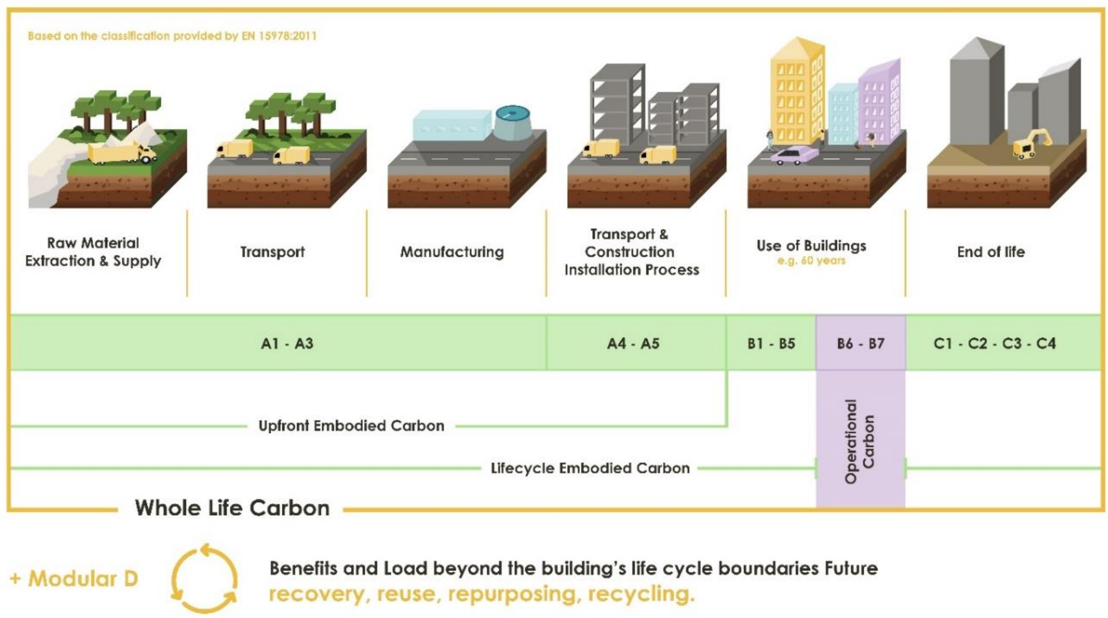


Figure 4: Whole Life Carbon Assessment Stages

Building Regulations Compliant building vs Ultra-low energy building

Embodied carbon occurs at different stages of the lifecycle, and this may differ across different building types, the scope of construction works, longevity and maintenance requirements. The London Energy Transformation Initiative (LETI) conducted a study utilising RICS data to demonstrate the differences of embodied carbon proportions between a new office building that is Building Regulations compliant against an ultra-low energy building. The embodied carbon resulted to be 33-34% against 72% respectively of WLC emissions for a new office building (embodied carbon including maintenance, repair, and replacement of components during the in-use phase).

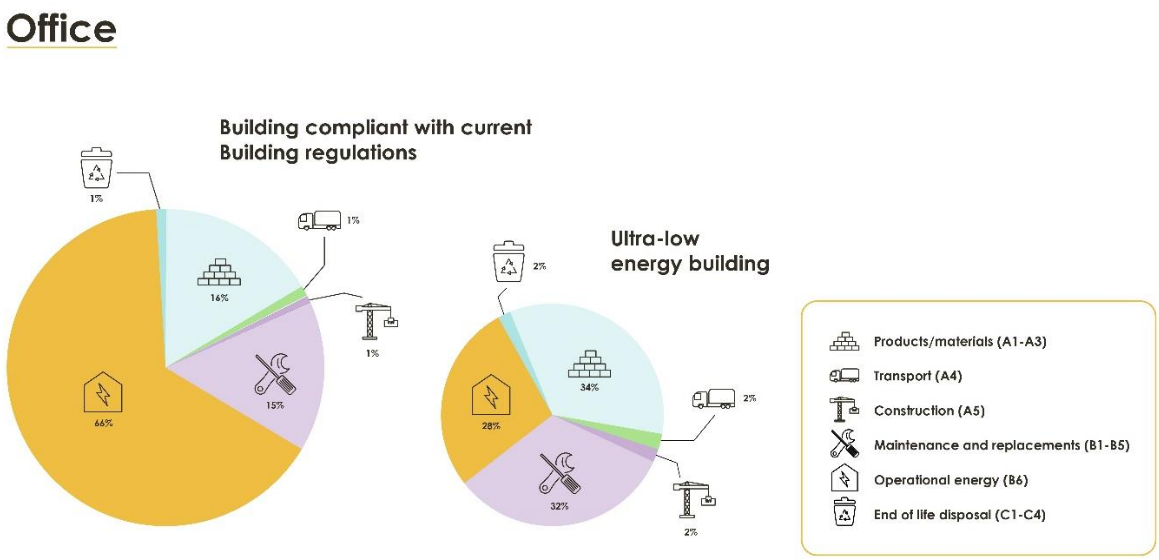
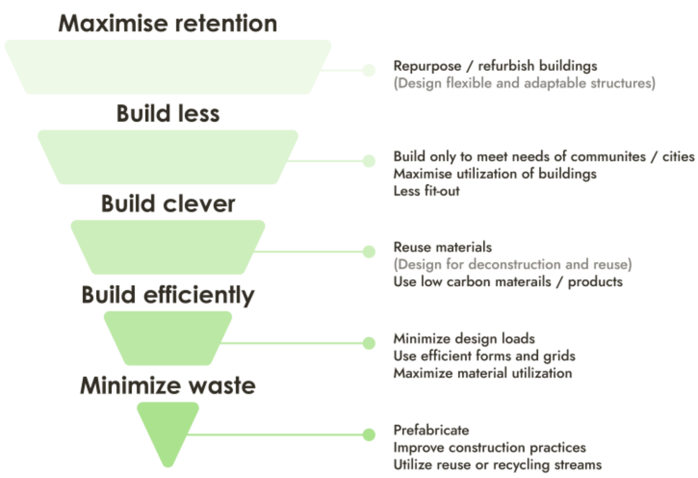


Figure 5: Building Regulations Compliant vs Ultra-low Energy New Office Building , LETI

Approximately half of the raw materials around the globe are utilised for the built environment. Therefore, reducing new build is the most effective way to save on resources and avoid high upfront embodied carbon emissions, despite new build having lower operational emissions. Arguably the most sustainable and less embodied carbon-intensive buildings are the ones which are retained and have their lifespan extended.



Embodied Carbon Reduction

Decarbonising construction and lifecycle processes through the design and procurement of buildings and infrastructure is required for achieving the net zero carbon ambition.

Embodied carbon is not currently part of building regulations in the UK, despite typically accounting for 35-70% of a building's lifetime emissions and up to 85% of a masterplan's total embodied carbon, including the spaces between buildings (i.e. hard surfaces, roads, parking areas) (UKGBC, 2022).

Lower embodied carbon emissions can be achieved by implementing measures such as material use optimisation and waste reduction; increased recycled content; low carbon alternatives to building elements; local sourcing (where lower carbon in production); low emission construction processes; and reducing the need for soil movements and reducing need for hard surfaces in the spaces between buildings. Optimising and reducing level of embodied carbon at masterplan-level should be tackled at early design stages with careful planning.

The use of mass timber construction, cement alternatives and reused steel beams for example are just some of the trends and innovations observed recently in the construction industry where developers are targeting low embodied carbon emissions. The industry is rapidly gathering, improving, and benchmarking data around greenhouse gas emissions from manufacturing, transportation, construction, and maintenance processes.

Embodied carbon emission targets up to Practical Completion (also known as the Product Stage or Upfront Carbon) have been established in industry publications (e.g. by LETI – see Figure 6, and the RIBA) and more recently in planning policy (GLA), to provide some industry direction around what best practice looks like today and how it needs to improve over time to limit global warming.

Figure 6: Example of embodied carbon targets trajectory for residential and non-residential buildings (Source: LETI)

Operational Carbon Reduction

Operational carbon derives primarily from operational (regulated and unregulated) energy use and operational water use. Typically, the aim of designing new build is on lowering the energy demand and consumption of the property.

For refurbishment projects, certain design solutions may not be possible depending on the scope and constraints of a project, the design focus may vary largely depending on specific building characteristics, context, changing (existing or future) operational uses.

Generally, the first rule to follow to reduce carbon emitted from energy consumption, is for passive design and efficiency. For years, the UK Building Regulations have applied standards on building fabric insulation and permeability, heat recovery and the energy efficiency ratings of buildings services.

A fabric first approach following a passive design is typically prioritised to reduce energy demand. This may include optimising orientation and glazing, improving thermal performance and reducing thermal bridging and heat losses. In addition, improving energy efficiency is a good policy solution, not only because of reduced carbon emissions, but it also offers additional benefits such as future resilience, affordability, comfort, energy security and innovation.

The retrofit interventions for commercial buildings vary across a spectrum from light to deep interventions, as illustrated in the figure below. The UKGBC defines these as:

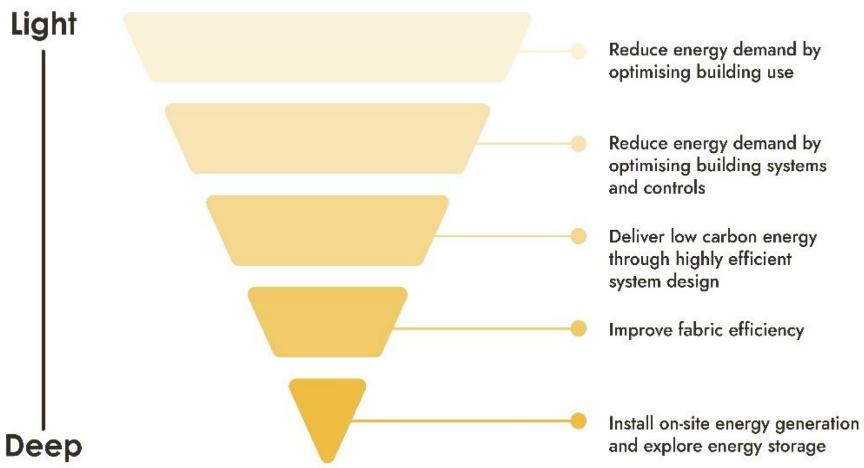


Figure 7: Hierarchy of retrofit interventions for commercial buildings, (adapted from: (UKGBC, 2021)*)*

Light Retrofit:

UKGBC (Delivering Net Zero: Key considerations or commercial retrofit, May 2022) defined light retrofit as having a "*focus on performance optimisation, basic remodelling, replacement, or adaptation of existing building elements which tend to focus on a single aspect or feature (lighting upgrades, optimisation of building controls and operation, etc)*." (UKGBC, 2021) These interventions are commonly effective when stakeholders/ occupiers are engaged and behavioural change is achieved, as this further increases the efficiency and may maintains good performance of the building. Light retrofit measures are consider 'easy wins' as these are less disruptive, less costly and may address in the short-term smaller energy reductions. These may form the basis of an initial retrofit approach ahead of a more in-depth, intrusive retrofit works.

Figure 8: Light Retrofit Measures (adapted from: (UKGBC, 2021)*)*

Deep Retrofit:

UKGBC (Delivering Net Zero: Key considerations or commercial retrofit, May 2022) defined deep retrofit as having a "*focus on significant works of size or scale that result in a fundamental change to the building structure and/or services. This can be represented as a collection of light retrofit enhancements or individually disruptive measures, such as major plant replacement*." (UKGBC, 2021)

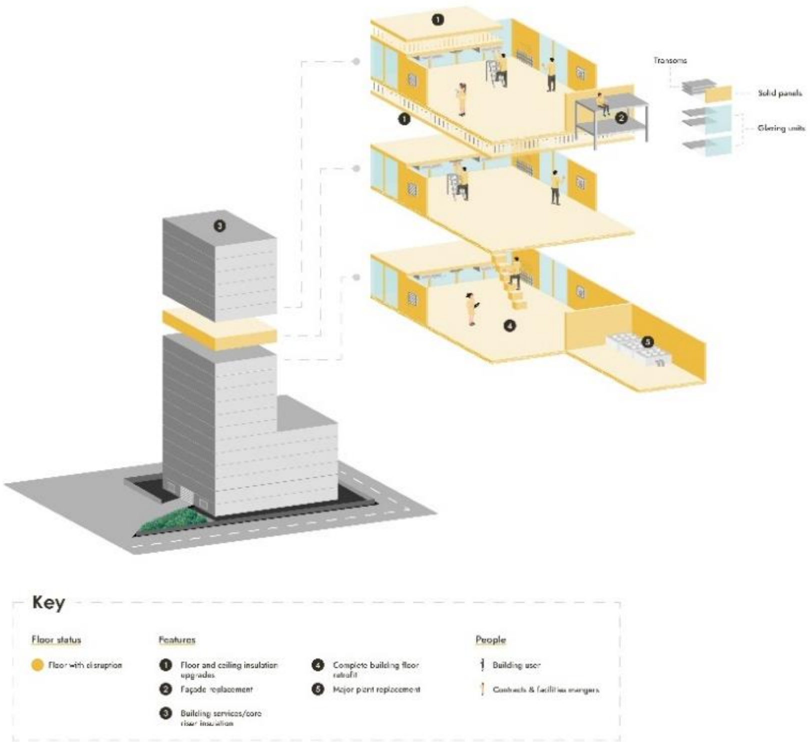


Figure 8: Deep Retrofit Measures (adapted from: (UKGBC, 2021)*)*

3. Current Policy, Regulation and Market Trends

Carbon and Building Retrofit/Redevelopment in Planning Policy

This section highlights some of the key policies focused on sustainable design and construction across a few major countries and cities around the world. Table 1 gives an overview of the key policies related to energy efficiency in buildings, decarbonisation, and carbon neutral buildings. An in-depth policy review can be found in the White Paper "*International Regulatory & Policy Review on Carbon Emissions within the Built Environment*". There is a vast quantity of requirements and polices across various nations. These have been developing at pace over the last few years, however there is also an enormous variation in the approaches taken to reducing carbon. Most policies seem to focus on operational energy, with few looking at the carbon impact of materials. It could be observed that the area of embodied carbon is beginning to become part of policy, due to its known adverse impacts at scale.

Policies are quite varied and use a variety of methods to achieve lower carbon objectives, often factoring in consideration of regional and local issues. Most policies focus on macro decarbonisation strategies with a focus on emissions form energy consumption.

Where specifically mentioned in policy, low carbon refurbishment / retrofit or similar is an encouraged option rather than a mandated one, yet no real metrics are attributed to it.

In addition the EU are looking implement a suite of forthcoming polices, including mandating of Digital Product Passports (under the Proposal for Eco-design for Sustainable Products Regulations) and a declaration of performance such as an Environmental Product Declarations (EPD) as part of the review of the Construction Product Regulations (European Commission, 2022). The White Paper summarises all policies related to energy and carbon falling under the EU remit. The proposed revision of the Energy Performance of Buildings Directive (European Parliment, 2023) is proposing that *'The life-cycle Global Warming Potential (GWP) of new buildings will have to be calculated as of 2030 in accordance with the Level(s) framework, informing on whole life-cycle carbon emissions (2027 for large buildings)'*, the methodology is yet to be defined, but broadly will require LCA to EN 15978 and encourages the use of national tools. Should this be implemented, this will accelerate policy making in EU nations by requiring policies and reduction targets of WLC GHGs in member states.

Policy developments are moving at pace because of drivers such as climate change. Polices are currently more weighted to predicted energy emissions, energy in use, and or energy efficiency. Policies in terms of embodied carbon are starting to appear in various forms, and this trend may continue as countries try to transpose their legally binding carbon commitments into policy and aim to achieve their carbon reduction goals. The UK has been a leader for some time in this area, but more recently it appears to be lagging as well as lacking in long term vision.

There are also several building certification standards that include energy and carbon performance and associated metrics. These have not been reviewed as part of this exercise. BREEAM version 6 for instance does not mandate the implementation of the lowest (or even a lower carbon) carbon options choice, yet the Mat 01 credit makes up approximately 10% of the total scheme score.

As part of the policy outlook, there is clear that short term policy goals will not solve the problem, as it needs longer term thinking, with clearer and consistent action. Policies also need to be quicker to react to fast changing data and approaches for carbon calculations. Without further policy, until the market matures (UK approach appears to be market led) and there is further evidence of higher value for more sustainable buildings, it will be challenging for the UK to achieve carbon emission goals, let alone be a leader on the global stage.

Net Zero Carbon Buildings

At the time of writing of this topic paper, *'a UK Net Zero Carbon Building Standard'* is being drafted in a joint initiative between BBP, BRE, the Carbon Trust, CIBSE, IstructE, LETI, RIBA, RICS, and UKGBC. Whilst significant progress has been made in defining what 'net zero' means for buildings since 2019, there is a demand for a single, consulted, and national methodology. The aim is to produce a standard which enables the industry to robustly prove their built assets are net zero carbon in line with our national climate targets.

The most robust guidance produced to date is the UKGBC 'Net Zero Carbon: A Framework Definition' (April 2019) and its subsequent 'Renewable Energy Procurement and Carbon Offsetting: Guidance for Net Zero Carbon Buildings' (April 2021).

The Net Zero Carbon framework sets out definitions and principles around two approaches of equal importance, namely:

- **Net zero carbon – Construction:**
  "When the amount of carbon emissions associated with a building's product and construction stages up to practical completion is zero or negative, through the use of offsets or the net export of on-site renewable energy."
    - Requires a WLCA to be undertaken (module A) with a strategy to effectively abate embodied carbon emissions arising from product and construction stages, as far as practical. Only secondly should the remaining emissions be offset at practical completion.

- **Net zero carbon – Operational:**
  "When the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset."
    - Requires the calculation of regulated, operational energy consumption and a strategy to abate operational emissions through reduced energy demand, fabric first approach, energy efficient electric-led heating solutions, and on-site renewable energy generation. Off-site renewable energy can be considered if additionality is demonstrated. The residual emissions that cannot be reduced should be offset via a recognised framework and disclosure.

- **Net zero carbon – Whole life:**
  "When the amount of carbon emissions associated with a building's embodied AND operational impacts over the life of the building, including its disposal, are zero or negative."
  - Requires a WLCA that covers modules A-D with a strategy that reduces both embodied and operational carbon where practically feasible across all lifespan stages. Only as a last resort, should residual emissions be offset.

	New Buildings / Major Renovations	Buildings in Operation
1. Establish Net Zero Carbon scope	Construction	Operational
2. Reduce construction impacts	✓	
3. Reduce operational energy use	D	✓
4. Increase renewable energy supply	D	✓
5. Offset any remaining carbon	✓	✓
Public disclosure	✓	✓

***D**: New buildings and major refurbishments targeting net zero carbon for construction should be designed to achieve net zero carbon for operational energy by considering these principles.*

Figure 9: Steps to Achieving a Net Zero Carbon Building, UKGBC 'Net Zero Carbon: Framework Definition' (April 2019)

The framework establishes the steps for reducing emissions, offsetting the remaining carbon and public disclosure. It is worth noting that limitations exist when calculating emissions related to the maintenance, repair, and end-of-life parts of a building's lifecycle.

Note on 'True Zero Carbon': The "net" element in NZC essentially treats CO_2 emissions like a balance. If, you emit 1,000 tonnes of CO_2 from construction activity, for example, you can account for them by buying 1,000 tonnes of high value carbon offsets. Despite the definitions of NZC focusing on offsetting as a last resort, the 'net' element is increasingly viewed as insufficient because the offsets don't replace the emissions generated. The term 'True Zero Carbon' or "Zero Carbon" therefore describes a situation where no carbon emissions are being produced from a product or service.

International Carbon Buildings Policies

Several policies have been reviewed and summarised in Table 1. It is not a comprehensive list but shows the general themes and approaches to reducing carbon in policy and some wider initiatives.

The review in Table 1 has identified that there are different approaches around the globe to the same carbon emissions problem. More policy and legislation is emerging to address this issue at national and local level. The UK appears to be lagging in policy terms compared to other nations and does not appear to have a clear strategy to address carbon reduction in the industry. Most of the action is being undertaken by the voluntary and commercial groups (i.e. LETI, RICS). It is worth noting that there is lack of consistency and standardisation at a global scale. Therefore, the methodologies, scopes and data metrics vary across nations, despite having very similar objectives to reduce carbon emissions.

Table 1: Summary of Carbon-related policies at national scale globally (Detailed version of this table available in White Paper 'International Regulatory & Policy Review on Carbon Emissions within the Built Environment')

Location	Policy Level	Policies Titles	Summary of the Standards / Requirements
United States	**State/national level** ***New York State (NYS)***	• **2020 Energy Conservation Construction Code of New York State (ECCCNYS)** [1] • **NYStretch Energy Code (2020)** [2]	**(1)** Establishing minimum requirements for energy-efficient buildings, encouraging refurbishments and retrofits. **(2)** Available for voluntary adoption by local governments as a more stringent local energy code. It aims to improve the ECCCNYS's efficacy by roughly 10% and is a model for New York jurisdictions to use to meet their energy and climate goals.
	City level guiding visions ***New York City (NYC)***	• **80x50** [1] • **Mayor's NYC Green New Deal** [2] • **NYC Benchmarking Law (Local Law 133 of 2016)** [3] • **The Climate Mobilization Act** [4] • **Executive Order 23: Clean Construction (2022)** [5] • **New York City Energy Conservation Code (NYCECC)** [6]	**(1)** Aiming to achieve at least 80% reduction on GHG emissions by 2050. **(2)** Bringing new legislation and concrete action at the city level for *a nearly 30% additional reduction in emissions by 2030.* **(3)** Mandating owners of large buildings must annually measure their energy & water consumption through benchmarking and standardises this process by requiring utilising Environmental Protection Agency's (EPA) online benchmarking tool, Energy Star Portfolio Manager. **(4)** A package of legislation to reduce greenhouse gas emissions from and improve energy efficiency for certain buildings in NYC. **(5)** Emphasising to reduce embodied carbon of building materials and construction equipment and strategies. Within this scope, it requires the development of guidelines of procurement of low-carbon concrete. **(6)** More stringent than the state level energy conservation code.

Location	Policy Level	Policies Titles	Summary of the Standards / Requirements
	California	• 2022 California Green Building Standards Code (CALGreen), Part 11, Title 24	**(1)** Inclusion of a reserved mandatory section over the existing voluntary measures, for the deconstruction and reuse of existing structures measuring 50,000 sqft, as well as stricter requirements for Tier 1 (150,000 sqft project aggregate) and Tier 2 (250,000 sqft project aggregate). **(2)** Establishing a minimum requirement for building reuse, including at least 45% of structure and enclosure. **(3)** Requiring mandatory Whole Building Life Cycle Assessment (WBLCA), with the intent of indirectly conserving energy and resources. The WBLCA conducted should achieve at least a 10% improvement in environmental impact for specific building components. **(4)** A prescriptive approach is mandated, specifying the materials that meet specified emission limits, including the specification for concrete.
	External initiatives	• Environmental Protection Agency (EPA) Energy Star Portfolio Manager (ESPM) [1]	**(1)** An online and interactive resource management tool that enables the users to benchmark the energy use of any type of building.
Hong Kong Special Administrative Region of the People's Republic of China	National level	• Buildings Energy Efficiency Ordinance (BEEO) [1] • Building Energy Code (BEC) and Energy Audit Code (EAC) [2] • Energy Saving Plan for Hong Kong's Built Environment 2015~2025+ [3]	**(1)** Promoting building energy efficiency by focusing on building services installation. **(2)** Setting out the technical guidance and details in respect of the minimum energy efficiency requirements governing the building services installations defined in the ordinance. **(3)** Aiming to achieve an energy intensity reduction of 40% by 2025 using 2005 as the base.
	External initiatives	• The Hong Kong Green Building Council (HKGBC) Benchmarking & Energy Saving Tool (HK BEST) [1] • HKGBC ACT-Shop Program [2] • HKGBC BEAM Plus scheme (New Buildings & Existing Buildings and Interiors) [3] • RCx Retro-commissioning [4]	**(1)** Promoting better energy performance for commercial and office buildings. Providing a comparison practice and identify potential energy improvement measures. **(2)** Focussing on the enhancement of the energy performance of the existing buildings. **(3)** Offers independent assessment of building sustainability performance. **(4)** The program is developed to timely check the energy performance of an existing building to identify energy saving potentials for operational improvement.
Japan	National level	• Building Energy Efficiency Act (2016) [1] • Building Energy Conservation Act (2022) [2]	**(1)** Introducing regulatory measures for mandatory compliance with energy efficiency standards for large-scale non-residential buildings. **(2)** Mandating all new houses and buildings from 2025 to comply with upgraded energy efficiency standards.
	City level guiding visions *Tokyo*	• Renewable Energy Installation Standards [1] • Tokyo Cap-and-Trade Program (2010) [2]	**(1)** Require the installation of PVs on buildings of a certain size (or larger) **(2)** Within the city's sustainable building policy, it was developed for existing large facilities.

Location	Policy Level	Policies Titles	Summary of the Standards / Requirements
		• **Carbon Reduction Reporting Program (2010)** [3] • **Green Building Program (2002)** [4]	**(3)** It is required for small and medium facilities. Operational carbon reporting became mandatory in 2014. **(4)** It focusses on the environmental performance of new buildings (reducing energy consumption, using eco-friendly materials).
	External initiatives	• **Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) for Existing Buildings & CASBEE for Renovation** [1]	**(1)** A green building rating system assessing the environmental efficiency of buildings, evaluating materials and equipment that save energy or achieve smaller environmental loads.
The European Union	**European (EU) level**	• **The European Green Deal (2019)** [1] • **2030 Climate Target Plan (2020)** [2] • **A Renovation Wave for Europe (2020)** [3] • **Level(s) framework** [4] • **The European Climate Law (2021)** [5] • **The Fit for 55' Package (2021)** [6] • **The Energy Performance of Buildings Directive (EPBD) (2021)** [7]	**(1)** A package of policy initiatives aiming to set the EU on the path to a green transition, with an ultimate goal of reaching climate neutrality by 2050. **(2)** It was proposed to change the current emissions reduction pathway to reach climate neutrality by 2050. **(3)** Aiming at least doubling the annual energy renovation rate of buildings by 2030 (based on an annual renovation rate of 1% in 2020). **(4)** The framework was developed to be as a guidance on key areas of sustainability and how to measure them. It also promotes the use of Life Cycle Assessment (LCA) and Life Cycle Costing (LCC). **(5)** The framework established for achieving climate neutrality and amending regulations (enacting the targets stated in the Climate Target Plan into law). **(6)** Aiming to modernise existing legislation in line with the EU's 2030 climate target and introduce new policy measures to help bring about the transformative changes. **(7)** The latest revision of the directive sets out how the EU can achieve a zero-emission and fully decarbonised building stock by 2050, by increasing the rate of renovation for the worst-performing buildings in each EU Member State.
	National level	• **RT par élément (Regulation by Building Component) (2007 & 2018 & 2023)** [1] • **RT globale (Global Thermal Regulation) (2008 & 2018 & 2023)** [2] • **RT travaux embarqués (Regulation for embedded works)** [3] • **RE2020** [4] • **Low Energy Consumption Renovation - BBC renovation (2023)** [5] • **E+C- (Positive energy, carbon reduction) Scheme** [6]	**(1)** An existing regulation applies to existing buildings (residential or not) related to the thermal characteristics and energy performance of them. **(2)** An existing regulation applies to existing buildings with a surface area of more than 1,000 m² is subject to major renovation work (residential and tertiary buildings). **(3)** Relating to energy transition, an obligation to implement thermal insulation during major building renovation works, such as façade renovation, roofing, or the transformation of garages or attics into habitable rooms.

Location	Policy Level	Policies Titles	Summary of the Standards / Requirements
France			**(4)** A national regulation for all new building. It is the combination of the energy, the carbon criteria (embodied) in buildings and the summer comfort. Embodied carbon limits given for dwellings, multi-residential buildings, offices, and educational buildings. **(5)** Demanding conventional energy consumption of less than 110 kWhEP/m²/year and induced greenhouse gas emissions of less than 11 $kgCO_{2\,eq}$/m²/year for residential buildings **(6)** A pilot programme prepared by the government for new constructions (residential and tertiary). It is based on a new calculation method and new indicators to assess not only the energy performance but also the environmental performance of buildings. It prefigures the RE 2020.
	City level guiding visions *Paris*	• **The Ile-de-France Region Territorial Energy Renovation Platform (Plateforme Territoriale de Rénovation Énergétique – PTRE) (2019)** [1] • **The City of Paris Plan Local d'Urbanisme' (PLU)** [2] • **City Of Paris, Paris Climate Action Plan (2018)** [3]	**(1)** Aiming to bring together all the players to encourage the emergence of a market. **(2)** A new local plan promoting more environmentally friendly construction are in the city. Introducing a height limit for new buildings of 37 metres or 12 storeys. **(3)** Aiming to achieve the goal of zero emissions in Paris: halving the energy consumption in Paris and obtaining its energy from 100% renewable sources.
	External initiatives	• **The Paris Climate Agency (APC)** ○ CoachCopro [1]	**(1)** Aiming to accelerate the massification of energy renovations of residential condominiums on the Parisian territory and implement comprehensive interventions with high environmental value.
The Netherlands	**National level**	• **The Building Decree 2012** [1] • **The Dutch Climate Act (2019)** [2] • **The National Climate Agreement (2019)** [3] • **Energy Performance Standard for Buildings (NEN 7120) (2021)** [4]	**(1)** Containing the technical regulations that represent the minimum requirements (incl. energy efficiency) for all structures it the country, also mandating embodied carbon reporting for new residential and office buildings over 100 m². **(2)** Aiming to 49% reduction in GHG emissions by 2030, compared to 1990 levels, and a 95% reduction by 2050. **(3)** Containing a package of measures and agreements with the sectors on what they will do to help achieve these climate goals. **(4)** Also referred as EPG, setting minimum energy performance for new buildings. Mandatory for all new buildings and for large renovations.
	City level guiding visions *Amsterdam*	• **The Amsterdam Climate Neutral Roadmap 2050 (2020)** [1] • **The Amsterdam's Circular Strategy 2020-2025** [2]	**(1)** Setting out a long-term vision of the energy transition in Amsterdam, and the actions to be taken in the short term. It aims the city to be climate-neutral by 2030. **(2)** The strategy aims to significantly reduce the use of new raw materials and preserve valuable raw materials.

Location	Policy Level	Policies Titles	Summary of the Standards / Requirements
	External initiatives	• **Dutch Green Building Council (DGBC), The Paris Proof Commitment: Delta Plan for Sustainable Renovation** [1] • **DGBC, The Paris Proof Methodology (2019)** [2] • **The Netherlands Enterprise Agency (RVO), Energy Saving Monitor for the Built Environment (2017)** [3]	**(1)** A nationwide plan aiming for buildings to be extensively energy efficient. **(2)** Introduced as a common sustainable goal for urban buildings to achieve the Paris climate accords by accelerating to carry out major renovations, measuring actual consumption. **(3)** An online tool that enables building owners to explore investment costs, annual savings, payback times and carbon savings for different options to meet the minimum energy performance standard.
Germany	**National level**	• **National Action Plan on Energy Efficiency (NAPE) (2014)** [1] • **The Energy Saving Ordinance (EnEV, 2017)**[2] • **Buildings Energy Act (GEG) (2020)** [3] • **The Assessment System for Sustainable Building (BNB)** [4]	**(1)** Aiming to achieve 20% reduction in primary energy consumption by 2020 compared with 2008 and halve it by 2050. **(2)** Setting minimum requirements for the quality of energy performance in the envelopes and technical installations of new buildings and larger-scale renovations of existing buildings **(3)** Introducing mandatory standards for energy performance of new construction, existing building stock and the use of renewable energy for heating and cooling buildings. **(4)** A novel integral quantitative assessment method for office, administrative, teaching and laboratory buildings completing the guide to sustainable construction. Whole-building LCA is required for new federal building projects as part of a green building rating program specific to government projects.
	City level guiding visions *Berlin*	• **The Berlin Climate Protection and Energy Transition Act (EWG Bln) (2021)**[1] • **Berlin Energy and Climate Protection Program 2030 (BEK 2030) (2019)** [2] • **diBEK** [3] • **The Berlin ImpulsE Programme** [4]	**(1)** Setting a legal framework for ambitious binding climate protection goals to become climate-neutral by 2045 at the latest with at least 70% by 2030 and at least 90% by 2040 (compared to 1990's levels). **(2)** Presenting an integrated approach to climate change mitigation by defining a range of measures that can contribute the city's decarbonisation. **(3)** The digital monitoring and information system of the BEK 2030. It creates transparency on data and promoting continuous monitoring and evaluation. **(4)** The central information and education platform on energy efficiency. One of the key focus areas of the programme is the mobilisation of energy savings potential in existing buildings.
	External initiatives	• **German Sustainable Building Council (DGNB), Framework for Carbon Neutral Buildings and Sites (2020)** [1] • **Passivhaus Institut,** EnerPHit [2]	**(1)** Presenting a climate action roadmap and a framework for CO_2 reporting with a structured and transparent format. **(2)** The Passive House Certificate for retrofits
	National level	• **The Danish Parliament, The Climate Act (2020)** [1]	**(1)** A legal goal to reduce its CO_2 emissions by 70% by 2030, compared to 1990's levels, and climate neutrality by 2050 at the latest.

Location	Policy Level	Policies Titles	Summary of the Standards / Requirements
Denmark		• **The Danish Building Code 2018 (BR18)** [2] • **The Danish National Strategy for Sustainable Construction (2021)** [3] • **The Danish Government 2020 Green Housing Agreement (2020)** [4]	**(2)** The minimum requirements/regulations for the building construction to ensure they achieve minimum standards in fire, safety & health terms, and energy efficiency; applicable for new construction and renovation works. **(3)** The Government's sectoral action plan for the building and construction sector; it sets out tightening of targets combining both embodied carbon and operational carbon emissions for buildings. **(4)** Supporting the launch of comprehensive refurbishment measures in the council housing sector.
	City level guiding visions *Copenhagen*	• **The Copenhagen 2025 Climate Plan (2012)**[1]	**(1)** A holistic plan for Copenhagen's decarbonisation journey (carbon neutral by 2025).
	External initiatives	• **Københavns Kommune, Energispring (2020)**	**(1)** It is a partnership between large building owners, administrators, and interest organizations in Copenhagen. The main aim is reducing energy consumption.
UK	**National level**	• **The Climate Change Act 2008, 2050 Target Amendment (2019)** [1] • **Industrial Decarbonisation Strategy (2021)** [2] • **Net Zero Strategy: Build Back Greener (2021)** [3] • **Future Building Standard 2025** *(still emerging)* [4] • **The Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government** Approved Document Part L1B&L2B (2021) [5] • **The Department for Business, Energy, and Industrial Strategy (BEIS)** The Non-Domestic Private Rented Property Minimum Standards (2021) [6] • **BSI PAS 2035/2030:2019+A1:2022 (2022)** [7]	**(1)** A legally binding commitment of the UK government to reduce national carbon emissions. With the amendment in 2019, the net UK carbon account for the year 2050 must be lower than the 1990 baseline is increased from 80% to 100%. **(2)** Covering the full range of UK industry sectors, it sets out how the UK can have a thriving industrial sector aligned with the net zero target, without pushing emissions and business abroad. **(3)** It sets out policies and proposals for decarbonising all sectors of the UK economy to meet our net zero target by 2050. It is also the main climate change policy document of the UK. **(4)** Expected to come in to effect from 2025, it aims to deliver energy efficient non-domestic buildings by using low carbon heating. Primary focus is new buildings, but it includes policy regarding works to be undertaken on existing buildings. **(5)** An uplift to the energy efficiency standards for existing and new non-domestic buildings. It came into force in June 2022. **(6)** A future regulatory target for the non-domestic buildings to have a minimum rating of EPC C by 2027 and EPC B by 2030. **(7)** It presents a framework of new and existing standards on how to conduct effective energy retrofits of existing domestic buildings.
	City level guiding visions *London*	• **The City of London Corporation** Climate Action Strategy 2020-2027 (2020) [1]	**(1)** It sets out the City of London Corporation's Climate Action Strategy from 2020 onwards. It highlights the climate emergency and outlines the approach of the corporation for the first six years.

Location	Policy Level	Policies Titles	Summary of the Standards / Requirements
		• **The London Plan 2021: Greater London Authority (GLA) policy [2]** • **The City of London Corporation Carbon Options Guidance (COG) Planning Advice Note (March, 2023) [3]**	**(2)** Sets out Planning Policies for referable schemes. The Policies related to carbon and retrofit include: Policy SI 2 Minimising Greenhouse Gas Emissions, Policy SI 7 Reducing Waste and Supporting the Circular Economy. There are also associated guidance documents that set out clear policy deliverables to help achieve these aims. **(3)** The guidance is designed to provide consistency for applicants that conducting WLC optioneering evaluations at early project stages. This is designed to encourage and maximise reuse, where possible. A toolkit accompanies this guidance to enable a consistent format for reporting to be established. It also requires third party review of the options.
	External and Emerging initiatives	• **No direct national policy** • **Royal Institution of Chartered Surveyors (RICS)** Whole Life Carbon Assessment for the Built Environment, 2nd Edition (2023) [1] • **Low Energy Transformation Initiative (LETI)** Climate Emergency Retrofit Guide (2021) [2] • **NABERS UK [3]**	**(1)** The 1st version was prepared to be a world-leading standard for consistent and accurate carbon measurement in the built environment and is used as the basis of the GLA's WLC Guidance March 2022. The 2nd version covers all buildings and infrastructure throughout the built environment life cycle. **(2)** It sets practical advice on getting existing domestic buildings to achieve net-zero emission targets. Currently, LETI has not published a guidance for non-domestic buildings yet; however, LETI is planning to publish this guidance in the future. **(3)** Operational energy performance rating based on in-use performance that can be used for meeting the GLA energy requirements under the 'Be Seen' energy policy, which requires major developments monitor and report actual energy performance.

Global Context – Current energy performance of buildings

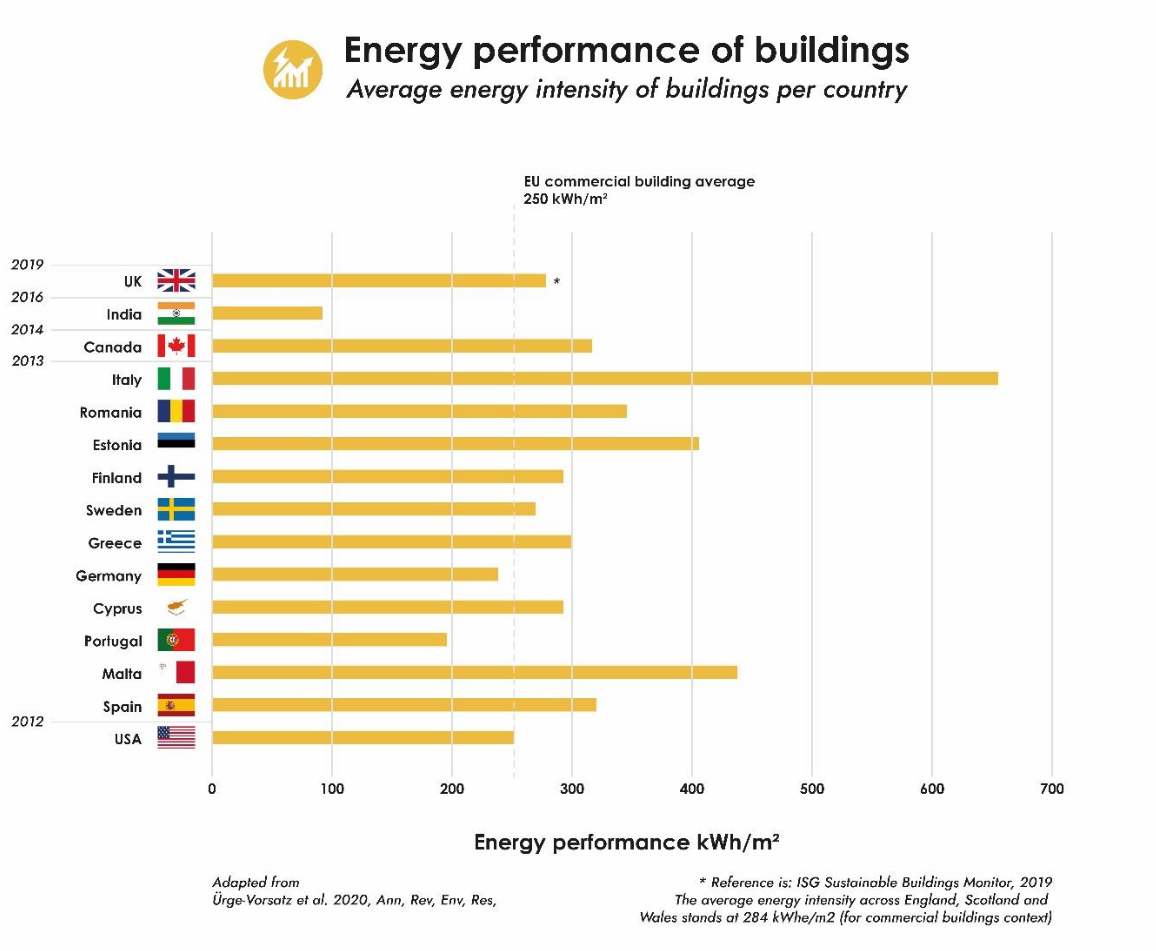


Figure 10: Energy Performance of Buildings, source: Urge-Vorsatz et al., 2020.

Buildings around the world vary in energy performance, with the majority of commercial buildings across countries ranging between 180-300 kWh/m²/yr (see Figure 10). The variations of average energy intensity relate to local climate conditions, heating and cooling requirements and local building standards. In comparison, the UK has an average of energy intensity of 284 kWh/m²/yr for commercial buildings (ISG, 2019) (Construction Management, 2021), above the EU average.

In the UK the Better Buildings Partnership Real Estate Environment Benchmark (REEB) data set (Better Buildings Partnership, 2023) have also analysed member data on Energy Use Intensity. Its 2022 Insights report used pre pandemic data from 2019-2020, for 1,275 commercial properties. The 2020 environmental benchmarks show a typical practice air-conditioned property would have a EUI of 234 kWhelec-eq/m² NLA/yr with good practice being 167 kWh elec-eq/m² NLA/yr. Current design targets are trying to achieve considerably lower EUIs of 90-70 kWh elec-eq/m² NLA/yr, which is a significant reduction based on the above data.

REEB 2020 Energy Benchmarks for Offices Chart (Better Buildings Partnership, 2023)

England Policy & Regulation

Current policy in England is focused mainly on regulated energy performance and associated carbon emissions. This is based on design assumptions and does not reflect the real-world emissions from energy consumption. Consultation on operational energy reporting (Introducing a performance-based policy framework in large commercial and industrial buildings, March 2021) has taken place, however like MEES this closed in June 2021 and no summary outputs, or indication of requirements has been provided. This needs to be addressed urgently, design teams are quite disconnected from performance in reality.

National policy for non-public authority buildings only accounts for carbon emissions from regulated energy emissions through building regulations Approved Document Part L. Part L is based on a set of standardised assumptions and does not account for unregulated energy emissions and does not account for actual energy use, hence the misalignment between predicted and in use emissions.

Emissions arising from other areas of a building's lifecycle such as the embodied carbon from construction, demolition, and decommissioning are not included. Assessment focused on embodied carbon emissions is voluntary and not covered in most planning policies (except in some local planning requirements such as in London). There is an urgent need for consistent policy to require consideration of emissions across a buildings entire lifecycle and therefore taking full accountability of the environmental impact arising from construction and in use.

The National Planning Policy Framework (NPPF) 2021, Chapter 14 Meeting the challenge of climate change, flooding, and coastal change Paragraph 152 states that: "*The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure*." However, more guidance on what approach to take is required in order to achieve this.

A summary of the adopted and emerging carbon-related regulation in England is outlined in the Table 2.

Table 2: *Summary of carbon-related policies in England*

Area	Adopted Policies/Regulation at National level in England	Emerging Policy** at national level in England	Local Policies & Commitments in England
Refurbishment Specific Related	None specifically although NPFF wording does want planning system to '*...shape places in ways that contribute to radical reductions in greenhouse gas emissions.*' NPPF is a framework interpreted regionally and locally.	None at the current time that relate to specifically requiring refurbishment	Determined by Local Authority / Region / Borough None at the current time that relate to specifically requiring refurbishment.
Operational Energy & Carbon	Part L (Interim uplift 2021) Minimum Energy Efficiency Standards (MEES)- EPC min. E	The Future Buildings Standard (2025) MEES update to minimum EPC B by 2030. Performance based framework for large commercial buildings requiring annual	Determined by Local Authority / Region / Borough Often based on a percentage improvement over Part L Regulated Target emissions rating. Some local LZCT percentage generation targets

Area	Adopted Policies/Regulation at National level in England	Emerging Policy** at national level in England	Local Policies & Commitments in England
		performance-based ratings for commercial buildings over 1,000m^2	Some policies require reporting of energy in Use (i.e. the GLA 'be seen' requirements) Some London boroughs have in use reporting requirements for first few years of occupation Public Authority building must have a Display Energy Certificate (DEC) if it meets certain thresholds. This is based on energy in use but is not monitored yearly and is valid for 10 years.
Embodied Carbon	None	Part Z proposal for Embodied carbon in Building Regulations in very early stages. Embodied Carbon Research Project – CPD4124072 to review the practical, technical, and economic impacts of carrying out whole life carbon assessments	Determined by Local Authority / Region / Borough A few Local Authorities require WLC reporting as part of planning, however scopes can be varied an inconsistent or even not defined. London is covered by the GLA criteria which several boroughs have adopted for non GLA referable applications
In Use Carbon Emissions reporting	UK net Zero by 2050.* Streamlined Energy and Carbon Reporting (SCER)		Determined by Local Authority / Region / Borough

*The Climate Change Act commits the UK government by law to reducing greenhouse gas emissions by at least 100% of 1990 levels (net zero) by 2050.

**Potential future policy, based on consultation or industry groups:

MEES (Uk Gov, March 2021): https://www.gov.uk/government/consultations/non-domestic-private-rented-sector-minimum-energy-efficiency-standards-epc-b-implementation

A Performance-Based Policy Framework in large Commercial and Industrial Buildings in England and Wales (UK GOV 2021) https://www.gov.uk/government/consultations/introducing-a-performance-based-policy-framework-in-large-commercial-and-industrial-buildings

https://part-z.uk/ - Proposal to Parliament for

Uk Government research study: https://www.gov.uk/guidance/live-research-studies-commissioned-by-dluhc-january-2023-onwards

In terms of carbon monitoring, there are piece of legislation such as the Streamline Energy and Carbon Reporting (SCER) this requires businesses to include their energy use (including electricity, gas, and transport) emissions and an intensity metric in their annual Directors' report for financial years beginning on or after 1 April 2019. This does not provide the exact procedure for measurement, and there are no obligations to reduce carbon emissions, although a narrative on energy efficiency measures must be disclosed every financial year. The SCER covers scope 1 and 2 GHG emissions in line with the GHG Protocol. Reporting scope 3 emissions is voluntary, but strongly recommended.

4. Benchmarks & Targets

Several studies and reports have been produced to demonstrate how the UK's built environment can transition towards net-zero. These have presented their understanding how the UK should be designing buildings to meet the climate change targets set by the UK Climate Change Act.

UK Green Building Council Net Zero Pathway – Macro Level Industry Target

The UKGBC has estimated the total allowance for the built environment in terms of heading trajectory for 2050 for net zero construction industry based on a year to year. The projected emissions are based on a 2018 baseline, which is the most recent and complete dataset for UK emissions currently available. The following key milestones and policy interventions are anticipated to take place to enable such transition. According to the UK GBC 'Net Zero Whole Life Carbon Roadmap, these include:

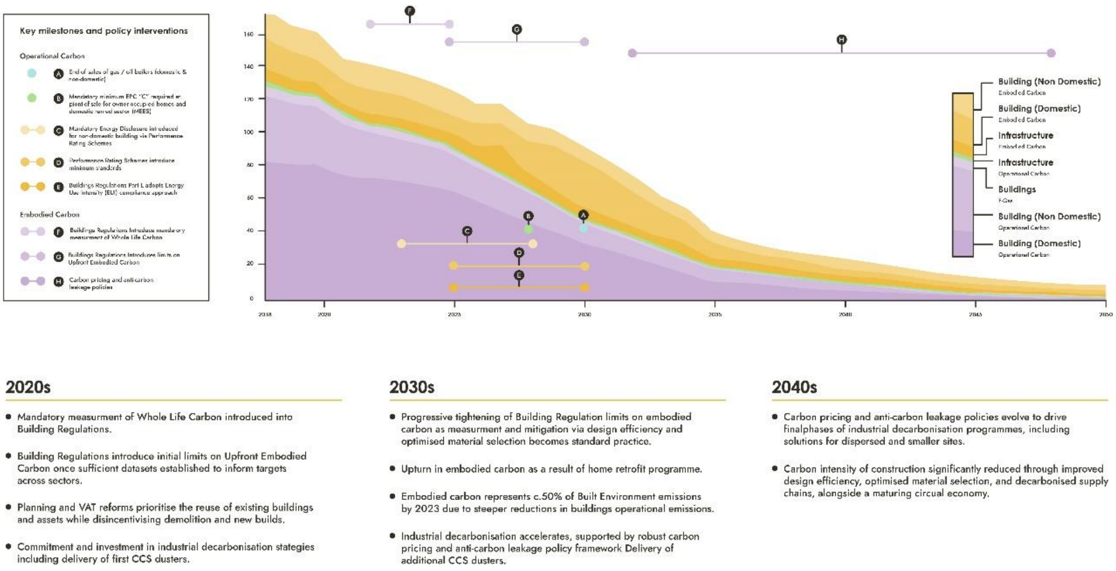


Figure 11: Net Zero Trajectory showing projected emissions from the Built Environment through to 2050

Targets & Benchmarks – Embodied and Operational Carbon

As part of industry commitments and guidance, indicative benchmarks have been provided to guide the industry in relation to embodied carbon targets to achieve net zero. These are summarised in Table 3 below. The performance targets proposed by various industry players and advisors can be used to inform decision making process and tracking project performance. These benchmarks are in regular evolution as more analysis, data and understanding is being established by the industry, which will inform the policy-making process.

Retrofit and refurbishment projects can enable developments to reduce their embodied carbon and operational carbon. The retention of building elements enables a development to avoid embodied carbon that would otherwise be emitted through new materials. A low carbon property can be delivered by prioritising low embodied carbon materials and by promoting the circularity of construction materials and products. Similarly, retrofit of energy efficient building services and shifting from fossil fuel-based to electric-led heating systems can aid to reduce emissions associated to operational use of a building. To ensure low carbon benefits are realised, measurement, recording and Evaluation of data should take place to verify the effectiveness of retrofit measures.

Table 3: Carbon Metrics/ Benchmarks / Targets

Metrics	Benchmarks & Targets	Target breakdowns	Lifecycle modules	Offices
Embodied Carbon kgCO_2e/m^2	**GLA Benchmarks**	**WLC Benchmarks**	A1-A5	950
			A-C	1400
		Aspirational WLC Benchmarks	A1-A5	600
			A-C	970
	RIBA 2030 Climate Challenge Targets	**Business as Usual (BAU)**	A-C	1400
		2025 Target	A-C	< 970
		2030 Target	A-C	< 750
	LETI Targets *Including substructure, superstructure, MEP, façade & internal finishes*	**Business as Usual (BAU)**	A1-A5 *	1000
		2020 Target	A1-A5 *	< 600 + 30% reused materials and 50% reusable building at end of life
		2030 Target	A1-A5 *	< 350 + 50% reused materials and 80% reusable building at end of life
			A-C **	< 750
Operational Energy kWh/m^2/yr GIA	**RIBA 2030 Climate Challenge Targets**	**Business as Usual (BAU)**	associated with B6	130 DEC D (90)
		2025 Target	associated with B6	< 75 DEC B (50) and/or NABERS Base build 5
		2030 Target	associated with B6	< 55 DEC B (40) and/or NABERS Base build 6
	LETI Energy Use Intensity Targets	**2020 Target**	associated with B6	55 ***
	UKGBC Net Zero Carbon Targets for Whole Building Energy	**2020 – 2025**	associated with B6	130
	–2025 - 2030		90	
	–2030 - 2035		70	
		Paris Proof Target (2035 – 2050)		55

*   *Excluding carbon sequestration*
** *Including carbon sequestration*
*** *Excluding renewable energy contribution*

5. City of London – a local perspective

Introduction

The City of London is one of the world's leading international financial and professional services locations and a driver of the UK economy, continually innovating and developing new business areas and flexible ways of working.

The City is also a very dense and intensely used area with a high overall level of greenhouse gas emissions, largely because of the energy needed to serve over 600,000 daytime users. A significant amount of emissions also arises from the demolition and construction of new buildings, including embodied carbon arising from the production, transportation and disposal of products and materials.

The future growth of the City needs to take place in a sustainable and inclusive way, incorporating the principles of 'Good Growth' set out in the London Plan. These principles ensure that London remains resilient to our changing climate and is green and healthy; with clean air, easy access to green space and more efficient buildings supplied by cleaner energy.

Current Position

Based on EPC data, refurbishment and investment will be required by owners and occupiers to bring buildings in line with standards for businesses in the City. A proportion of institutional grade leases (approximately 32m sq ft10) may not currently comply with EPC regulation, with a rating below C (as illustrated by Figure 12). It is anticipated many businesses will implement changes required to adhere to EPC changes. Conversion of Grade B stock to Grade A, or to best in class is possible in some cases, however this can be challenging.

Many assets in the City are historic, including over 600 listed buildings and 26 conservation areas. Heritage assets can impose additional constraints on development, and the financial case for retrofit can be difficult to make, particularly in terms of additional costs and limitations on the potential to deliver modern office requirements, whilst at the same time conserving or enhancing the significance of the heritage asset. In some limited circumstances, where Grade B offices are obsolete, cannot be viably refurbished and there are wider sustainability and planning benefits, there may be a case for demolition (Arup, 2023).

We note that lower EPC-rated offices may face a 'perfect storm' from the market's 'flight to quality'. In the wider London and UK context, these locations perform well in terms of amenities. However, they are perhaps at greatest risk of becoming stranded assets. It should be noted that whilst EPC ratings provide a measure for understanding potential stranded assets, it should also be complemented on a site-by-site basis with specific NABER rating data for individual premises, to accurately understand a building's real energy performance across energy, water, waste and indoor environment (Arup, 2023).

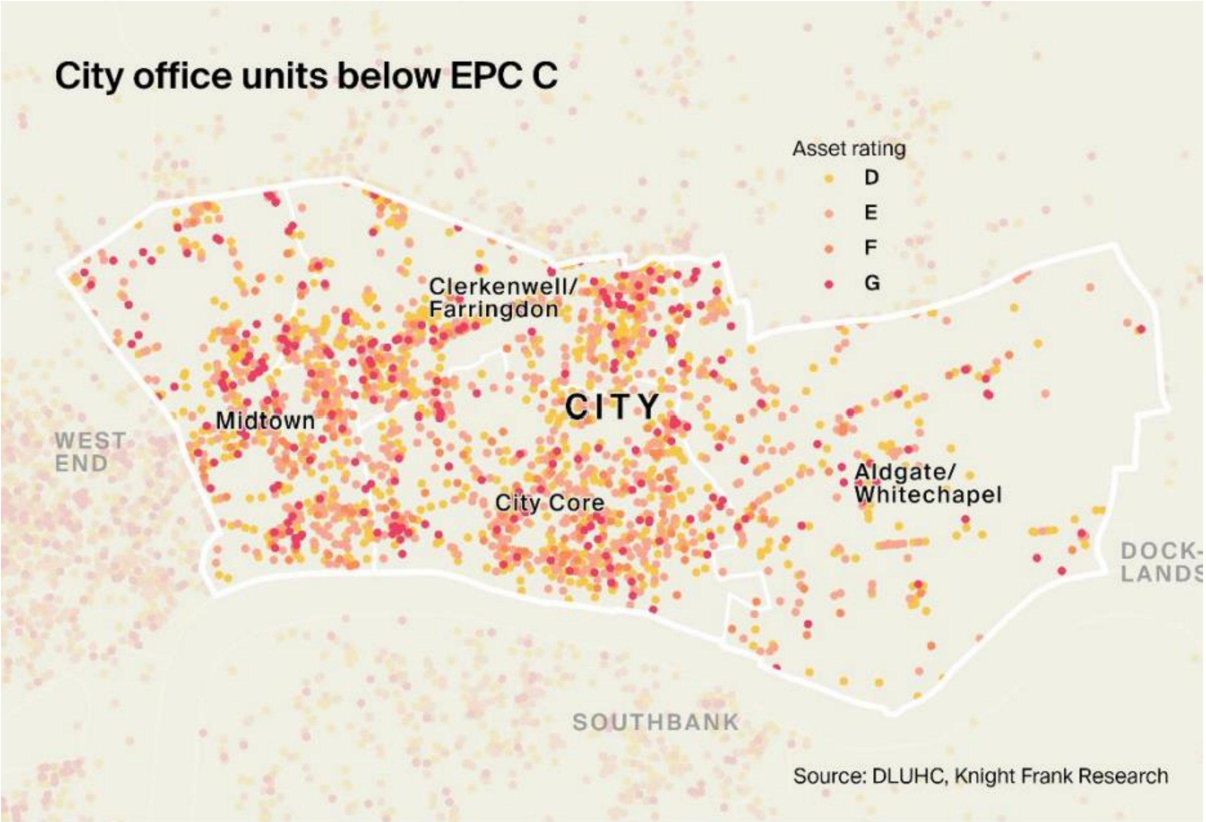


Figure 12: Building Energy Performance Certificate (EPC) Rating in the City of London, below C

The City is developing a framework of policies, guidance and action plans which seek to support the retrofitting of existing buildings. The following provides an overview:

Climate Action Strategy (2020): this Strategy includes goals for the City Corporation to be net-zero in its own operation (including its buildings) by 2027 and for a net-zero Square Mile by 2040. Achieving these goals assumes a significant increase in the rate of building refurbishment and retrofit in the City and a shift away from the traditional 'demolition and re-build' model.

Carbon Options Guidance (2023): this Planning Advice Note is a new optioneering exercise for planning proposals in the City of London, allowing an accurate comparison of development types, ranging from refurbishment to the more substantial redevelopment of a site. The carbon optioneering process enables the holistic consideration of carbon impacts, sustainability outcomes and wider planning objectives to meet the goals of the City's Climate Action Strategy and enable a net zero future.

The guidance is published alongside a 'Carbon Options Tool', which provides a consistent presentation of the assessment results.

https://www.cityoflondon.gov.uk/services/planning/sustainable-development-planning-requirements

'Planning for Sustainability' Supplementary Planning Document (SPD) (2024, draft): this SPD sets out guidance, requirements, and processes for the environmental sustainability aspects of proposed development in the Square Mile. The SPD seeks to achieve an ambitious and high quality outcome for the environmental sustainability of development in the City of London, in line with the Local Plan 2015 and the forthcoming City Plan 2040.

City Plan 2040 - 'Retrofit First'(draft): The City Corporation is in the process of developing a new City Plan 2040. One of the key policy features is a 'Retrofit First' approach to development.

This policy will encourage applications that promote new ways of thinking about repurposing buildings as the most effective way to drive down carbon intensity of development and create a unique sense of place. It will further encourage shifting the creative focus of architects, engineers, and designers to the transformation of existing buildings into sustainable, characterful, and interesting architecture

The following sets out key actions to develop an exemplar City scheme:

- Adopt a retrofit first approach that is informed by a carbon optioneering assessment (see Carbon Options Guidance Planning Advice Note).
- Consider the optimal use of an existing building that would enable a retrofit approach while supporting strategic land use policies.
- Engage creative architects, engineers and designers that focus on the opportunities of existing buildings and transform the exterior and interior to the highest environmental and design quality.
- Ensure that retrofit schemes achieve the highest possible level of energy efficiency, climate resilience, health and wellbeing, and occupier amenity.
- Assess the opportunities of the local context and sustainability aspirations for a site to develop the best practice circular economy and low carbon strategy.
- Seek specialist heritage expertise for historic buildings to identify sensitive solutions for retrofit.

Heritage Buildings Retrofit Toolkit (2024, draft): The purpose of this toolkit is to provide clear and actionable guidance for owners, occupiers, and caretakers of historic and listed buildings, to help them take steps to reduce carbon and build climate resilience in their heritage buildings.

The intention isn't to replace or supersede existing guidance on this topic, but to collate and signpost best practice principles and examples. This will provide a resource enabling building owners to confidently start the process of responsible retrofit, build a business case and deliver the adaptations necessary. Whilst this toolkit draws on the historic environment of the Square Mile, referencing typologies that are most significant to the City's unique character, it is equally relevant to towns and cities in the UK and around the world who are exploring how to adapt their historic buildings for a sustainable future.

https://www.cityoflondon.gov.uk/services/environmental-health/climate-action/climate-action-projects/supporting-the-square-mile-achieve-net-zero

Local Area Energy Plan (LAEP) (2023)

The LAEP sets out a route map and priority intervention areas for transitioning the energy system in the Square Mile to net-zero by 2040, in line with the ambitions of the Climate Action Strategy. The recommended pathway to a net-zero energy system by 2040 is a blend of deep retrofit interventions applied to the City's building stock and heat networks, using both centralised and decentralised heat pumps. The Plan highlights the importance of connecting building decarbonisation to planned changes in the wider local energy system.

https://news.cityoflondon.gov.uk/city-of-london-corporation-approves-local-area-energy-plan-to-deliver-a-net-zero-square-mile-by-2040/

6. Case Studies of Commercial Building Refurbishment

Retrofit and refurbishment projects vary in typology, size, and approach. The illustrated case studies within this report aim to convey this. There are projects ranging in uses from offices, retail to public spaces; some that are schedule listed buildings and other that have other types of characteristics. The buildings have been built across several decades, some as early as 1920s and others up to 1990s and refurbished in the past 5 to 10 years.

The Case Studies vary in typology of intervention, which are defined as:

Refurbishment	Modification and improvements to an existing building to bring it up to an acceptable condition. The refurbishment of something is the act or process of cleaning it, decorating it, and providing it with new equipment or facilities.
Retrofit	The act of providing something with a feature not fitted in the original construction or a replacement of a component. Often this refers to building systems upgrades, however if can refer to improving fabric and or glazing. This work generally improves amenities for the building's occupants and the overall building performance. **Light retrofit**: *focus on performance optimisation, basic remodelling, replacement, or adaptation of existing building elements which tend to focus on a single aspect or feature (lighting upgrades, optimisation of building controls and operation, etc).* **Deep retrofit**: *focus on significant works of size or scale that result in a fundamental change to the building structure and/or services. This can be represented as a collection of light retrofit enhancements or individually disruptive measures, such as major plant replacement.*

Due to varying timelines, regulatory developments, and increase in awareness and measurement of carbon, there is differing levels of data availability and data quality reported.

It is important to note that the case studies collected within this report aim to provide a snapshot of refurbishment practice in the City and beyond. The City Corporation's intends to continue to collect data and develop a pool of case studies, best practice examples and useful data set moving forward. There have been other reports that have also collated case studies such as JLL, LETI and New London Architecture.

It is important to note that the evolution in standards, requirements and analysis make it difficult to compare projects across time. It is clear from the case studies that improvements in the quality and transparency of data and changing policy are making this easier for more recent projects. Also, behind each of these projects there is context that needs to be understood, and constraints that can affect performance that should be acknowledged.

To demonstrate the wide spectrum of opportunities that may exists in this space, a selection of case studies has been compiled. These are summarised below and the full case studies can be found in **Appendix A**. They aim to shed light on the challenges and opportunities related to refurbishment of buildings located within urban districts, which aim to tackle net zero carbon standards within the commercial building stock. These projects showcase specific approaches or contained elements that enable commercial properties to achieving low carbon design and depict the contributions that retrofit projects may have in the advancement towards a net zero future.

We see a trend of case studies which have lower carbon compared to an equivalent new build. Table 4 shows the performance versus the LETI / RIBA carbon metrics.

It should be noted that this is a rather simplistic analysis, as there will be variations between stage of project and performance. In addition, analysis and industry skill is improving, so too is guidance for evaluating embodied carbon. Theses case studies have not all been third party verified and are evaluated to different stages.

Generally, as more detail and more materials are added, specially evaluated to a project the greater the embodied carbon. Lifecycle embodied carbon can also be tricky as it is determined by the number of replacements, which in offices can vary substantially based on bother materials life but also lease length, over a 60-year reference period this can mount up.

Table 4: *Case Studies verses carbon benchmarks for offices*

Total Case Study Projects: **18** Total with A1-A5 (upfront carbon) provided: **15** Total with A1-A5, B1-B5, C1-C4 life cycle embodied carbon provided: **13**	**Metric ($kgCO_{2e}$ /m^2 /GIA)**	**Number achieving LETI / RIBA 'Metric'***
LETI 2020 (Band C) (A1-A5)	600	12
LETI 2030 (Band A) (A1-A5)	350	8
RIBA 2030 Challenge 2025 (A1-A5, B1-B5, C1-C4)	970	10
RIBA 2030 Challenge 2030 (A1-A5, B1-B5, C1-C4)	750	7

**at current the time and based on information provided relative to project stage.*

8 of the projects are currently in line with the LETI 2030 metric for upfront carbon. When you consider several of the projects have had little to no structural intervention it shows how challenging this metric is to achieve. In line with this, 10 projects perform in line with RIBA benchmark Challenge 2025 of 970 $kgCO_{2e}$ /m^2 /GIA, whilst the remaining 7 falling within RIBA benchmark Challenge 2030 of 750 $kgCO_{2e}$ /m^2 /GIA. There are less projects capturing modules B1-B5 and C1-C4. There is lack of data in relation to the assumptions and replacement cycles (e.g. for MEP).

In terms of carbon from energy in use, it is more challenging to compare projects with accuracy. This is due to the methods used from evaluating operational energy in the design and construction phases. Most case studies have carried out estimation based on a process such as TM54 or projects in earlier stages based on NABERS DFP. There is variation in estimations, and context of the works undertaken need to be considered rather than just looking at the numbers (e.g. listed facades).

Carbon factors used to convert energy use into mass of CO_2 also vary. This affects the final carbon estimations and therefore inhibit the possibility to compare such metrics. It would be reasonable at design stage to use current energy performance as a worst case, but this is not always the case. The New RICS WLC Professional Standard (Sept 2023) should aid consistency in future.

Planning policy could align with best practice for carbon estimations/predictions and mandate consistent metrics in future. One thing is clear, the industry needs to get better at feeding back actual building performance to design teams. Post-occupancy evaluations may support in data collection and bridge the 'performance gap' between building design and use. It is worth noting that in London the GLA requires operational reporting under the 'Be Seen' energy policy for GLA referable project. Several London boroughs have also adopted this approach, beyond referable projects.

Some of the case studies are based on as built information, however the majority with available data are based on design information, and hopefully as part of this project as-built information will be fed into the database that the City of London is hoping to compile. The intention is for case studies to be updated as projects progress.

Table 5 is a summary of the case studies and performance. It is important these are read in the context of the detailed case studies provided. Full detail of the case studies can be found in **Appendix A**.

Table 5: *Case Studies summary*

Project name & Location	**Project type & RIBA Stage**	**Design team***	**Whole Life Carbon *Module A-C (excl. B6 & B7) kgCO2 e/m2 GIA**	**Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon) kgCO2 e/m2 GIA**
1 Appold Street London, UK	Deep retrofit RIBA Stage 2	**Applicant:** Bluebutton Properties UK Limited **Developer:** British Land **Project Manager:** Opera **Architect:** Piercy & Co **Structure:** AKT II **MEP:** Hilson Moran (after planning) **Sustainability:** Hilson Moran	621.4	495.5
3 Sheldon Square London, UK	Refurbishment RIBA Stage 5	**Applicant :** British Land **Developer:** U+I **Project Manager:** Opera **Architect:** Morris and Company **Structure:** Heyne Tillet Steel (HTS) **MEP:** Ramboll **Sustainability:** Ramboll	321	104
50 Finsbury Square London, UK	Refurbishment RIBA Stage 6	**Applicant :** Great Portland Estates **Developer:** Great Portland Estates **Project Manager:** Blackburn & Co. Limited	1,041	270

		Architect: Doone Silver Kerr **Structure:** Heyne Tillet Steel **MEP & Sustainability:** Hilson Moran **WLC:** Arup (after PC)		
62 Threadneedle Street London, UK	Retrofit RIBA Stage 6	**Applicant :** Royal Sun Alliance Insurance **Developer:** **Project Manager:** Jones Lang LaSalle **Architect:** *Rolfe Judd Architects* **Structure:** Watermans Group **MEP:** Elementa **Sustainability:** Mecserve Ltd	40.3	192
81 Newgate (Panorama St Pauls) London, UK	Refurbishment RIBA Stage 5	**Applicant:** Orion Capital Managers **Development manager:** Pella Real Estate Partners **Project Manager:** Arcadis **Architect:** KPF **Structure:** AKT II **MEP:** Chapmanbdsp **Sustainability:** Chapmanbdsp	646	455
100 New Bridge Street London, UK	Refurbishment RIBA Stage 2	**Applicant:** Helical **Developer:** Helical **Project Manager:** Avison Young **Architect:** Gensler **Structure:** ARUP *and* Watermans Group **MEP:** L&P Group **Sustainability:** L&P Group	883	459
160 Old Street London, UK	Refurbishment RIBA Stage 6	**Applicant:** Great Portland Estates and Great Ropemaker Partnership **Developer:** Great Portland Estates **Project Manager:** Jackson Coles **Architect:** ORMS **Structure:** Heyne Tillett Steel **MEP:** Hilson Moran **Sustainability:** Hilson Moran	**N/A**	**N/A**

Coal Drops Yard London, UK	Refurbishment RIBA Stage 6	**Applicant:** King's Cross Central Limited Partnership (KCCLP) **Developer:** KCCLP **Project Manager:** Argent (Development Manager) **Architect:** Heatherwick Studio (Concept), BAM Design (Delivery) **Structure:** Arup **MEP:** Hoare Lea (Concept), BAM Design (Delivery) **Sustainability:** N/A	**N/A**	**N/A**
International House London, UK	Refurbishment RIBA Stage 4	**Applicant:** British Land **Developer:** **Project Manager:** RPP **Architect:** Barr Gazetas **Structure:** Evolve **MEP:** INsignis Consulting **Sustainability:** INsignis Consulting	509.8	322.3
One Exchange Square London, UK	Deep retrofit RIBA Stage 5	**Applicant:** Permodalan Nasional Berhad PNB and LaSalle Investment Management **Developer:** **Project Manager:** M3 Consulting **Architect:** Fletcher Priest Architects **Structure:** Heyne Tillett Steel **MEP:** Sweco **Sustainability:** Sweco	939	525
Pall Mall Manchester, UK	Deep retrofit RIBA Stage 5	**Applicant:** Bruntwood **Developer:** Bruntwood **Project Manager:** Bruntwood **Architect:** Sheppard Robson **Structure:** DW Consulting **MEP & Sustainability:** Ramboll	522	189.6
Portland House London, UK	Refurbishment RIBA Stage 5	**Applicant:** Landsec **Developer:** Landsec **Project Manager:** Opera **Architect:** Buckley Gray Yeoman **Structure:** Parmar Brook **MEP:** Watkins Payne **Sustainability:** Buro Happold	758	348
Quay Quarter Tower Sydney, Australia	Deep Retrofit RIBA Stage 6	**Applicant:** AMP Capital Investors **Developer:** AMP Capital **Project Manager:** **Architect:** 3XN **Structure:** BG&E	**N/A**	818

		MEP & Sustainability: Arup		
The Gilbert and One Lackington Street London, UK	Refurbishment RIBA Stage 6	**Applicant:** Brookfield Office Property Management **Developer:** Brookfield Office Property Management **Project Manager:** Jackson Coles LLP **Architect:** Stiff + Trevillion **Structure:** Heyne Tillett Steel **MEP & Sustainability:** Hilson Moran	250.3	147.1
The Hickman Building London, UK	Retrofit RIBA Stage 6	**Applicant:** Great Portland Estates **Developer:** Great Portland Estates **Project Manager:** Hush PM&C Ltd **Architect:** DSDHA **Structure:** Heyne Tillett Steel **MEP & Sustainability:** Milieu Consult	**N/A**	337
The Kensington Building London, UK	Deep retrofit RIBA Stage 6	**Applicant:** **Developer:** Ashby Capital *and* Janson Urban **Project Manager:** **Architect:** Pilbrow & Partners **Structure:** WSP **MEP & Sustainability:** WSP	1050	700
YY London London, UK	Refurbishment RIBA Stage 5	**Applicant:** Quadrant and Oaktree Capital **Developer:** Quadrant **Project Manager:** Avison Young **Architect:** Buckley Gray Yeoman **Structure:** Watermans Group **MEP & Sustainability:** Hilson Moran	**N/A**	**N/A**
* It covers a limited information about the project team.				

7. Lessons Learned – Insights from Case Studies

The following sets out key lessons learned from the case studies within the context of the policy and market trends set out in the previous sections.

Carbon performance: From a carbon perspective, retrofit and refurbishment often result in lower Whole-life carbon emissions when compared to a new build equivalent (as described in Section 2) and are part of a lower carbon solution to meet to our climate goals.

Business case and viability: decision making is more complex than just using a single viewpoint, such as the 'carbon' perspective. These case studies provide examples of schemes which have sought to combine a viable business case with decarbonisation and wider economic and social value. This is an area of opportunity that the built environment sector can focus on to demonstrate tangible, cost-effective solutions that can also reduce overall net emissions whilst supporting the UK's net zero trajectory.

Net zero targets and ESG: some developers are starting to use impact mitigation as a way forward and funders are beginning to request performance metrics relating to environmental impacts, including Whole life Carbon, as prerequisites for investment. This is particularly true as greater ESG requirements are being demanded from investors. As referenced by UKGBC in their 'Sustainable Investment Practical Guide'(2023), investors, are providing funding to property groups that are subject to sustainability-linked KPIs, meaning that favourable borrowing rates are available when measurable environmental credentials or improvements in the assets are demonstrated (GBC, 2023). There are other examples of funders requesting an ESG-linked credit facility.

Industry standards: schemes like the forthcoming UK Net Zero Building Standard should assist developers to align the design and performance of their schemes with clear principles that define net-zero for various building typologies.

In terms of operational energy there is encouraging progress in terms of closing the 'performance gap' with design performance being assesses in a more detail way than just Building Regulation Part L. For example, the NABERS UK rating scheme for offices sets a high bar for design reviews and requires actual performance to be monitored for a final rating to be provided.

More recent schemes are evaluating carbon from the outset of the project. As more data becomes available better decision making should be made. This trend is anticipated to continue, where more and more projects will evaluate carbon and take learnings and data from best practice examples. Similarly, regulation and policy will shift to enforce embodied carbon considerations and assessments.

Whole Lifecycle Carbon data and benchmarking: the case studies all show good levels of Whole Lifecycle Carbon performance, especially when compared to a new build equivalent. It is challenging though, to compare building on a like for like basis and to understand the detail within the WLC model on just a headline number basis.

For example, a project which has undertaken a more in-depth review may have reviewed more elements, and therefore have a higher emission footprint than a similar project. There are several variables that can dictate a project's performance. This underlines the need to rationalise and standardise these gaps.

Advice notes, such as the City of London Carbon Options Guidance (COG), are also helping to set uniform metrics, all be it at a very early stage in the decision process. The new RICS Professional Standard 'Whole life carbon assessment for the built environment' 2^{nd} Edition (Sept 2023) which is due for implementation from 1st July 2024 should help bring greater clarity and standardisation to detailed assessments, and what to include at each design and construction stage.

The role of planning policy and Retrofit first: It is likely that planning policy will start to demand better verification and reporting, which would help the industry be more transparent in its decision-making process. The case studies demonstrate that good quality data can provide good insights which in turn can support developing more effective policies to reduce carbon. Better quality and more consistent carbon data can support design teams to more effectively demonstrate performance numbers that can be achieved.

More broadly, a 'retrofit first' approach within planning policy is beginning to emerge which seeks to incentivise the retention of buildings and lower carbon projects. Time will tell whether such policies will assist in bringing clarity to this area, but they should not restrict design-led solutions. Recently, there have been several high-profile disputes between retrofit / refurbishment over new build (for example the flagship M&S building on Oxford Street). These are complex projects which need to consider a significant amount of information and perspectives.

Cost-benefit analysis: based on the case studies, a retrofit / refurbishment solution typically leads to a lower carbon outcome as less new material is needed, especially when structures (which are typically quite intensive) are reused. However, it is important to note that in today's world there are conflicting interests such as maximising commercial floorspace provision, which can hinder the viability of the refurbishment option. In these instances, a cost benefit analysis should be conducted to account both monetary and non-monetary (i.e. carbon/environmental impact) costs and benefits related to the project.

Temporary works: In retrofit projects, careful consideration of temporary works needs to be factored in to reflect the real whole-life carbon of the project. The general rule still stands, however, the teams need to evaluate the options and ascertain the best project approach on a case-by-case basis. The case studies generally show a performance close to or below the 'towards 2030' net zero LETI 600 $kgCO2/m^2$ target. However, it is challenging to know the depth of the assessment undertaken, and whether results have been verified.

Skills, capacity, and capability: Whole Lifecycle Carbon analysis is still at an embryonic stage in the UK, particularly outside London and other big cities. The built environment industry is upskilling at pace but there is still significant inconsistency in analysis and reporting. Analysis of embodied carbon in detail requires skilled professionals and a standardisation of approach. As a result, the GLA and several London boroughs are requiring third party reviews of analysis to help verify assessments.

Design v as-built: there is also a difference between design predictions and the 'as-built' performance. This is often not intentional but results from on-going design changes, better accuracy in quantity reporting at later stages of projects, and more accurate understanding of the actual materials procured and installed. It is vitally important that case studies from design stages turn into as built reporting and data is fed back into future designs.

Industry ambition: despite the uncertainties and potential inconsistencies, progress developers within the industry have succeeded in setting strong sustainability objectives, driven by their corporate ambitions to reduce their carbon footprint. Key features of this approach include maximising retention, adhering to best practice standards and benchmarks, stripping out fossil fuel-based systems and transitioning to electric-led ones.

Growing evidence base: this report is a contribution to a growing evidence-base related to building retrofit and refurbishment. For example:

- **'Retrofit First, not Retrofit Only – a focus on the retrofit and redevelopment of 20th century buildings' (2023)**: was produced by JLL and the London Property Alliance (WPC/CPA) and calls for action that is urgently needed if we are to tackle the climate emergency and reduce emissions as an industry. The recommendations outlined in the document are specified for two different parties:
    - *property owners*: developing both a portfolio strategy for NZC transition and asset sustainability strategies considering economic, environmental, and social aspects, engaging all key stakeholders to prepare initial project brief, undertaking a robust WLC assessment as well as assessing the range of options to deliver NZC.
    - *policy makers*: improving consistency in national, regional, and local planning policy and applications; prioritising 'retrofit first' rather than 'retrofit only'; request evidence of the assessments of the NZC approaches and the decision-making process; provide robust and consistent guidance on Whole Lifecycle Carbon; as well as ensure the availability of the well-skilled workforce within the planning departments to guide these processes.

- **'Retrofitting Office Buildings: the case for Net-Zero' (2024)**: This report focuses on deepening understanding of how to retrofit large (>1000sqm) commercial office buildings towards net zero, the retrofit measures required, potential impacts, and associated costs.

8. Recommendations

Commercial refurbishment projects have the potential to provide commercially viable option against the 'business as usual' and simultaneously deliver carbon benefits.

To deliver these benefits, a best practice strategy should encompass:

- A robust business case, following a net zero approach and associated funding.
- Good quality building data and /or survey data (i.e. pre-development audit).
- A clear brief with sustainability as its core objective, and pre-agreed carbon targets.
- A slightly different approach to programme – grater upfront work, and potentially earlier engagement of contractors.
- Long-term and circular thinking.
- Transparent and referenceable metrics and the methodology that underpins them.
- Monitoring and verification of expected benefits being delivered, and
- Adopt a portfolio-wide approach against the carbon budget that specifically considers upfront carbon.
- Future asset value factoring in carbon and climate risk

These following sections aim to provide further detail on these considerations to support commercial retrofit projects which follow a net zero approach. These have been determined through the collation of industry best-practice case studies and key lessons learned, which can in hand inform future upcoming projects.

1. Develop the business case with a carbon perspective - Business viability including environmental / carbon impact

A viability business case that is developed and includes an environmental / carbon impact. Carbon impact should be an element accounted for within business viability assessment over the long term. Developing a building construction business case and assessing its viability from a carbon perspective offers several benefits from an environmental and economic standpoint including: maximising emissions reduction potential, enabling cost savings, regulatory compliance, market differentiation, risk mitigation, resilience and future-proofing, stakeholder engagement, access to funding, operational efficiency, long-term value, innovation, and reputation.

2. Obtain existing building data early – Understand the building

The first step for a successful retrofit project is getting a clear snapshot of the existing asset information. As part of the acquisition procedure a due diligence should be undertaken to assess existing building properties, refurbishment potential and sustainability considerations.

This involves data collection and ensuring surveys are carried out right at the start of the project and form part of the brief. Fully understanding the building is key to inform appropriate decision making. Things to consider at this stage include:

- Building characteristics and location, which may limit retrofitting options or result in a unique design opportunity, such as heritage considerations, protected or conservation area,
- Building structure and fabric, condition of external elements and materials used in construction (that could be retained or recycled if replaced),
- Original building operational use and energy consumption,
- Status of building services and plant, and requirements for replacement,
- Operational control and maintenance practices taking place,
- Responsibilities on-site for operating the building between landlord and tenants / owner and occupiers; and
- Risks associated with the property.

A successful project example in high quality data collection for refurbishment measures is 1 Appold Street in the City of London (see case study profiles). 1 Appold Street had good original drawings and information, some of which was recorded on micro dot. The team was able use this building data to provide confidence to the project team and de-risk any unknowns. The Project obtained planning in 2023.

3. Set a brief for the Design team, inform stakeholders, and enable collaboration

One of the key components of achieving significant carbon savings in the projects is to have collaborative and integrative environment during the design process. This primarily starts from a clear brief that is set around carbon savings and impact minimisation.

From the project outset, the client team should have a clear and transparent justification for a new development, identify what is possible for refurbishment/retrofit and what are the constraints/barriers. Organisational vision and agenda towards a net-zero carbon future is an important component of delivering low carbon refurbishment solutions. The commitment of sustainability/design team encourages the client to pursue ambitious carbon reduction strategies since the commencement of the project. This often lacks within projects and when optioneering takes place, it may be that the lowest carbon option/scenario is not selected as other options (e.g. cost-effective option) have taken priority.

The developers' goals regarding carbon savings is a key driver and enables the achievement of significant carbon reductions with financial benefits as well. Maximising the carbon reduction opportunities requires the commitment and involvement of each team member as well as alignment across teams.

4. Establish Your Assessment Criteria

Effective and robust whole-life carbon assessments are based on reliable and realistic data. Every assessment will be project-specific but should be analysed using a consistent approach. For this reason, it is important to identify and collect suitable data in advance to support a comprehensive assessment. Key considerations related to assessment and measurements include:

- Work closely with property manager, facilities/operational manager who are familiar with the building functionalities, operability, maintenance practices and possibly common/recurring issues.

- Set out a request for information (RFI) list that clearly outlines the data entries required for a robust assessment.
- Set a baseline that can be used to compare 'business-as-usual' against retrofit scenario. This is an opportunity to measure and quantitatively demonstrate improvements achieved through refurbishment interventions (for example operational energy performance).
- Set performance targets that can inform decision making, provide clear benchmarks to track project performance in line with best practice standards (i.e. LETI, RIBA, NABERS UK).
- Evaluate the most suitable refurbishment/retrofit interventions that yield the highest carbon savings (either embodied or operational) whilst considering technical feasibility and commercial viability. These should be considered in line with the pre-agreed targets, client expectations, and asset management strategy. Following all reduction measures carbon offsetting should be considered as a last resort. Where used make sure there is a mechanism for this offset cost to be accounted for in the project budget. This may enable lower carbon product replacement to be undertaken, and potential cost savings (when project cost and offset cost is calculated).
- Follow a NABERS UK Design for Performance approach committing to tracking and verification during and after completion of works.

5. Analyse opportunities and challenges.

Once initial assessment is carried out, trends will emerge, and opportunities and challenges will be identifiable for different elements of the building. These may form the basis of the project's business case and a unique selling point.

It is therefore crucial that the analysis is carried out with a circularity and long-term vision, with net zero carbon as the main objective, considering the whole lifecycle of the development and following a Design for Performance approach. Circular thinking involves the promotion of retaining, re-using, repurposing, and recycling of construction materials to reduce the projects Whole Life Carbon and environmental impacts.

A whole life carbon or carbon optioneering analysis are methods of reviewing development options for reducing of embodied carbon through. The optioning process should be used as a tool to inform design decisions and provide planners with suitable information to make planning decisions form a carbon perspective.

Where feasible, projects should prioritise and maximise the retention and reuse of existing materials and building fabric. The case studies (appendix A) have provided the following general insights:

- Identification of opportunities and challenges early in the design process, using a long-term and circular thinking approach.
- Challenges can include unforeseen issues / limitations and/or barriers that can restrict the success of interventions. Some metrics may not be established due to missing building information or restrictions in performance due to a range of factors (e.g., thermal bridging, u-value performance, air tightness, programme, and costs). This is especially the case for fabric performance in listed buildings. Regulatory

developments and forthcoming requirements should be raised early on to anticipate this and to inform the design proposals.

- Opportunities may lie in relation to building's context, location, characteristics, stakeholders involved, and financial incentives/opportunities (e.g., real estate funding/loans based on sustainable performance). There may be opportunity to increase the asset value through a refurbishment project and raise the potential rental income. A business case may be established in circumstances where the project was able to deliver operational cost savings (i.e., from reduced maintenance or reduced energy consumption). Rental premiums may be achieved where interest and occupational demand rises for low and net zero carbon requirements (JLL, 2023). Landlords and investors may recognise the opportunity of increasing the rentability of their properties, enhancing relationship with their tenants, de-risking their assets and portfolios by future-proofing the value of their properties. Keeping tenants satisfied means lower vacancy rates and increased tenant retention in the long-run.

A successful project will identify specific carbon-saving opportunities through retrofitting and refurbishment measures. These may tackle either embodied carbon (through efficient fabric upgrades or retention of external building elements) or address the reduction of operational carbon (through improved building management, optimisation and replacement of building services that are low carbon). Circularity must be at the centre of the retrofit/refurbishment strategy.

The case studies analysed have shed light on several specific areas that building renovation projects could take into consideration:

- **Programme:** Whilst programme savings may be achieved during a retrofit project, additional time needs to be allowed for in the design process to enable teams to obtain data and set out strategies to achieve the project goals and prevent future changes due to new information being obtained. Potentially early engagement form contractors could be sought.
- **Ceiling heights:** There might be some physical constraints regarding the floor to ceiling heights of the existing building structure to deliver a high quality of building environment. However, clear height of buildings can be maximised through designing exposed ceiling, introducing air conditioning systems distributed beneath the floors (CAM-V). 100 New Bridge Street is a great example of a project that already has generous floor-to-ceiling heights and therefore largely retained elements such as floor and frame of the building, saving on carbon emissions.
- **Glazed facades:** Design of glazed facades can help to increase the penetration of daylight and enhance the thermal performance of the existing buildings; therefore, it plays an important role in reducing operational energy and carbon. However, increased glazed areas can increase embodied carbon too and should be considered in the design and optioneering stage.
- **Choice of material replacement:** A key consideration should be around ensuring to keep a high quantity of materials and components within the system. Some materials retained or replaced may play a role in increasing the recycling content of the project or may serve to improve the fabric performance of the building. Kensington case study used 99% plus ISG, demonstrating a high recycled content

value. This project saved 30% of embodied carbon and followed circular economy principles.

- **Retaining sub-structure:** A significant reduction on embodied carbon of a proposed development can be achieved, as a great proportion of embodied carbon is associated with substructure of a building. This can be observed in case studies such as 1 Appold Street and Kensington and 3 Sheldon Square which have high retention rates for sub-structure.
- **Introducing less material and lightweight structural design:** Reducing the structural mass of the design is one of the key principles in reducing embodied carbon. Therefore, there are potential carbon saving opportunities as well as lower costs to use reclaimed materials/components and develop lightweight and efficient structure or structural intervention options. 100 New Bridge Street used lightweight block materials for the walls to reduce structural mass of the building
- **Improved fabric and energy performance:** Older buildings are typically less energy-efficient than newer ones. Retrofitting can significantly improve energy efficiency by upgrading insulation, windows, heating, ventilation, and lighting systems. This reduces energy consumption and operating costs.
- **Design for durability, future adaptability & flexibility:** By retrofitting and refurbishing infrastructure, it is possible to extend their lifespan, avoiding costly replacements and disruptions. Long-term sustainability may allow the assets to evolve over time despite changes in use or operational demand. It may increase resilience of the building and re-risk from future climate change effects. Retrofitting can enhance the resilience of infrastructure to withstand natural disasters and climate-related impacts, contributing to community safety and stability. In addition, it entails less energy and waste in case of future transformations.
- **Preservation of Cultural Heritage:** Many older buildings have architectural or historical significance. Retrofitting and refurbishing these structures allow for the preservation of cultural heritage while making them functional for modern needs. *See an example of case studies: Pall Mall*
- **Innovation/Technology – The use of Digital Twin:** technology provides considerable potential to reduce assets' carbon footprint. It can rationalise and optimise the asset demand / performance by providing continuous live data. *See an example of case studies: The Hickman Building*
- **Replace inefficient technologies and embrace renewable energy and clean technologies:** Refurbishment projects present a great opportunity to replace old, inefficient technologies that may be fossil fuel based with new systems that are more efficient, more sustainable and use renewable sources. This may include replacing gas boilers with air source heat pumps to electricity heating systems, or the introduction of solar photovoltaics mounted on roof space. 100 New Bridge Street is a refurbishment projects that switched from gas to electricity and introduced on-site renewable energy generation.

6. Responsible Investing – Capitalise on Infrastructure

Capitalising on existing infrastructure is crucial for promoting and facilitating more retrofit and refurbishment building projects. Existing infrastructure, such as buildings and urban infrastructure, represents a significant investment of resources, materials, and energy. Retrofitting and refurbishing these assets can extend their useful life, reducing the need for new construction, which consumes additional resources.

Retrofitting and refurbishing existing buildings often offer a more cost-effective solution compared to constructing entirely new structures. This can make projects financially viable and attractive to investors and developers. The case studies set out in this report showcase the carbon reduction opportunities associated within different projects, but also shed lights on areas that require greater investment.

For example, there is limited coverage of heat networks across London to serve new developments across London and meet the demand of proposed developments in a financially viable way. The UK Government's forthcoming heat zoning regulation may provide an enabling framework for heat network expansion at scale.

7. Review the Performance – Monitoring and Verification

Design for Performance can be followed through by measuring, recording, tracking, and evaluating data to verify the effectiveness of the measures conducted within a project. Following the design, construction, and delivery of retrofit/refurbishment interventions, it is crucial to verify the outcomes.

Monitoring and verification help ensure that the energy-efficient measures implemented during the refurbishment are performing as expected. This validation is essential for confirming that energy-saving goals are met. This exercise can confirm the accuracy of initial assessments and provide a feedback loop for improved design stage approaches and measurements. Data collected through monitoring can reveal opportunities for further improvements or adjustments to the building's systems and operations, leading to even better performance and sustainability outcomes.

Tracking building performance post-refurbishment allows for the verification of cost savings resulting from reduced energy consumption, maintenance, and operational expenses. This information is valuable for both building owners and tenants. In some cases, best practice standards, regulatory requirements, or sustainability certifications (e.g., LEED, BREEAM) may necessitate third party verification and ongoing monitoring to maintain compliance.

Maintaining accurate records of a building's post-refurbishment performance can enhance the asset's value, making it more attractive to potential buyers or investors (e.g. producing a materials passport). Monitoring and verification help demonstrate the return on investment (ROI) of the refurbishment project. This information can be useful for future funding, financing, or investment decisions.

9. Conclusions

The built environment sector is moving towards a trajectory that increasingly values the optimisation of resources and the minimisation of environmental impacts, particularly carbon emissions. Policy and market drivers are shifting to address the climate emergency and some developers are positioning themselves, not only to embrace, but also to lead on the sustainability front.

There is an increasing awareness and expectation from investors related to embodied carbon and circular economy, which enables a rationale and need to carry out early-stage consideration for retrofit and refurbishment options as a viable alternative to new build. Similarly, demand is surging with tenants and occupants expecting and seeking sustainability attributes in buildings. Studies have shown a potential link between buildings with green credentials and premium rents. Overall, a trend is emerging that the industry and all participants should embrace.

The review of international regulations underlines this trend by highlighting how national and city-level climate policies are setting ambitious targets emission reduction. Despite greater emphasis on climate action, there is a need for further guidance and evidence of how this can be achieved.

Refurbishment and retrofit form an important part of achieving low Whole Life Carbon performance as well as 'Circular Economy' goals. Building fabric retention, recycling or reuse of materials and use low embodied carbon are a few ways to establish circularity and reduce whole life carbon.

There is need for quality data, better estimation of carbon performance and standardisation of measurement methods based on life cycle analysis. National policy frameworks need to be created, allowing for some regional adaptions, so consistent approaches can be adopted. The industry recognises the need for change but requires consistency to be able to invest in effective and viable solutions.

This report has collected a series of case studies that showcase current best practice in London and beyond which highlight key lessons learnt. The case studies show that retrofit and refurbishment measures can help address the climate challenge, both in terms of reducing the use of new resources, their associated impacts including carbon emissions.

The case studies show that benchmarking and analysis for carbon impacts has been evolving at a fast pace, making historical comparison challenging. Data, evaluation, and transparency is improving over time, and key metrics are now being looked at all stages of development. It is noted that as performance-built requirements become mandatory, the knowledge, data and reporting is expected to become more accurate and standardised moving forward.

The information gathered shows that, historically, data surrounding both embodied carbon and in use operational energy is scarce. This is correlated to the feedback provided by designers in terms of how the building operates in use from an energy perspective. Nevertheless, positive change is beginning to take place, as policy evolves, and developers seek to report on their actual emissions.

Overall, this report aims to take insights from real retrofit projects and summarises several key best practice recommendations. These include:

1. Collect and analyse existing building data.
2. Ensure the business case also accounts for carbon impact.
3. Evaluate risks and opportunities for the site.
4. Establish a clear strategy for decarbonisation, accounting for comparisons of building types and regulation considerations.
5. Use consistent reporting metrics and review against targets (peer reviewed data is recommended)
6. Consider market maturity – i.e. can lower whole life carbon buildings attract a premium if demand rises?
7. If refurbishment / retrofit is not possible and demolition is required, ensure a justification and plan is in place to have rationalized the demolition and maximise reuse potential of existing materials. This should be communicated to the planners.
8. Report on as built upfront carbon performance and operational energy in use.

If retrofit and refurbishment is not considered, it should be justified, explaining why it is being discounted as an option. Similarly, justification for demolition should be provided to explain the loss of embodied carbon and unfeasibility to extend the lifespan of structures and materials.

This report concludes that retrofitting and refurbishment may not always be the way forward for a project. However it should be considered at early stage of decision making as it may present opportunities beyond solely carbon saving, such as increase asset value, attraction and rentability of property, improved tenant-landlord relationship, benefits to the wider community, investor satisfaction and potential monetary savings.

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Appendix A – Case Studies

These are included as a separate document.

Appendix B – Detailed Policy Review

Global Context – Building Standards

An initial review of the building standards and policies has been undertaken covering different geographical contexts around the globe. This review is based on English-language documents only and available on the public domain. It should be noted that some information may be missing in the instances of unavailability or non-English documentation.

New York State, with a special focus on the New York City

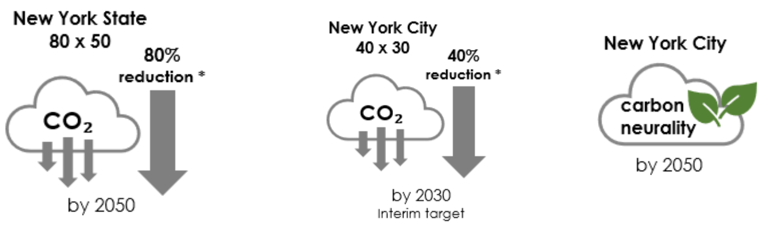


Figure 1: Decarbonisation targets of the NYS

Note: On January 20, 2021, the US rejoined the Paris Agreement

Overview of the state's decarbonisation journey: New York State has made the commitment to reduce GHG emissions 80% by 2050, as known '80 x 50' target. In line with this, New York City (NYC) has specified an interim target of 40% reduction by 2030 (i.e. '40 x 30' target), and has already implemented policies, programs, and initiatives on the path to reach the '40 x 30' Target. According to the OneNYC report (OneNYC, 2019), it is anticipated that the city has taken suitable measures to indicatively achieve interim '40 x 30' target, however, it was highlighted that the efforts alone were not enough to reach '80 x 50' target. Currently, NYC has pledged to hit carbon neutrality by 2050, placing a particular focus on the building sector, as it is responsible of approximately 66% of the city's emissions (JLL, 2022). To fulfil this pledge, NYC requires to rethink its approach to the operation and management of buildings as well as building design and construction in the industry (NYC Congress, 2021).

Highlights in the current policy:

- **Energy efficiency:** The Local Law 85 of 2019 requires any buildings going under renovation or alteration to have designs to comply with the New York City (NYC) Energy Conservation Code (NYCECC) (Anon., 2023).

- **Embodied carbon:** There has been a lack of regulations to mandate accounting of the embodied carbon of buildings in both the New York State and the NYC. However, recent regulation introduced in 2022, Executive Order 23: Clean Construction, emphasises to reduce embodied carbon of building materials and construction equipment. Therefore, it requires the development of guidelines of procurement of low-carbon concrete.

Outlining that energy efficiency in buildings is at top in the agenda: In line with the global trend of focusing on operational energy and operational emissions, NYC has led on reducing operational carbon emissions through the significant efforts in increasing energy efficiency and electrification in buildings. This follows the legislative package of Climate Mobilisation Act (CMA) as a part of the Mayor's New York City Green New Deal.

Energy efficiency in existing buildings and retrofits: Local Law 97 of 2019 requires existing buildings sizing more than 25,000 ft^2 (about 2320 m^2) to reduce their emissions within the '40 x 30' target (NYC Congress, 2021; NYC, 2019). In addition, Local Law 85 of 2019 requires any buildings going under renovation or alteration to have designs to comply with NYC Energy Conservation Code (NYCECC) (Anon., 2023). Furthermore, Local Law 92 of 2019 and Local Law 94 of 2019 mandate for all new buildings and buildings undergoing major roof renovations to allocate all roof space for solar panels **(100%),** green roofs, or some combination of the two **to provide a sustainable roofing zone** (NYC, 2019) (JLL, 2022).

In line with the Local Law 95 and 133 require commercial and residential buildings to measure their annual energy and water consumption to help benchmark energy and water efficiently (NYC, 2019). Since there is a lack of data on how buildings perform, benchmarking of buildings become important to monitor the performance of the buildings as well as offer target and guideline to reduce the impacts of the building. The availability of benchmarks also supports to develop better strategies and more spoken measures ultimately facilitate to make the right investments for interventions.

The table below (**Table 3**) summarises the key NYC laws that contribute to reducing operational carbon emissions.

Table 6: *A summary of key laws regarding the decarbonisation of existing building stock*

Local Laws	The scope related to the decarbonisation of existing buildings
Local Law 97 of 2019	It introduces a building performance standard to cut emissions of the city's buildings and calls for existing NYC's buildings of more than 25,000 ft^2 (about 2323 m^2) to reduce their emissions within the 40 x 30 target (NYC Congress, 2021; NYC, 2019). It also mandates building owners to prepare annual energy efficiency, energy use, and GHG emissions reports annually (New York City Government, 2019).
Local Law 85 of 2019	It requires building designs to comply with NYC Energy Conservation Code for any renovation or alteration project (Anon., 2023).
Local Law 95 of 2019 Local Law 33 of 2018 Local Law 133 of 2016	Benchmarking (energy efficiency grade): They require owners of buildings that have more than 50,000 ft^2 of gross floor area (4645 m^2) and either no residential units or 17+ residential units to annually measure their energy and water consumption (Anon., 2023) (NYC Congress, 2021).
Local Law 92 of 2019 Local Law 94 of 2019	All new buildings and buildings undergoing major roof renovations are required to be covered with solar panels, green roofs, or some combination of the two (NYC, 2019) (JLL, 2022).

To support the design, construction, and retrofitting process of buildings, New York State Energy Research and Development Authority (NYSERDA) has launched a range of programmes as described in **Table 4**.

Table 7: *A summary of NYSERDA programmes focussing on retrofitting existing buildings*

NYSERDA programmes	Key points for existing buildings
Carbon Neutral Buildings Roadmap	• Need for the transition to emission-free electricity and shift away from onsite fossil fuels use in existing buildings (new buildings as well) • Adoption of new carbon neutral construction and adaptive reuse projects to future-proof

	• Advancement of insulation types and other envelope-based load reduction strategies for existing buildings • Thermal energy network systems for existing buildings • Building energy performance requirements for existing buildings and minimum energy efficiency standards mandatory for existing building.
Empire Building State Challenge	• Stating potential decarbonisation solutions for improving the performance of existing high-rise buildings (iconic buildings of NYC), by primarily focusing on operational energy & carbon emissions.
RetrofitNY	• Existing buildings showcased in the NZE by driving dramatic improvements in energy performance.
NYStretch Energy Code 2020	• It was developed to support the State's energy and climate goals by accelerating the savings obtained through their local building energy codes.

The NYC mandates standards for minimum energy efficiency performance for existing buildings under the NYStretch Energy Code. These are more stringent than state-level code (JLL, 2022) by aiming to achieve a 20% boost in energy savings beyond code for residential, commercial, and multifamily buildings (Caputo, 2018).

Following the mandate of Local Law 97 of 2019 (LL97), approximately 50,000 buildings (59% residential and 41% commercial) are required to drastically cut their carbon emissions within the '40 x 30' target (Margolies, 2022). In addition, the LL97 specifies a benchmark, which is set to achieve an average building emissions intensity for all covered buildings of no more than 0.0014 tCO_2e per ft^2 per year (*about 15 $kgCO_2/m^2$*), applicable for calendar years 2040 through 2049 (New York City Government, 2019). Based on the LL97 of 2019, **Table 5** outlines the annual building emission limits for some of the building types classified with respect to occupancy (*also known as Class Use in the UK*).

Table 8: *Annual building emission limits for building classes (Local Law 97 of 2019)*

Building Classes	**Building emission limits ($kgCO_2e/m^2$)**	
	2024-2029	**2030-2034**
Occupancy Group A: Assembly *(excl. dwelling unit. A building or structure used for gathering, social, civic purposes, etc.)*	115.6	45.2
Occupancy Group B: Business *(offices, public or civic services)*	91.1	48.8
Occupancy Group E: Educational *(schools, academies, libraries, day care facilities, etc.)*	81.6	37.0
Occupancy Group F: Factory & Industrial *(factories, manufacturing buildings, etc.)*	61.8	18.0
Occupancy Group R1: Residential *(dwelling and sleeping purposes, for a period less than one month: hotels, motels, club houses, dormitories etc.)*	106.2	56.6
Occupancy Group R2: Residential *(dwelling and sleeping purposes, for permanent purposes: apartment houses, dwellings, etc.)*	72.7	43.8
Occupancy Group S: Storage (warehouses, storage rooms, etc.)	45.9	11.8
The reference document shows values based on tCO_2/ft^2. Conversion factor for ft^2 to m^2 is 0.092903.		

Real estate developers need to undertake major changes in buildings to be in compliant with the city's carbon commitment thresholds and be on track to avoid the penalties. Regarding the electrification of space heating, in 2021, the NYC announced a ban on natural gas in newly constructed buildings that is expected to come into effect from 2027 for buildings with seven storeys high, and from 2023 for all other buildings (New York City Council, 2021). The implication of electrification of space heating, as required by LL97, has raised questions as to whether the current grid can meet the increasing demand (Margolies, 2022).

Summary & insight: Although a wide spectrum of measures has been taken at city level in NYC, only considering operational carbon emissions will not be enough to enable the city to fully decarbonise. There is need to also address embodied carbon emissions to achieve the ambitious goals NYC has set by 2050. The industry of the built environment in the city should therefore adapt and move towards a whole life cycle carbon approach to encompass both operational and embodied emissions (NYC Congress, 2021).

California

Overview of the state's decarbonisation journey: California has introduced a new whole building embodied carbon policy within the 2022 California Green Building Standards Code (CALGreen), Title 24, Part 11, which will be effective from 1st July 2024. This pioneering move marks the first whole building lifecycle assessment (WBLCA) policy in the United States. The amendment provides three compliance path options that can be elected by design professionals to meet the new standards, as per the Figure below.

Proposed Mandatory and Voluntary Carbon Reduction Measures for Non-Residental Buildings

	Existing Voluntary	Mandatory 50,000 sq ft (project aggregate)	Tier 1 50,000 sq ft (project aggregate)	Tier 2 50,000 sq ft (project aggregate)
Building Reuse	75% of the structure and enclosure to be reused.	45% of structure and enclosure to be reused.	75% of the structure and enclosure to be reused.	75% of the structure and enclosure to be reused, AND 30% of interior non-structural elements to be reused.
Whole Building Lifecycle Assessment (WBLCA)	10% reduction from baseline	10% reduction from baseline	15% reduction from baseline	20% reduction from baseline
Prescriptive Approach		175% of IW-EPD GWP limits; concrete 130% of ready-mixed GWP values	150% of IW-EPD GWP limits; concrete 130% of ready-mixed GWP values	IW-EPD GWP limits; concrete 130% of ready-mixed GWP values

The 2022 CALGreen includes a reserved mandatory section for the deconstruction and reuse of existing structures, as well as Tier 1 and Tier 2 voluntary measures. It also requires mandatory Whole Building Life Cycle Assessment (WBLCA), with the intent of indirectly conserving energy and resources. The WBLCA conducted should achieve at least a 10% improvement in environmental impact for specific building components.

The carbon reductions build on California's Buy Clean California Act (BCCA) of 2017, extending the scope of projects covered significantly, and adding to the list of covered materials to include concrete. The compliance paths include one based on reuse of at least 45% of an existing structure; one based on specification of materials that meet specified emission limits, and a third performance-based path that allows use of a Whole Building Lifecycle Assessment analysis.

Hong Kong

Decarbonisation:

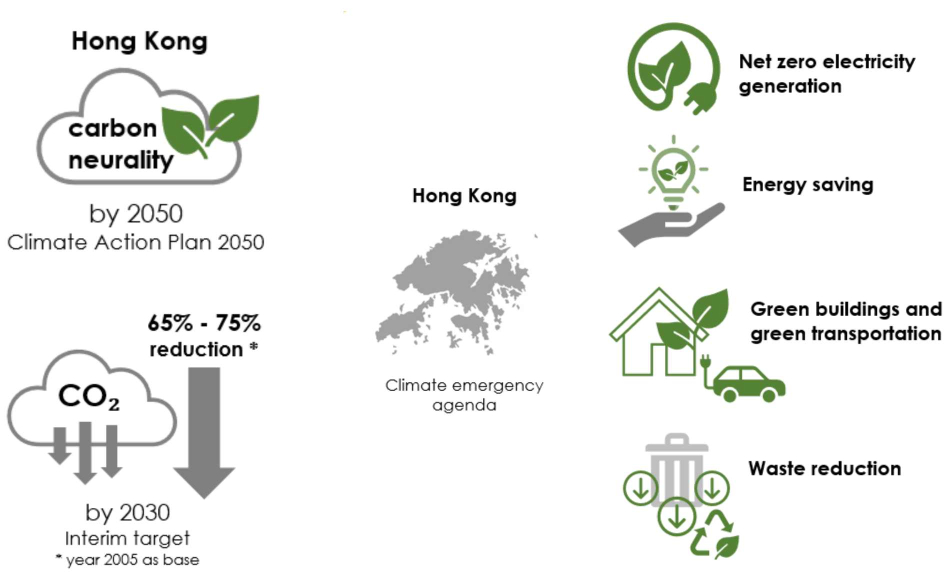


Figure 2

Data source: (Civic Exchange, 20

In Hong Kong, electricity generation is responsible for 66% of the nation's carbon emissions. The building sector is still the major energy consumer and responsible for the 90% consumption of electricity generated in the territory accounting for over 60% of GHG emissions generated in 2019 (Hong Kong's Climate Change Action Plan 2050, 2021). Based on the best available data (EMSD, 2018), Hong Kong is home to many private and government-owned buildings, indicated as more than 42,000 and 8,000 respectively. In addition to the existing building stock, the rate of new build per year was between 300 and 500. It is therefore urgent for Hong Kong to act for decarbonising the building sector, focusing on both new and existing buildings.

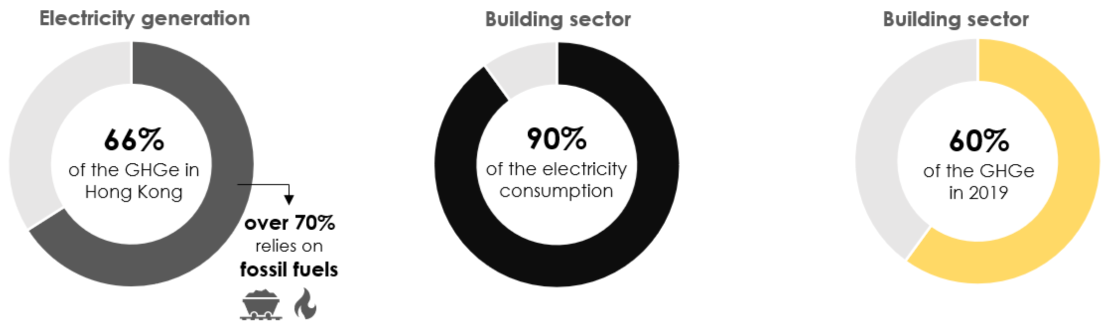


Figure 3 Hong Kong Statistics related to energy and carbon (data source: Hong Kong's Climate Change Action Plan 2050, 2021; EMSD, 2018)

Highlights in the current policy:

- **Energy efficiency:** The Energy Saving Plan for Hong Kong's Built Environment 2015~2025+ (2015) draws attention to reducing energy consumption by looking at the demand-side of energy in Hong Kong to become highly energy efficient by 2025.

- **Embodied carbon:** There has been a lack of regulations mandating the accounting and reporting of the embodied carbon of buildings in Hong Kong. **However, there are some voluntary schemes which are run by Hong Kong Green Council, the Construction Industry Council (CIC), and Hong Kong Green Building Council (HKGBC).**

Energy efficiency in the current policy: The government's policies focus on the supply side of the energy, although the demand side is responsible for a considerable part of the overall emissions. Therefore, it is critical to address the high energy consumption that Hong Kong is experiencing. For this, a requirement has been set out to optimise operational energy performance of both new buildings and existing buildings in the city. This has been mandated through rigid policies, stricter standards, and public visibility of energy efficient buildings (Civic Exchange, 2020).

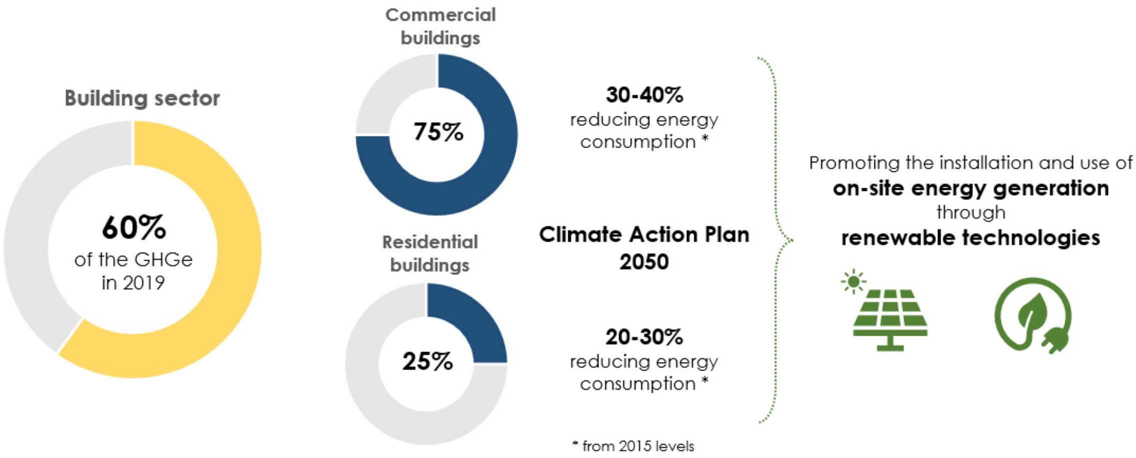


Figure 4

Table 9: *A summary of policies focussing on building energy-efficiency in Hong Kong*

Policies regarding building energy efficiency	**Highlights and key areas focussed on**
The Building Energy Code (BEC)	• Aims to address and reduce high energy consumptions. • The new edition uplifts the energy efficiency standards with an improvement of more than 15 % compared to the previous iteration in 2015
The Building Energy Efficiency Ordinance	• Focussing on 4 key types of building services installation which are air-conditioning installation, lighting installation, electrical installation as well as lift and escalator installation.
The Energy Audit Code (EAC)	• Setting out the technical guidance and details in respect of the energy audit requirements governing the central building services installation.
Source: (The Electrical and Mechanical Services Department, 2022)	

As a private sector professional body and partner to the Government, the Hong Kong's Green Building Council (HKGBC), launched a couple of programs which are the following:

- **HKGBC Benchmarking & Energy Saving Tool (HK BEST):** It is developed to promote better energy performance for commercial and office buildings. It provides a comparison practice for the energy consumption of buildings with other similar buildings and identify potential energy improvement measures. In addition, it gives an appropriate class of recognition to which have achieved outstanding energy performance amongst their market peers.
- **ACT-Shop Program:** In 2016, the programme launched, and it adopts the 4T's operation framework, which namely Timeline, Target, Transparency and Together. The main aim of the programme is to assist building owners to enhance the energy performance of the existing buildings by implementing a knowledge-based energy management and retro-commissioning practices in their buildings (HKGBC, n.d.).
- **BEAM Plus Scheme:** It is the leading initiative to offer independent assessment of building sustainability performance by primarily focussing on to enhance the health and wellbeing of building occupants, to reduce the environmental impact of

buildings, as well as to make buildings more efficient and emit less carbon (HKGBC, n.d.)

- **RCx Retro-commissioning:** It is a cost-effective systematic process to check an existing building performance and identify energy saving potentials for operational improvement. It also offers a systematic training programme for practitioners, professionals, and service providers to fill gaps in knowledge and practice (HKGBC, n.d.).

Embodied carbon measures: There are some voluntary schemes which briefly given below:

- **Carbon Assessment Tool (CAT):** It is an online tool which is designed by the Construction Industry Council (CIC) to create a database of embodied carbon for construction materials, measure the impact of materials and site activities, analyse the carbon performance of the projects as well as establish carbon reduction targets for the industry. The tool is integrated into a voluntary building certification scheme, BEAM Plus NB to promote carbon reduction (Civic Exchange, 2020).
- **Green Product Certification (GPC):** Within the collaboration of CIC and HKGBC, this scheme is designed to classify and certify construction materials and products. The scheme consists of two main streams: Carbon Labelling Scheme and HK G-PASS. The former focusses on only carbon footprint information about the materials, the latter is about overall sustainability rather than focusing on carbon emissions (Civic Exchange, 2020).
- **Hong Kong Green Label Scheme:** This scheme was developed by the Hong Kong Green Council, and it certifies environmentally preferable products through a label, called Green Label. With this, it aims to encourage manufacturers to supply products having a good performance in terms of environmental performance emissions (Civic Exchange, 2020).

It is worth noting that the reporting of embodied carbon impacts is not mandatory in Hong Kong.

Japan, with a special focus on Tokyo

Japan is one of the countries where high percentage of GHG emissions generated. Under the Paris Agreement, the government committed to reach carbon neutrality by 2050 with an interim target of achieving a 46% reduction of GHG emissions by 2030, compared to 2013 (The Carbon Brief, 2018). In line with this, Tokyo, Kyoto, and Yokohama and 931 other local governments announced their commitment to net zero carbon emissions by 2050 as well (Ministry of Environment Government of Japan, 2023).

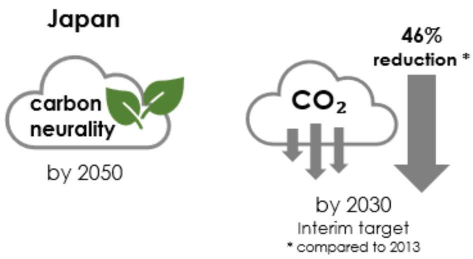


Figure 5 Japan's statistics related to carbon emissions

Highlights in the current policy:

- **Energy efficiency:** For non-residential buildings (≥2000 m^2), it has been mandatory to be compliant with the minimum energy efficiency standards and obtain a certification of conformity with standards since 2017. On the other hand, even though the government aims to achieve net-zero energy consumption in all buildings by 2050, there is no national law serving as a renewable energy requirement for buildings in Japan (Morimoto, 2023).

- **Embodied carbon:** There has been a lack of regulations mandating the accounting and reporting of the embodied carbon of buildings at national level. Similarly, there are lack of voluntary examples of developments that have conducted embodied carbon and WLC assessments.

Energy efficiency in the current policy:

In Japan, the built environment is responsible for approximately 30% of total energy consumption of the country; therefore, energy efficiency and renewable energy are high in the government's agenda. Even though the government aims to achieve net-zero energy consumption in new constructed buildings, as well as houses by 2030, the best available data in 2020 shows that only 0.42% of new constructed buildings and nearly 24% of new built houses were net-zero energy assets. Therefore, the target to achieve net-zero energy consumption all buildings and houses (both existing and new constructed buildings) by 2050 is considered to be highly challenging (METI, 2022) (Climate Acton Tracker, 2023). The latest amendment in the main energy efficiency law, the Building Energy Efficiency Act, took place in 2022 and started to be implemented in 2023. Despite the installation of PV panels was considered, it was not included in the Act. Therefore, there is no national law serving as a renewable energy regulation for buildings in Japan (Morimoto, 2023).

In Japan, compliance with minimum energy standards and obtaining a certification of conformity with standards for non-residential buildings with a floor area of 2000 m^2 or more is mandatory. This mandatory regulation aims to cover all new built non-residential and residential buildings from 2025 onward. In response to the obstacles in achieving net-zero energy in energy-intensive high-rise buildings, Japan plans to streamline height restrictions to energy saving renovations (REthink Tokyo, 2022).

Embodied carbon in the current policy:

There has been a lack of regulations to mandate the accounting and reporting of the embodied carbon of buildings at national level. However, it is promoted to incorporate using more timber in both new constructions and renovations. Timber use is advocated as a building material in construction as a way for achieving carbon neutrality, yet there is no reference of the implications related to embodied carbon. **Regarding the best available sources, increasing the use of timber in buildings is not clearly highlighted as an action within the embodied carbon context. However, it is associated with achieving carbon neutrality in built environment.** In terms of the limitation on building heights, it is planned to be relaxed to enable the increased use of the wooden buildings (16 metres or less).

Tokyo:

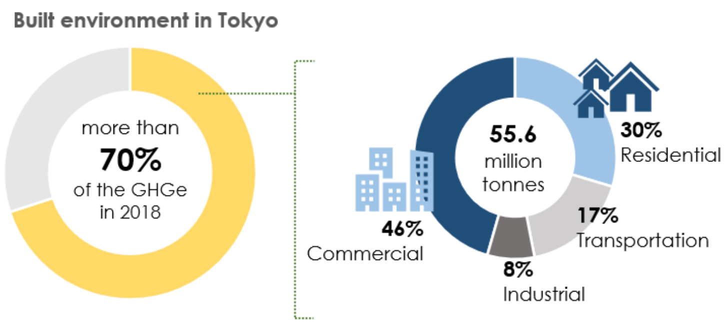


Figure 6

With a special focus on Tokyo, there is a significant amount of energy consumed by the built environment; therefore, there is an urgent need to adopt renewable energy systems in buildings particularly in Tokyo. Although there is no national law serving as a renewable energy regulation for buildings at national level, the Tokyo Metropolitan Government (TMG) amended its ordinance to reflect this urgency in 2022. Within this context, it is required for buildings **within a certain threshold of size** must install photovoltaic panels from 2025.

Due to the abundance of high-rise buildings in Tokyo, the TMG introduced a program, The Cap-and-Trade scheme, to introduce additional requirements for reducing carbon emissions in those existing large-scale buildings and companies. This scheme represents the world's first urban-based emissions trading system. Following this, two more programmes have been developed to target new buildings and small-to-medium buildings too. With these mechanisms, TMG encourages building owners to identify their carbon emissions and implement energy efficiency measures. TMG also provides Low Carbon Benchmarks to enable building owners to understand and contextualise the energy efficiency performance of their buildings (Tokyo Metropolitan Government, 2021).

European level policies and programmes

In 2015, the EU and all its members have committed to the implementation of the Paris Agreement and aim to reach carbon neutrality by 2050 as a long-term goal. Based on 2020 data, it is indicated that approximately 75% of the EU building stock is energy inefficient. This resulted that the building stock was responsible for 40% of energy consumption and 36% of GHG emissions. It is also stated that retrofitting the existing building stock could reduce the EU's total energy consumption by 5-6% and lower carbon dioxide emissions by about 5%. However, the annual renovation rate was estimated to be around 1% of the national building stock. Yet, the rate should be at least double to meet the targets (European Commission, 2020). Therefore, to achieve the ambitious targets of carbon neutrality by 2050, key measures to improve energy efficiency in the existing buildings are required.

In 2019, the European Commission developed the European Green Deal (EGD) with the aim of making the EU's economy sustainable. It provides an action plan and includes a package of policy initiatives which aim to set the EU on the path to a green transition by reducing GHG emissions to at least 55% below 1990 levels by 2030 then reaching climate neutrality by 2050 (European Commission, 2019). To raise the 2030 ambition and put forward a comprehensive plan on how to achieve the targets set in the EGD, the Commission prepared and adopted the 2030 Climate Target Plan (European Commission, 2020). Although both the EGD and the 2030 Climate Target Plan are not enforced laws, they inspire legislations in member states. Therefore, in 2021 European Climate Law enacted the targets into law (Frizberg, 2022).

Within the EGD, some key frameworks, packages and strategies have been introduced. These are explained in detail below.

A Renovation Wave for Europe:

Due to the energy inefficient building stock in the Europe, the Commission presents a strategy, 'a Renovation Wave for Europe', to boost the annual building renovation rate to facilitate meeting the decarbonisation targets. The main objective of the strategy is to at least double the annual energy renovation rate of residential and non-residential buildings by 2030 and to foster deep energy renovations (European Commission, 2020).

On this basis, the Renovation Wave focuses on 3 main areas: (i) tackling energy poverty and worst-performing buildings, (ii) public buildings and social infrastructure, (iii) decarbonising heating and cooling. In line with these, some of the key principles are proposed, these include:

- ***Energy efficiency first***: Puts emphasis and prioritises energy efficiency measures.
- ***Affordability***: Aims to make sustainable and energy efficient buildings widely available for everyone (in particular lower-income households and vulnerable areas).
- ***Decarbonisation and integration of renewables***: Due to that most of the existing building stock relies on fossil fuels as a source for operational energy for the buildings, this principle promotes the integration of renewables to decarbonise the built environment.

- ***Life cycle thinking and circularity***: Focus on minimising the building footprints and emphasises the resource efficiency and circularity as key strategies to reach decarbonisation. It also promotes the use of naturally sourced materials that can absorb and store carbon **(such as materials derived from plants, trees, and soil).**
- ***Tackling the twin challenges of the green and digital transitions together:*** Highlights the important potential of integrating smart systems into the buildings on enabling the highly efficient and zero-emission buildings.

To achieve a truly net-zero carbon building stock, the strategy acknowledges that there is a need for a shift from considering the design, construction and operation of buildings independently from one another, and towards whole life-cycle considerations. The consideration of embodied carbon has started to be implemented or agreed in some countries including the Netherlands, France, and Denmark; while it is still in the planning stage in Finland and Sweden (BPIE, 2021). It is worth noting that renovation projects may in some cases increase embodied carbon through:

- Minimum retention of existing structure
- Additional floors/storeys
- Use of higher carbon intense materials (with higher carbon footprint).

The Fit for 55 Package:

Within the goals of the EGD, the Fit for 55 Package consist of a set of inter-connected proposals to modernise the existing legislation in line with the EU's 2030 climate target and introduce new policy measures to help bring about the transformative changes.

Figure 1 presents the main areas outlined in the Fit for 55 Package.

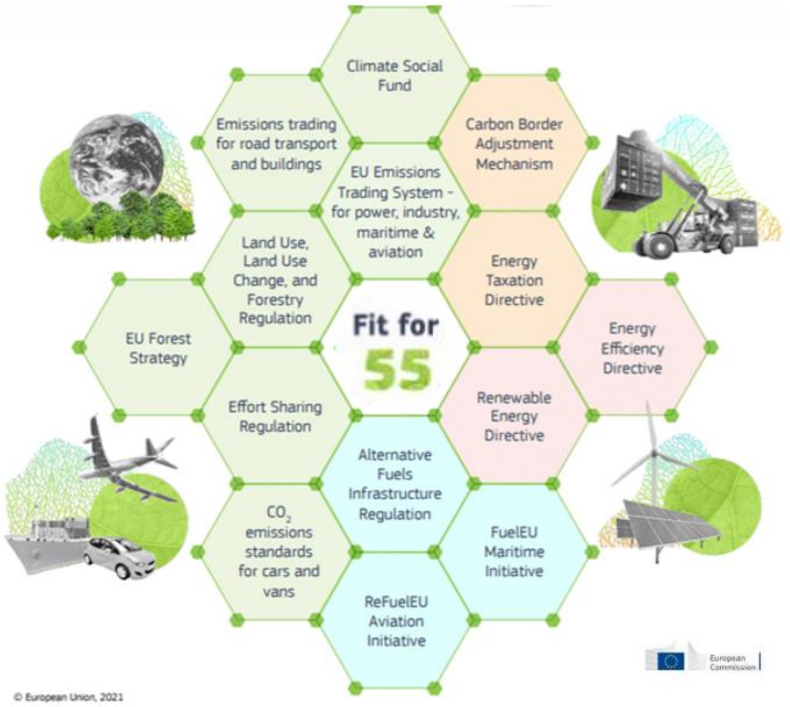


Figure 7: *The main areas in the Fit for 55 Package (Source: European Union, 2021).*

The Energy Performance of Buildings Directive:

To boost energy performance of buildings and reflect higher ambitions and pressing needs in climate action, the European Commission revised the Energy Performance of Buildings Directive (EPBD) by upgrading the existing regulatory framework in December 2021 (EPB Center, n.d.). This revision puts emphasis on increasing the rate of renovation for the worst-performing buildings. With the help of this, it defines how the EU can achieve net-zero emission and decarbonisation of the building stock by 2050. To achieve this, it sets out the Minimum Energy Performance Standards (MEPS) for new buildings, for major renovation of buildings and for the replacement or retrofit of building elements. It also presents a methodology for calculating the integrated energy performance of buildings as well as introduces an energy performance certification (EPC) for buildings (Wilson, 2023).

EPCs are based on an A-G scale to make it easily identifiable. The commission considers that the availability of EPCs in accessible databases enhances the transparency of the performance of the building stock. While they are essential for identifying the worst-performing buildings that requires urgent renovation at the national level, EPCs provide information on energy performance, the percentage of renewable energy as well as energy costs at the building level. In line with these, EPCs can be used to assess the improvements relative to the investment before and after the works; therefore, they can be a useful tool to provide both quality of renovation and cost-effectiveness (European Commission, 2020). It should be noted that the parameters for allocating buildings to particular EPC classes continue to be defined nationally, while the distribution of buildings across the A-G scale varies considerably between Member States (Wilson, 2022).

A closer look to the MEPS defined at European level, the worst performing buildings, those in Energy Performance Certificate (EPC) classes G or F, are required to be renovated. In addition, public and non-domestic buildings are required to be improved to at least EPC class F by 2027, and to at least class E by 2030. Regarding the residential buildings, it is required to be renovated to achieve at least class F by 2030, and to at least class E by 2033. Member States must then establish specific timelines for achieving higher energy performance classes through new National Building Renovation Plans, in line with their pathway to achieve zero-emission building stock by 2050. Member states are also expected to set national MEPS in line with their National Building Renovation Plans (European Commission, 2021).

The latest recast on the EPBD brings the following issues:

- **A new definition of 'zero emissions building':** This means as '*a building with very high energy performance where the very low amount of energy required is fully covered by energy from the building itself or from locally produced renewables*'. It will be applicable to all new buildings from 2027 and to all renovated buildings from 2030 (Wilson, 2022).
- **National building renovation plans:** The Commission proposed these as a replacement of the *long-term building renovation strategies* to promote the inclusion of concrete targets for renovation by 2030, 2040, and 2050. These plans will require to be renewed in 5-year period and be fully integrated into the 10-year National Energy and Climate Plans (NECPs) (Wilson, 2022).

- **The life-cycle Global Warming Potential (GWP):** The latest recast in EPBD is set to integrate measures for the decarbonisation of buildings. From 2030, this indicator is required to be calculated for all new buildings (applicable to all large buildings > 2000 m^2 from 2027 onwards) (Wilson, 2022).
- **New provisions relating to EPCs:** The validity of period for EPC classes D-G would be reduced to only 5 years (rather than 10 years), to ensure they reflect the latest efficiency standards. EPCs in classes A-C would continue to be valid for up to 10 years (Wilson, 2022).
- **Obligation to issue and display EPCs:** In 2010, it became mandatory to produce and display EPCs for the sale and rental of new buildings; however, it was not required for the existing buildings. The current EPBD requires all new buildings and those undergoing major renovations to have an EPC, as well as 'all buildings' sold or rented out to new tenants (Wilson, 2022).
- **Renovation passports:** The Commission is planning to develop an EU framework for renovation passports. It is believed that the development of national schemes for the renovation passports can facilitate the owners to plan a staged renovation of the building (Wilson, 2022).
- **Smart readiness of buildings:** The Commission is planning to develop a smart readiness of buildings indicator to be applicable to all large non-residential buildings. This would be required to install mandatory building automation and control systems for these buildings. The latest recast on the EPBD aims to change the threshold for the non-residential buildings from '> 290 kW (for large buildings)' to '> 70 kW (for medium to large buildings)'. (Wilson, 2022).
- **Encouraging renewable heating systems:** From 2027 onwards, the Member States would not be able to subsidise the use of fossil fuel boilers (Wilson, 2022). To ensure the decarbonisation of the building sector, the latest revision requires that all new buildings (in the case of being technically feasible) have 100% of on-site energy consumption covered by renewable energy as of 2030, with an earlier adoption as of 2027 for public buildings (European Commission, 2021).

In line with these, it can be stated that clear efforts have been taken to foster more transparency, better comparability, better implementation, and monitoring procedures within the aim of building decarbonisation at EU level (European Commission, 2021).

Ecodesign for Sustainable Products (ESPR):

The Ecodesign Directive has been established in 2009 with the intent to deliver benefits to the environment and businesses by mandating regulations for energy-related productions Rooted on the Directive, the Ecodesign for Sustainable Products Regulation (ESPR) was published in March 2022 to set Ecodesign requirements for specific product groups. It centred on improving the circularity, environmental sustainability as well as energy performance of the products. Therefore, the proposal represents a cornerstone of the Commission's approach to more environmentally sustainable and circular products. While it is still in the drafting stage, it is planned to be mandated to cover the following sustainability requirements (European Parliment, 2023):

- Durability, reusability, upgradability, and reparability,
- Recycled content as well as remanufacturing and high-quality recycling,
- Carbon and environmental footprints,
- Energy and resource efficiency, and
- Digitalisation of product information.

The Construction Products Regulation (CPR):

Adopted in 2013, The Construction Products Regulation (CPR) is a key regulatory framework for construction products. It is construction-specific and centred on the specific needs of the industry to deliver construction products in the European common market through a harmonised format. Its approach is performance based, which means that manufacturers declare information about their products' performances (Construction Products Europe, 2021) via a Declaration of Performance (DoP). Considering the ambitious decarbonisation targets, the CPR amendments should aim to ensure all construction projects, both new and renovation projects, are able to contribute meeting the targets as well as embrace the principles of circular economy (Wardal & Briard, 2022).

Given the large contribution of the construction sector to Europe's GHG emissions, the CPR has an important potential to not only reduce the carbon intensity of Europe's building stock, but also provide impetus for the decarbonisation of the construction materials having carbon-intensive manufacturing processes (Sandbag, 2020)**.**

Level(s) Framework:

Due to lack of a standardised approach to measure the sustainability of buildings, the European Commission introduced a framework, 'Level(s)', as a response to this problem. **It was officially launched on 15 October 2020.** It is a voluntary framework which is based on a life-cycle approach considering whole lifetime of buildings. Therefore, it goes beyond operational carbon performance of the assets; it covers embodied carbon impacts of the buildings and promotes adopting circular economy principles. Within its core macro-objectives (**Figure 10**), the first one, Greenhouse gas emissions along buildings life cycle, considers the life cycle impacts of buildings. **It does not specify any benchmarks. The main aim is setting out a methodology, common language for how to undertake assessments.**

The results are required to be reported in $kgCO_2e$ per m^2 of useful internal area for a 50-year time frame (One Click LCA, 2022).

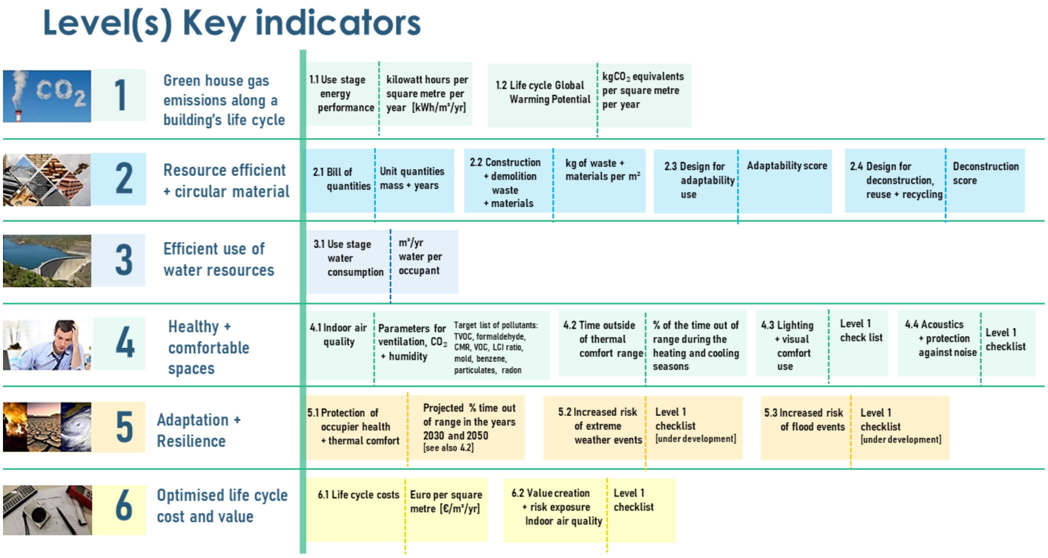

Level(s) Key indicators
CO2
1
Green house gas emissions along a building's life cycle
1.1 Use stage energy performance
kilowatt hours per square metre per year [kWh/m²/yr]
1.2 Life cycle Global Warming Potential
kgCO2 equivalents per square metre per year
2
Resource efficient + circular material
2.1 Bill of quantities
Unit quantities mass + years
2.2 Construction + demolition waste + materials
kg of waste + materials per m²
2.3 Design for adaptability use
Adaptability score
2.4 Design for deconstruction, reuse + recycling
Deconstruction score
3
Efficient use of water resources
3.1 Use stage water consumption
m³/yr water per occupant
4
Healthy + comfortable spaces
4.1 Indoor air quality
Parameters for ventilation, CO2 + humidity
Target list of pollutants: TVOC, formaldehyde, CMR, VOC, LCI ratio, mold, benzene, particulates, radon
4.2 Time outside of thermal comfort range
% of the time out of range during the heating and cooling seasons
4.3 Lighting + visual comfort use
Level 1 check list
4.4 Acoustics + protection against noise
Level 1 checklist
5
Adaptation + Resilience
5.1 Protection of occupier health + thermal comfort
Projected % time out of range in the years 2030 and 2050 [see also 4.2]
5.2 Increased risk of extreme weather events
Level 1 checklist [under development]
5.3 Increased risk of flood events
Level 1 checklist [under development]
6
Optimised life cycle cost and value
6.1 Life cycle costs
Euro per square metre [€/m²/yr]
6.2 Value creation + risk exposure Indoor air quality
Level 1 checklist

Figure 8

France, with a special focus on Paris

Decarbonisation

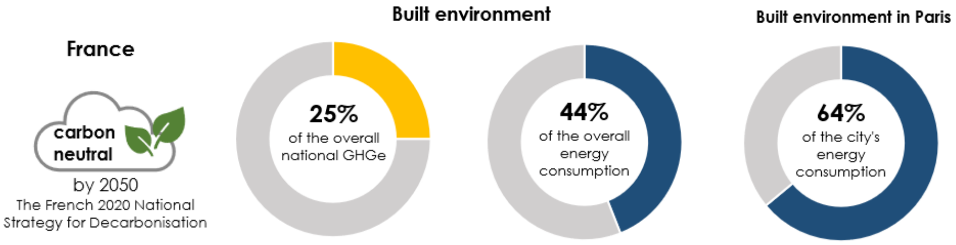


Figure 9

The building sector in France accounts for almost 25% of national GHG emissions and is responsible for 44% of energy consumption (Agora Energy Transition, 2022). In Paris, the energy consumption of building sector accounts for 64% of the city's energy consumption (CDP, 2019). In response to this, the city prepared a Climate Action Plan for Paris that aims to achieve the decarbonisation of all buildings (as well as all sectors) by 2050, in line with the (SNBC) (Agora Energy Transition, 2022). In addition, the city has an interim target for new buildings to be operationally net zero carbon by 2030. In line with the regulatory enforcements, several programmes, and initiatives both the national and regional level, are monitored to achieve the decarbonisation goals (Castellazzi, et al., 2022). For example, the Territorial Energy Renovation Platform (*Plateforme Territoriale de Rénovation Énergétique – PTRE*) provides financial, technical, and legal support on dwelling renovation projects to the individuals to achieve this (Bordier, et al., 2018).

Highlights in the current policy:

- **Energy efficiency:** It is mandatory to have an EPC for new and existing buildings when sold or rented as well as undergo major renovations. France's Energy Transition Law encourages new constructions to have low-energy and low carbon profiles.

- **Embodied carbon:** From 1st of January 2022 onwards, it is required to calculate whole life cycle emissions for all residential, office, and primary or secondary educational buildings applying for a building permit. The RE2020 regulatory calculation method is to use for the assessments.

To meet these ambitious targets, in 2016, the government prepared a pilot programme, called Énergie Positive & Réduction Carbone (E+C-) for the regulatory method and tools. Its methodology is based on two performance levels regarding carbon and energy efficiency (One Click LCA, 2018). This programme provided a basis for a new environmental regulation, called RE2020, was introduced in 2021 that provides more detail and emphasises the need to reduce, not only operational carbon, but also embodied carbon following a whole life carbon perspective (JLL, 2022). Moreover, it significantly tightens the existing energy efficiency requirements on the built environment and specifically aims for a 52% reduction in embodied carbon emissions arising from all new buildings by 2031 (in comparison to 2015). This is in line with the Paris' decarbonisation strategy by 2050 (Kone, 2022; ACAN, 2021). In addition, RE2020 promotes radical transformation of construction techniques and materials used to enable a market lower carbon content materials for construction (Agora Energy Transition, 2022). It is now mandated by French policy that all new public buildings are required to be constructed with at least 50% timber or other natural materials (Crook, 2020). Moreover, this new regulation requires new developments to undertake a whole-life carbon assessments via dynamic life-cycle approach. It concerns initially all new residential projects, secondly offices and primary and secondary school buildings, and lastly specific tertiary buildings such as, hotels, shops, gymnasium (Ministère de la Transition énergétique, 2023). Through dynamic life-cycle approach, the RE2020 proposes an ambitious threshold for embodied carbon emission of 100 $kgCO_2e/m^2$ which favours low-embodied carbon materials, biobased materials, and timber (RE2020, 2020).

Table 7 provides a brief information regarding the thresholds for the construction-related emissions for different types of residential buildings (Ministre de la Transition Écologique, 2021).

Table 10: *Based on RE2020, the thresholds for construction-related emissions of the types of residential buildings*

Building types	**Thresholds ($kgCO_2e/m^2$)**			
	2022	**2025**	**2028**	**2031**
Single-family houses	640	530	475	415
Apartment buildings	740	650	580	490
Offices*	980	810	710	600
Educational buildings *	900	770	680	590

***** Source: https://www.actu-environnement.com/ae/news/RE2020-decret-exigences-bureaux-batiments-enseignement-39197.php4

The RE2020 also sets some requirements to control the consumption limits (Bureau Etude Thermique, 2022):

- The annual primary heating consumption of a new building should be less than 12 kWh/m^2 per year.
- The total primary energy consumption is required to be less than 100 kWh/m^2 per year.

An overall renovation roadmap leading to Nearly Zero Energy Buildings has been introduced by the government (Energy and Climate Law, revised in 2019). This strategy addresses the obligatory renovation of existing building stock which has excessive energy consumption and requires that each renovation (deep renovations including staged renovations) is compatible with the roadmap guidance. The renovation obligation is expected to come into force in January 2023. This obligation addresses two building types with poor energy performance (based on the DPE[3] results) including dwellings and tertiary buildings over 1000 m² (Castellazzi, et al., 2022).

With the adoption of RE2020, France has strengthened labelling and building codes for new construction. The energy performance certificate of buildings, DPE, is based on two main criteria: its primary energy consumption and its GHG emissions. Figure 2 shows the scale of DPE for dwellings.

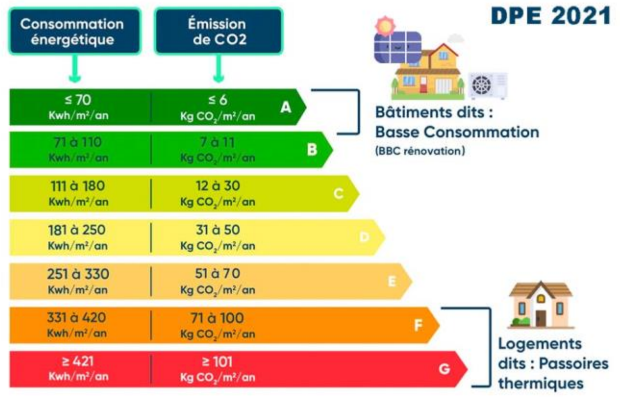
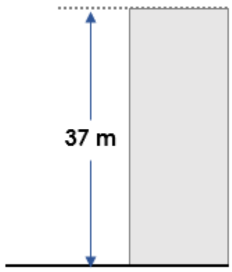


Figure 10: *DPE classification for dwellings (HBS France, 2021)*

Regarding the DPE classification, it should be noted that the building will be classified according to the worst performance between these two thresholds. For example, if the energy consumption of a dwelling is 190 kWh/m² per year but its CO_2 emissions are estimated at 68 $kgCO_2/m^2$ per year, it will be classified E instead of D.

It has been estimated that 17% of the building stock is classified within the F and G, as the worst performing buildings based on the data published by ADEME (MTE, 2020). Therefore, the government is strengthening building codes and labelling efforts, notably through the reformed DPE and the Low Consumption Building Renovation labelling. **The government passed legislation in 2020 detailing its minimum energy performance standards for non-domestic buildings. From 1 January 2030, it will be prohibited to occupy or use any office building without having at least an DPE C rating** (McAllister & Nase, 2023)**.** Starting from 2022, it is required for the dwellings to have mandatory energy audits prior to their sale or rental. From 1 January 2023, it is required a minimum energy performance criterion of 450 kWh/m² year in final energy in the definition of "decent housing". A dwelling cannot be rented if its performance is greater than this threshold (International Energy Agency, 2021).

> Paris:
> The new local plan, the Plan Local d'Urbanisme (PLU), has adopted in the city and it introduces a height limit for new buildings. Therefore, it allows the construction of the buildings no more than a 37-metre height. With this limitation, the regulation emphasises the challenge on optimising environmental performance of tall buildings due to having both higher energy consumption levels in their operation and embodied carbon intensive design in their construction (Gerrard, 2023).



[3] Diagnostic de Performance Energétique (Energy Performance Diagnosis), is a French EPC. It was introduced in 2006 and is issued for both existing and new buildings (Bordier, et al., 2018).

Germany, with a special focus on Berlin

Decarbonisation

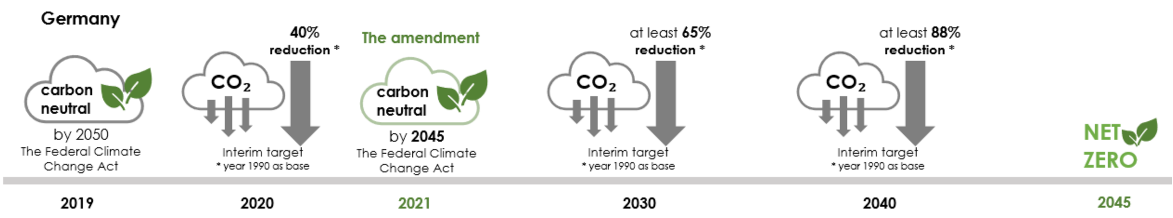


Figure 11

Data source: (BMWK, 2022).

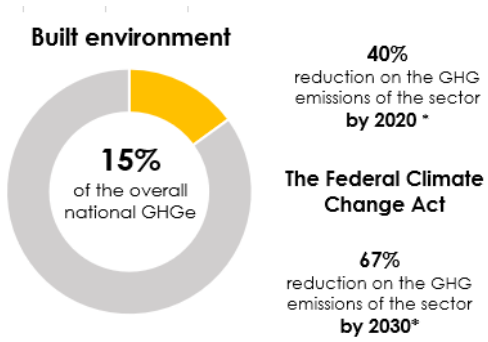


Figure 12

At national level, Germany aims to be carbon neutral by 2045 under the Federal Climate Change Act. **However, Berlin has more ambitious target and has committed to ensure that all new buildings and constructions will be climate-neutral by 2030, and all buildings will be operated net zero by 2050** (JLL, 2022). As an interim, Germany aimed to reduce GHG emissions of the building sector by 40% (comparing the 1990 level) by 2020, however it narrowly achieved this target. The building sector has been the only sector that failed to meet the interim target. Furthermore, the country aims to achieve a 67% reduction in the sector's emission until 2030 (BMWK, 2022). Major efforts are needed to achieve the ambitious reduction targets (DGNB, 2021).

Highlights in the current policy:

- **Energy efficiency:** It is mandatory to have an EPC for new and existing buildings when sold or rented as well as undergo major renovations (Buildings Performance Institute Europe, 2017). **In May 2023, the government has started to regulate energy efficiency targets for buildings. For renovated non-residential buildings, it is required to meet at least EPC C (around 300 kWh/m².a). Regarding new built non-residential buildings, the minimum requirement is EPC B (or A, around 200 kWh/m²a)**

- **Embodied carbon:** There has been a lack of regulations mandating the accounting and reporting of the embodied carbon of buildings at national level, therefore, the practice has been in voluntary basis. The German Sustainable Building Council (DGNB) has set out requirements for accounting embodied carbon (EC) emissions.

Energy efficiency in the current policy: Germany is one of the pioneer countries that has been applying regulations and measures to increase energy efficiency performance of buildings (Economidou, et al., 2020). Like other countries, Germany's existing building stock creates a challenge to reach firm decarbonisation targets. Based on the BMWK report (BMWK, 2022), it is indicated that majority of emissions in the building sector is arising from burning fossil fuels inhibiting Germany to reduce the sector's energy demand. It is therefore imperative that several key measures are undertaken including energy-efficient renovations, increase of electrification (of heating and transport), and growth of renewable energy technologies. To achieve the targets, the Federal Government revised the legal requirements to create a coordinated and single modern law, the German Buildings Energy Act *(Gebäudeenergiegesetz, GEG)* introduced in 2020. The GEG legislation introduces mandatory standards for energy performance of new construction, existing building stock and the use of renewable energy for heating and cooling buildings (Federal Ministry of the Interior and Community, n.d.) (Castellazzi, et al., 2022). Following this regulation, 50% of the energy for heating demand of new buildings is required to be generated by renewable energy sources by 2030 (BMWK, 2022).

> GEG 2023 update - **Energy efficiency in buildings**: The requirements for both new construction and redevelopments to limit the environmental impact of energy demand for heating and hot water. To achieve this, a part of the building's energy supply needs to be covered by renewable energies (Verbraucherzentrale, 2023). From 2023, it is required to install photovoltaic (PV) or solar thermal energy systems for new buildings and existing buildings undergo a major renovation. The installation area should be at least 30% of the gross roof area of the buildings (JLL, 2022).

- EPC classes in Germany are based on a A-H scale with a subclass for class A, A+. It is mandatory to have an EPC for new and existing buildings when sold or rented as well as undergo major renovations (Buildings Performance Institute Europe, 2017). **In May 2023, the government has started to regulate energy efficiency targets for buildings. For renovated non-residential buildings, it is required to meet at least EPC C (around 300 kWh/m².a). Regarding new non-residential buildings, the minimum requirement is EPC B (or A) around 200 kWh/m²a).**

Embodied carbon in the current policy:

There has been a lack of regulations mandating the accounting and reporting of the embodied carbon of buildings at national level, therefore, the practice has been on a voluntary basis. The German Sustainable Building Council (DGNB) has set out requirements for accounting embodied carbon (EC) emissions. Within the voluntary certification, undertaking LCA is mandatory part of the scheme. The DGNB set a reference value for the embodied carbon of the construction as 9.4 $kgCO_2e/m^2a$ (*where a represents 50-year lifetime of buildings, equals to 470 $kgCO_2e/m^2$ for 50 years, 564 $kgCO_2e/m^2$ for 60 years*). The reference value is below the value determined in a study by the German Federal Environment Agency as 10 - 16 $kgCO_2e/m^2a$ (*500 – 800 $kgCO_2e/m^2$ for 50 years*) for new buildings (DGNB, 2021).

The DGNB also developed an assessment and rating system, the BNB assessment[4], to be applicable for only new federal buildings. The assessment system became mandatory in 2011 and it initially focussed on office buildings. The methodology and some parts of it are based on whole building LCA, and brings a certificate based on the performance of the building. The system relies on a national LCA/EPD database, ÖKOBAUDAT -developed by the Federal Ministry for Housing, Urban Development and Building, and bespoke calculation rules. The performance of the building is determined by weighting of scores for different environmental impacts to produce a single overall environment impact score; therefore, it helps to specify performance limits for benchmarking and comparison practices against these limits (AECOM, 2019). After introducing requirements for new federal buildings, the government started to implement LCA requirements for refurbishments for existing federal buildings as well. In line with these, it can be clearly seen that considering the embodied carbon emissions of the buildings is gaining importance at national level. However, the building sector in Germany could not achieve its sectoral reduction targets a second time since 2021 (Bundesministerium für Wirtschaft und Klimaschutz, 2022). Therefore, there is an urgent need to develop strategies to achieve the country's decarbonisation target (Weinfeld, et al., 2023).

There are some external initiatives related to the energy efficiency, including EnerPHit. EnerPHit is a certification programme offered by the *Passivhaus Institut* for retrofitting buildings, that aims to deliver energy efficient buildings. It creates a benchmark for renovations and serves as a guideline for the modernisation of existing buildings by ensuring the buildings have reasonable thermal protection. It can be applied for residential and non-residential buildings (Passive House Institute, 2016).

[4] Bewertungssystem Nachhaltiges Bauen für Bundesgebäude, (https://www.bnb-nachhaltigesbauen.de/en/assessment-system/office-buildings/)

The Netherlands, with a special focus on Amsterdam

Decarbonisation

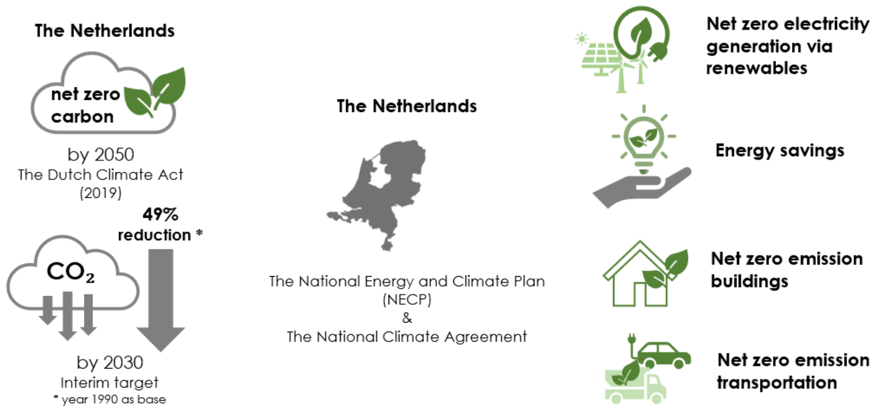


Figure 13

Source: (International Energy Agency, 2021) (The Government of the Netherlands, 2019).

Focus on built environment

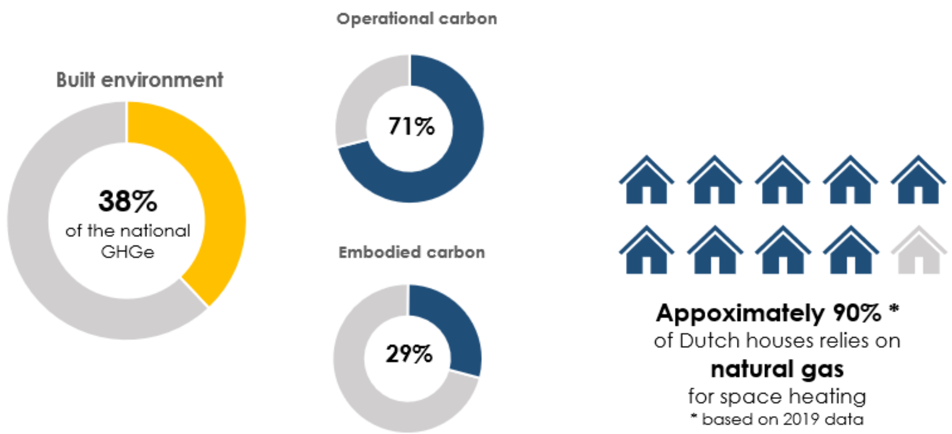


Figure 14

Source: (Fraunhofer ISI, 2022)

In the Netherlands, construction and building regulations are defined under the Building Decree 2012. It sets the minimum requirements in terms of energy efficiency, embodied carbon, health, safety and construction and demolition work for all structures (Rijksdienst voor Ondernemend Nederland, 2022).

Highlights in the current policy:

- **Embodied carbon:** Under the Building Decree 2012, all new residential and new office buildings over 100 m² are required to undertake a whole-building LCA via a national assessment method, MilieuPrestatie Gebouwen (MPG). **The MPG is based**

on a weighting methodology on the environmental categories. Therefore, it specifies building LCA limits based on €/m²/a.

- **Energy efficiency:** The Building Decree has been recast with stricter energy performance requirements which includes the requirement for new buildings owned by the government and ~~house~~ government agencies to be nearly zero energy from December 2018 onwards (Cruchten, 2020).

- **Energy Performance Certificate:** It is mandatory to provide a registered and definitive energy label (EPC rating) for both residential and non-residential buildings to the buyer or tenant in the case of selling or renting the buildings.

- **Limiting values for the energy performance of offices:** It is required for every office building larger than 100 m² to have at least **EPC C** level or above, from January 2023 onwards. This requirement is applicable to existing office buildings as well. **Currently, MEES targets only office buildings at the national context.**

Energy efficiency in the current policy: In addition to the Building Decree, a package of laws and regulations are also applicable for buildings. As from 2019, it is mandatory for companies to report on which energy saving measures they have implemented with a 4-year period (Odyssee-MURE, 2021). Furthermore, in line with the EU EPBD, a national EPC classification is defined. The class range is defined between the A to G, with subclasses for class A (A+++++, A++++, A+++, A++, A+, A).

From 2021, energy labels are based on a new method, the NTA 8800 certification. This method aims to include more details about the energy performance of the buildings and is applicable to both new and existing constructions. The EPC levels are based on the BENG 2 (primary fossil energy consumption, kWh/m²) requirements. The validity of EPC labels currently lasts 10 years (Rijksdienst voor Ondernemend Nederland, 2022). **Currently, it is required for every office building larger than 100 m² to have at least EPC C level or above. Furthermore, the government intends to increase the minimum standard which is projected to be required for all offices to have at least EPC A level by 2030** (McAllister & Nase, 2023).

Despite the ambitious limiting values for the energy performance in office buildings, the research undertaken by Savills Research in 2021 indicates that 11% of the office stock in the Netherlands does not meet this legislation criteria and more than 32% of the office stock has not any energy label at all yet. The report also highlights the speed of sustainability renovations for offices is not in line with the objectives of the government; therefore, it is projected to see more demand for the energy efficient offices than the availability of them in 2023.

Embodied carbon in the current policy: The Netherlands is a pioneer country where embodied carbon was specified under a public policy. Since the Building Decree 2012 came into force in January 2013, it is required to account as well as report embodied carbon impacts of all new buildings over 100 m². The regulation has not been applicable for renovation and refurbishment works undertaken in existing buildings. To calculate building's environmental profile, a national and standardised assessment method, MilieuPrestatie Gebouwen (MPG), was developed by the government.

The MPG assessment concerns carbon emissions of the use of materials; therefore, it excludes the operational carbon impacts (Module B6) and water use (Module B7). The scope of assessment is specified to cover foundations, floors, supporting structures, façades, roofs and building installations. To undertake embodied carbon assessments, a national EPD database and several tools have been also provided. Therefore, the MPG assessment is limited to materials available in the database.

Figure X shows the process flow of undertaking the MPG assessment method.

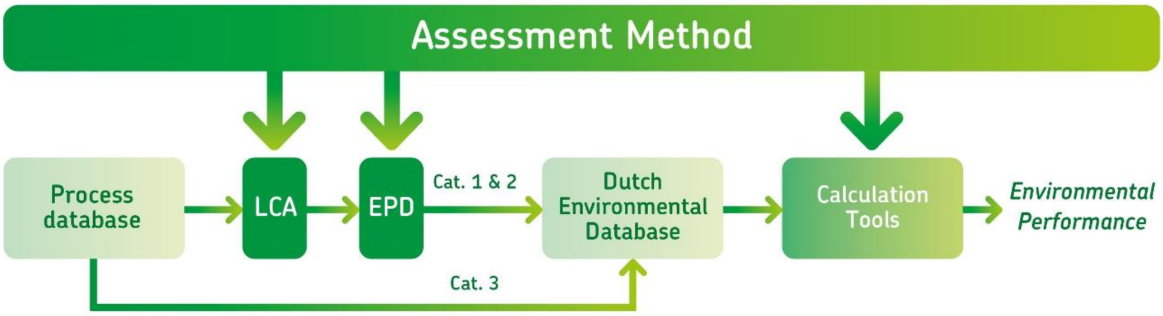


Figure 15 MPG assessment methodology (source: Nationale Milieu Database, 2023)

The MPG, based on a weighting methodology on the environmental categories, assigns the impacts into the shadow price indicator. It specifies building LCA limits within the format of €/m²/a. In 2018, the initial limit value for all buildings was specified as 1.0 €/m²/a. However, in 2021, the limit value was tightened for all residential buildings to 0.8 €/m²/year, while the value stayed the same for office buildings (One Click LCA, 2022)**.**

As an external initiative, DGBC introduced a nationwide plan, *The Paris Proof Commitment: Delta Plan for Sustainable Renovation* in line with the national targets declared within the Paris Climate Agreement in 2015. The main objective of this plan is providing transparency on actual energy use and CO_2 emissions in buildings by monitoring and reporting the actual figures (DGBC, 2020).

In line with the Paris Proof Commitment, DGBC indicated threshold values for some of the building types for new constructions and renovations as an attempt regarding the limiting embodied carbon emissions.

Table 8 shows the limit values for embodied carbon applicable for new constructions (DGBC, 2021).

Table 11: *In line with the Paris Proof structure, embodied carbon thresholds for new constructions*

	Embodied carbon ($kgCO_2e/m^2_{GFA}$)			
Building type	**2021**	**2030**	**2040**	**2050**
Single family home	200	126	75	45
Multi family home	220	139	83	50
Office	250	158	94	56
Retail	260	164	98	59
Industry (distrubition center)	240	151	91	54

Table 9 shows the limit values for embodied carbon applicable for renovations (DGBC, 2021).

Table 12: *In line with the Paris Proof structure, embodied carbon thresholds for renovations*

	Embodied carbon ($kgCO_2e/m^2_{GFA}$)			
Building type	**2021**	**2030**	**2040**	**2050**
Single family home	100	63	38	23
Multi family home	100	63	38	23
Office	125	79	47	28
Retail	125	79	47	28
Industry (distrubition center)	100	63	38	23

Overall, it is highlighted by the Dutch Green Building Council, DGBC, (2021) that the efforts on existing building stock are required to reduce their operational emissions as well as their embodied carbon emissions when undertaking sustainably renovation. Whilst for new constructions, the DGBC advised that the primary focus should be on reducing embodied carbon primarily.

Specific focus on Amsterdam: In 2020, The Climate Neural Roadmap 2050 was published by the City of Amsterdam, Spatial Development and Sustainability (SDS). According to this roadmap, the following areas have been emphasised:

- *Sustainable heating:* There is an urgent need for a shift from dependency on natural gas for space heating to alternative sources for heating to save energy. The city aims to develop a sustainable heat distribution as well as maintaining, extending, and greening the existing heat sources.
- *Energy efficient buildings*: The city is planning to put a tougher set of mandatory instruments, for new built dwellings and offices. As an example, it will be mandatory for all offices in the city to get EPC A rate from 2030 onwards (SDS, 2020).
- *Moving towards circular economy*: The city aims to be a completely circular by 2050; it is believed that moving towards a circular economy helps significantly to reduce CO_2 emissions by increasing the use of recycled and biobased materials in construction (Municipality of Amsterdam, 2020).

Denmark, with a special focus on Copenhagen

Decarbonisation

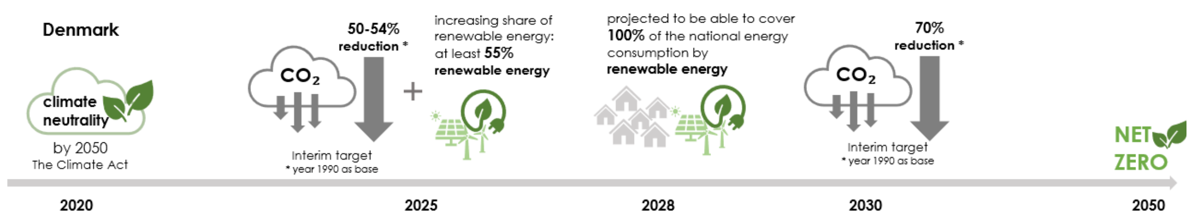


Figure 16

Focus on built environment

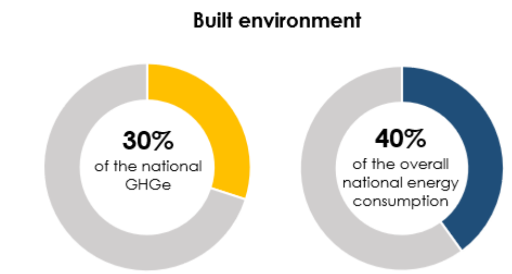


Figure 17

Source: (State of Green, 2022)

Highlights in the current policy:

- **Embodied carbon:** The National Strategy for Sustainable Construction introduced limitations for embodied carbon emissions for; these came into force in 2023. All new buildings required to undertake LCA; yet only large buildings (>1,000 m²) must meet the limits. New buildings (>1,000 m²) must comply with a carbon emissions limit of **12 $kgCO_2e/m^2$ per year**

- **Energy efficiency:** The energy efficiency requirements apply to new buildings as well as reconstruction and refurbishment of the existing building stock (Ramussen, 2021).

- **Energy performance certificate of buildings:** It is mandatory to carry out regular energy labelling of buildings. From 2010, it is required for all new buildings to have a minimum **Danish EPC ranking of A** (Nykredit Group and MOE, 2022). However, the minimum energy performance standards for existing buildings (not undertaking renovation) have not been introduced yet (Ramussen, 2021).

The Building Code 2018 -BR18 is one of the main policy instruments to achieve energy savings and applicable to new construction and renovation works. It is revised every 5 years to align with the technological developments (State of Green, 2022).

The 2020 Green Housing Agreement, launched in May 2020, highlights the comprehensive refurbishment measures specifically prepared for the council housing sector (Danish Ministry of the Interior and Housing, 2021).

Energy efficiency in buildings, the current policy:

Approximately 25% of the energy consumption in existing buildings is used for space heating and hot water. Thus, enhancing the energy performance of the existing building stock becomes important measure to achieve the green transition. Within this aim, the Danish government has set ambitious energy policies and measures. In the context of the BR18, **it is required for renovations in existing buildings to reduce the need for energy supply by minimum 30 kWh/m² per year. There are two categories (Renovation Class 1, and Renovation Class 2) within this framework. Table X shows energy performance framework for renovation of existing office buildings.**

Table 13: *Energy performance framework for existing buildings undertaking renovation*

Offices, schools, institutions, etc.	kWh/m² per year + kWh/year per heated floor area	Energy Label (EPC)
Renovation Class 1	71.3 + 1650	A2020
Renovation Class 2	135 + 3200	C

Table adapted from Kiviste, Musakka, Ruus, & Vinha (2023) and Ministry of Transport, Building and Housing (2018).

In addition, renewable energy must constitute part of the total energy supply in both new and existing buildings (except for listed buildings, churches, and building worthy of preservation) in the case of this is technically possible and financially viable (Ministry of Transport, Building and Housing, 2018) (Kiviste, et al., 2023).

As a part of these measures, EPCs or Energy Labelling has been used in Denmark since 2006 in accordance with the EU EPBD, and it is mandatory to have an EPC for (i) sale and rental of buildings, (ii) new buildings, and (iii) public buildings greater than 250 m² usable floor area (State of Green, 2022). These are valid for 10 years in Denmark (JLL, 2022). In addition, EPCs with building-specific data are required to be publicly available online. Based on the recent data, half of the building stock in Denmark already has EPC (State of Green, 2022).

Embodied carbon in the current policy:

Within the aim of reducing environmental impacts of the built environment, the Danish Ministry of Interior and Housing has launched the national strategy, the National Strategy for Sustainable Construction, in April 2021. It aims to tightening targets for operational carbon emissions and introduce limits for embodied carbon emissions for buildings. The strategy makes previous voluntary regulations into mandatory and strict ones from 2023 onwards. Denmark entered a new phase in 2023, becoming a pioneer country which introduces mandatory embodied carbon limits into the regulations (Danish Ministry of the Interior and Housing, 2021).

The Danish strategy requires to undertake an LCA calculation for buildings below 1,000 m^2, without a threshold limit for whole life carbon emissions (CO_2e). However, for larger buildings (>1,000 m^2), an LCA is required as well as meeting the threshold limits. The strategy has a step-by-step phasing for the limits. The initial limit value is 12 $kgCO_2e/m^2$/year. Currently, the strategy is applicable only for new buildings no matter the building type is (Danish Ministry of the Interior and Housing, 2021).

Figure 20 shows the step-by-step phasing and scaling up of CO_2 requirements.

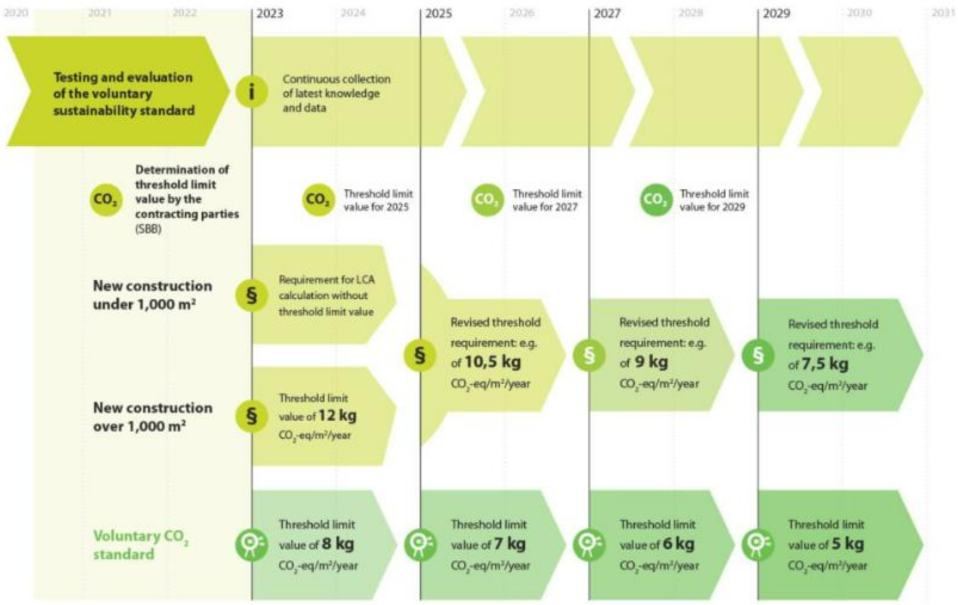


Figure 18: *Step-by-step phasing and scaling up of CO2 requirements within the National Strategy for Sustainable Construction, Source: Buro Happold and Danish Ministry of the Interior and Housing (2021).*

It should be noted that not all modules in an LCA calculation must be calculated and documented in compliance with the requirement. The LCA methodology in Denmark, Bygningsreglement, only covers *Module A1-A3, Module B4, Module B6, Module C3-C4, and Module D*. Module D should be reported, although it should not be included in compliance with the limit value for buildings over 1,000 m^2 (Bygningsreglement, n.d.).

The Danish government stated the importance of the development of a national LCA and LCC calculation tools to present the complex results of the analyses in a user-friendly and transparent way to help reduce lifecycle impacts of buildings. The first versions of LCAbyg and LCCbyg were launched in 2015 (Rasmussen & Birgisdottir, 2016). Primarily, LCAbyg is used for new constructions. The recent updated version, LCAbyg 5.0, provides users to compare renovation measures. On the other hand, it is also promoted by the government to develop a national material database by covering both generic data representing typical materials used in Denmark and material specific data, such as EPDs in the Danish construction industry within the aim of conducting better LCA (Danish Ministry of the Interior and Housing, 2021).

Copenhagen:

As a metropolis and capital of Denmark, Copenhagen aims to be the world's first carbon neutral capital city by 2025; therefore, the city council prepared the 'Copenhagen 2025 Climate Plan' to achieve this aim. The climate plan presents 5 main categories, namely energy consumption, energy production, green mobility, incentives, economy, and investments; then it outlines major goals for each category.

Figure 21 shows the major goals regarding the energy consumption specified in the plan.

Figure 19

To achieve the city's ambitious goal, the city council also highlights that there is a need for cooperation between authorities, companies, knowledge institutions as well as people living in Copenhagen. Energispring, as a part of the Copenhagen 2025 Climate Plan, is a partnership between large building owners, administrators, and interest organizations in Copenhagen. The partners represent 26% of the total building stock in the city. This partnership involves a confidential sharing of data to create a benchmark for heat consumption as well as promote energy efficient operation and renovations (Energispring, n.d.). **However, Copenhagen is unlikely to achieve its net zero pledge mainly due to its reliance on immature technology hindering the adaptation and installation of carbon capture and storage (CCS) systems. The installation of these systems was supposed to reduce 20% of the city's emissions, whereas the rest of it was projected to be reduced by switching its power and district heating systems to biomass, wind and solar, renovating buildings to make them energy efficient and improving public transport** (Christiansen & Hougaard, 2022)**. The company which is appointed for the installation of the CCS technology failed to meet the requirements to be eligible for state funding. Although Copenhagen could not meet its objective, Denmark keeps its leadership position in decarbonisation among other countries** (Szumski, 2022)**.**

Regarding the circularity, Copenhagen has an ambitious plan for waste and resource management, called as Circular Copenhagen, which aims to bring the circular economy into practice. Within this plan, overall targets include 1) reaching 70% recycling of municipal solid waste by 2024, 2) tripling reuse rate in 2024 from 2018 levels, and 3) achieving 59,000 tonnes CO_2e reduction in line with the city's decarbonisation targets (Circular Cities Declaration, n.d.).

United Kingdom, with a focus on London

In response to the climate emergency, the UK government prepared the UK Climate Change Act, and it passed in the parliament in November 2008. The act was the first national framework legislation in the world to be prepared for providing a comprehensive and overarching law for climate change mitigation and adaptation. It set legally binding emission reduction target including 80% reduction by 2050, based on 1990's levels. In 2019, this target was updated with a more ambitious agenda, which now requires the state to reach net zero by 2050, across all sectors as long-term goal (CCC, 2020).

The act also comprises of short-term goals that set legally binding limits over five-year periods, called as carbon budgets (see **Figure X**)

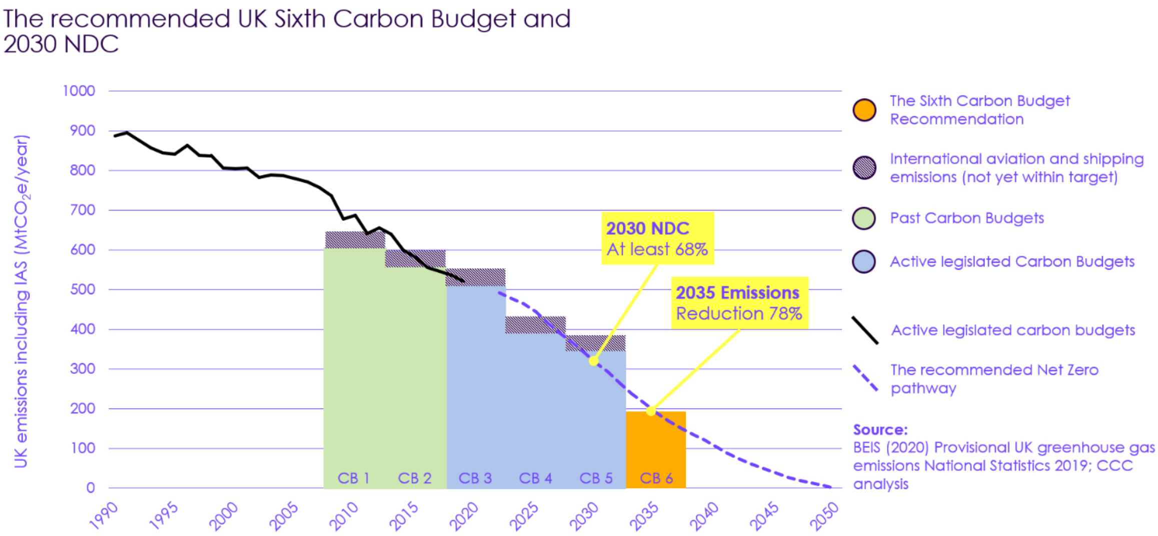


Figure 20: *The UK's carbon budgets and the recommended sixth carbon budget (BEIS, 2020)*

As mentioned in the Section 1, the built environment (buildings and infrastructures) is responsible for 25% of the UK's GHG emissions (UKGBC, 2021).

The heating demand for buildings in the UK is one of the main sources of the national GHG emissions; it accounts for approximately one third of the annual carbon footprint of the UK. For this reason, there is urgency to primarily decarbonise and electrify the heating systems in buildings through retrofit.

Both new and existing buildings in the UK are required to be decarbonised by adopting energy efficiency measurements such as phasing out fossil fuel based heating systems as well as accelerating the shift to using electricity for heating demand, introducing heating systems powered by renewables, and integrating smart technologies in order to facilitate for achieving the UK's 2050 net zero emission goal (HM Government, 2021) (UKGBC, 2021).

Highlights in the current policy:

- **Energy efficiency:** It is mandatory to meet minimum energy efficiency standards (MEES) for all both privately rented domestic and non-domestic buildings by requiring landlords to obtain at least an EPC E rating. **As a future regulatory target for the non-domestic buildings, it is required to have a minimum rating of EPC C by 2027 and EPC B by 2030.**

- **Embodied carbon:** The National Building Regulations 2010 has not regulated the whole life cycle emissions of buildings yet. However, Part Z, an industry-proposed amendment to the regulations, was proposed in 2022 outlining potential requirements for the assessment of whole life carbon emissions and limiting of embodied carbon emissions for all major building projects. These regulations are currently under consultation and are expected to be introduced as mandatory requirements by the government in December 2023 (Environental Audit Committee, 2022).

Energy efficiency in the current policy:

The standards were introduced by the UK government to increase the energy efficiency of the worst-performing privately rented buildings and ensure the quality and thermal comfort for occupants. Since 2008, the minimum energy efficiency standards (MEESs) require all properties across the UK to report on their EPC rating, using A-to-G rating scheme. The regulations came into force in April 2018 for both privately rented domestic and non-domestic buildings by requiring landlords to obtain at least an EPC E rating. In 2021's government consultation, it was proposed a future regulatory target for the non-domestic buildings to have a minimum rating of EPC C by 2027 and EPC B by 2030. The Government confirmed that the future trajectory for the non-domestic MEES will be EPC B by 2030 (HM Government, 2020).

Focussing on operational energy performance of buildings, some of the key policies and regulations at national level are summarised in the **Table 11** below:

Table 14: *Summary of key policies and regulations in the UK*

Key policies and regulations	Adopted Year	Brief explanation
Minimum Energy Efficiency Standards (MEES) Regulations	2008	A future regulatory target for the non-domestic buildings to have a minimum rating of EPC C by 2027 and EPC B by 2030. [1].
Future Buildings Standard (FBS)	2025 *anticipated to be adopted*	Aiming to deliver highly energy efficient non-domestic buildings by using low carbon heating. Primary focus is new buildings, but it includes policy regarding works to be undertaken on existing buildings [2]. It is expected to come in to effect from 2025.
Building Regulations - Part L Interim Uplift 2021 for Existing and New Non-Domestic buildings	2021	An uplift to the energy efficiency standards for existing and new non-domestic buildings. It came into force in June 2022. • Fabric-first approach focussing to improve insulation and airtightness by targeting a 27% reduction in carbon emissions [3]. • The introduction of a new metric, 'primary energy' to place more emphasis on reducing energy demand and on-site renewable energy generation [4].

Building Regulations - Part L Interim Uplift 2021 for Existing and New Domestic buildings	2021	An uplift to the energy efficiency standards for existing and new domestic buildings. • Fabric-first approach focussing to improve insulation and airtightness [3]. • Introducing the requirement of PV installation to be 40% of building foundation area for new domestic buildings [3]. • Moving away from fossil fuel-based heating: no gas boilers accepted moving forward to.
PAS 2038:2021 Retrofitting non-domestic buildings for improved energy efficiency	2021	Setting out requirements for retrofitting non-domestic buildings for improved energy performance. Except for dwellings, it covers all commercial and non-domestic buildings as well as multi-residential buildings where some facilities are available for communal use. It promotes to undertake a 'whole building' retrofit process therefore, it represents a significant milestone to accelerate the uptake of energy efficient retrofits [5]
[1] (HM Government, 2020) [2] (RIBA, 2022) [3] (Grainger & Morris, 2021) [4] (City of London Corporation, 2023) [5] (BSI Knowledge, 2021)		

Embodied carbon in the current policy:

It should be noted that decarbonising the built environment requires to take measures focused on the entire lifecycle of buildings, with the aim to reduce not only operational carbon emissions, but also embodied carbon emissions. Despite this acknowledgement, the UK government has yet to introduce mandatory requirements to undertake whole life carbon (WLC) assessment for buildings in line with other European countries such as the Netherlands, Denmark, and France. Currently, the UK government is working on finalising the evaluation of different methodologies employed by these countries to develop future policies regarding WLC assessments, and these mandatory regulations (Part Z) are expected to be introduced by the government in December 2023. Although there is a lack of mandatory requirement to undertake WLC assessments at national level now, local authorises, such as the Greater London Authority, are currently mandating it for the projects being proposed within their jurisdictions (Environental Audit Committee, 2022).

Greater London Authority (GLA)

The GLA has set several requirements that are aligned and possibly more ambitious than national regulation with the intent of delivering low carbon and net zero developments. Although these are not a national regulation, it is currently the only policy in force in the UK that delivers effective results, and which affects a big proportion of the country's population. The GLA has set an example to follow and is often used as a comparable benchmark across the UK.

The Mayor of London's London Plan 2021 requires proposals referable to the MGLA to be net zero carbon. Within the aim of minimising carbon emissions, the London Plan Policy SI 2 sets out the strategies for GLA referable projects. Within this policy, Part F requires development proposals referable to the GLA should calculate whole life-cycle carbon emissions through a nationally recognised whole life cycle carbon assessment and demonstrate actions taken to reduce life-cycle carbon emissions. There is a separate GLA (London Plan) policy guidance document - Whole Life Cycle Carbon Assessments (WLCA) Guidance, March 2022 - which sets out the requirements applicants must undertake. Reporting requirements and the scope of the assessment are defined in the London Plan Guidance for WLCA (Greater London Authority, 2022). Although WLCA reporting is required at pre-application, application, and post-completion stages of schemes that are referable to the GLA, it is also encouraged for all non-referable major developments. All studies account for a 60-year life-cycle period, as standard. Provisions for a different assessment period can be established if accompanying explanations are provided.

As recognised an industry leading guidance, it contains a detailed methodology and list of information to be included for materials across several Life Cycle Assessment (LCA) modules as well as including requirements for reporting emissions for demolition of existing assets on site and from refrigerants.

The Mayor of London's London Plan 2021 sets out a clear energy hierarchy for net zero operational carbon emissions. It defines the process required for reducing these emissions, clarifying local priorities for heating, and cooling strategies, setting minimum target savings and local carbon offsetting mechanisms. The carbon savings targets are based on regulated operational carbon and a 30-year lifecycle. It is targeted with at least a 35% on-site reduction in regulated carbon emissions beyond Part L 2021 of the Building Regulations. On the other hand, reporting unregulated carbon is encouraged through the design process and building infrastructure provision. Other policy requirements are in place for on-site energy generation and energy storage.

The Mayor of London's 'Energy Assessment Guidance, published in June 2022, clearly outlines reporting requirements for planning applications to demonstrate that the proposed climate change mitigation measures comply with London Plan energy policies, including the energy hierarchy and energy performance metrics in terms of Energy Use Intensity for regulated emissions (EUI). It also introduces a new 'be seen' stage to calculate whole building EUI (including unregulated emission), to monitor and report its energy performance post-construction. This will help to ensure that the actual carbon performance of the development is aligned with the Mayor's net zero carbon target.

The 'Be Seen Energy Monitoring Guidance', (September 2021) explains the process that needs to be followed and reporting requirements to demonstrate compliance with the London Plan policy addressing the monitoring, verifying, and reporting of energy performance after a building's practical completion ('Be Seen' level of the Energy Hierarchy). It also requires undertaking analysis for regulated and unregulated energy loads using a process such as TM54 (it is aligned with the London Plan guidance for 'Whole Life-cycle Carbon Assessments (WLCA)' module B6 approach.

Greater Manchester Combined Authority (GMCA) and Manchester City

In response to the national call for tackling climate change (UK Climate Change Act, 2008), Manchester, as one of the pioneer cities in the UK, launched a city level plan for climate action in 2009, called Manchester: A Certain Future. Between 2010 and 2020, direct carbon emissions of the city were successfully reduced by 54.7% with exceeding the target (41%) specified within the agenda. However, reports from the Intergovernmental Panel on Climate Change Summit showed that delaying global carbon reductions was projected to be resulted catastrophic impacts on climate; therefore, highlighted a drastic shift on global targets (Manchester City Council, 2023). As a response to this, Manchester strengthened its commitment by revising its zero-carbon target from 2050 to 2038 and declared a climate emergency, Climate Change Action Plan, in 2019 by highlighting six priority areas for action, namely (i) buildings, (ii) renewable energy, (iii) transport and flying, (iv) food, (v) consumption behaviour, and (vi) green infrastructure and nature-based solutions (Manchester Climate Change Agency, 2020).

Within the Climate Change Action Plan, the city council has also developed some standards and strategies. As one of them, the Manchester Low Carbon Build Standard is in line with the best practice guidance from the BRE and the RIBA and aims to reduce the carbon impact of both new-build developments and retrofit projects delivered by the council. This was endorsed in December 2020 and accepted as a key action to help move towards the council's 2023 target (Manchester City Council, 2020).

As the second biggest source of carbon emissions, after transportation, the built environment is responsible for 76% of Manchester's direct emissions (Manchester Climate Change Agency, 2022). Therefore, it is required for urgent actions on decarbonising of building sector. The city is committed to achieve carbon neutrality from 2023 only for new buildings, and 2038 for all buildings. Given the city's existing building stock, in July 2021, the council introduced the Greater Manchester Retrofit Task Force to reach an average of 61,000 domestic retrofits a year and an average of Energy Performance Certificate Rating C or Display Energy Certificate B on all non-domestic buildings by 2030 (Greater Manchester Combined Authority, 2021). The recent figures show that 26% of the city's carbon emissions are from domestic buildings and 51% of them are energy inefficient with an EPC rating D-G, based on the cumulative data between 2008-2022[5] (Department for Levelling Up, Housing & Communities, 2023). Most domestic carbon emissions (71%) come from space heating and hot water. In terms of commercial buildings' emissions, this rate is 48%. Given these, the city policies have been focussing on energy efficient retrofits and highlighting the need for a shift to electrified heating (Manchester Climate Change Agency, 2022).

In line with the city's decarbonisation strategy, a roadmap to net zero carbon in the context of new buildings has been prepared in 2021 and it highlights a new Manchester Standard 2023. Based on this new standard, it is restricted for all new developments to have onsite combustion of fossil fuel. To promote low-carbon energy supply, it is required for all developments to assess the viability of onsite renewable generation. There is a minimum requirement of 40% solar technologies installation for the developments with SE/SW facing roof(s) (Manchester Climate Change Agency, 2021). ***Table 12*** *highlights the targets specified in the Manchester Standard 2023.*

Table 15: *Targets in the Manchester Standard 2023*

To reduce	Domestic targets	Non-domestic targets

[5] The information is based on the number of EPCs lodged on the Register by Local Authority, and by Energy Efficiency Rating (EER).

Energy demand	• Energy Use Intensity (EUI) < 60 kWh/m^2 GIA/yr *(covering both regulated and unregulated consumption)* • Ultra-high energy efficiency consistent with space heating demand of 15-20 kWh/m^2/yr	• Office developments only, Energy Use Intensity (EUI) < 75 kWh/m^2 GIA/yr from 2023. • *For other building types, targets are not currently available.*
Embodied carbon	• Major developments, Upfront embodied carbon < 500 kgCO_2e/m^2 GIA	• Office developments, Upfront embodied carbon < 600 kgCO_2e/m^2 GIA (excl. sequestration) with future uplift set out in advance • Retail developments, Upfront embodied carbon < 550 kgCO_2e/m^2 GIA, with future uplift set out in advance • *For other building types, targets are not currently available.*
Further information: https://www.manchesterclimate.com/sites/default/files/Roadmap%20to%20Net%20Zero%20Carbon%20-%20Report.pdf		

West of England Combined Authority (WECA)

The West of England Combined Authority (WECA) consists of four local authorities which include Bath and North East Somerset Council, Bristol City Council, North Somerset Council, and South Gloucestershire Council. The WECA has set an ambitious plan targeting to reach net zero carbon by 2030. In September 2020, the authority prepared an action plan, Climate Emergency Action Plan, to achieve this target (WECA, 2020).

As outlined in the action plan, the built environment is one of the largest contributors to GHG emissions in the region. It is especially stemming from the energy source used for meeting the heating demand in buildings. Therefore, the main focus in retrofitting policy is increasing the energy performance of buildings by reducing the reliance on fossil-fuel based heating, and accelerating the installation of low carbon, energy efficient heating systems. In addition, the authority is planning to mandate to achieve at least EPC C rating for retrofit projects as a medium-term action between 2024-2028. It is also required for new developments and existing buildings that projected to have a retrofit/refurbishment process to deliver 10% Biodiversity Net Gain from early 2023 (WECA, 2022). To support the retrofit targets, is the action plan outlines the need to improve the available retrofit skills that currently rely on small and micro businesses in the region (WECA, 2023).

With regard to the embodied carbon, the WECA are working on introducing the whole life cycle carbon assessments as a part of future policy in each authority's local plan (Bath & North East Somerset Council, 2021).

Bath and North East Somerset Council (B&NES)

In line with the UK National Planning Policy, the B&NES outlined the strategies to support the national commitments towards a low carbon future and has declared a climate emergency. The B&NES council has committed to be carbon neutral by 2030 and aims to lead the decarbonisation journey within the WECA district (Bath and North East Somerset Council, 2021). To reach this target, some of the local policies have been established. These are outlined in the **Table 13**.

Table 16: *Examples of local policies regarding the decarbonisation aim*

	Subcategories	Highlights
Core Strategy	CP1- Retrofitting Existing Buildings	The policy highlights retrofitting of energy efficiency measures and encourages the appropriate use of micro-renewables in historic buildings. • Requirement to reduce regulated carbon emissions by 10-20% (*still in consultation process*) from a baseline of Part L through use of renewable energy. • Requirement to achieve EPC C rating or above when change of use to House of Multiple Occupation (HMOs).
	CP2- Sustainable Construction	The policy brings a requirement to maximise energy efficiency in new buildings. It is in line with the planned implementation of the Future Homes Standard (FHS). In case FHS is not implemented, the policy introduces the following requirements for residential (R) and non-residential buildings (NR): • A minimum operational carbon emissions reduction of 10% (R) and 15% (NR) through fabric performance from a baseline of Part L 2013, • A minimum operational carbon reduction of 35% through on-site renewable energy for both R and NR • Offsetting remaining operational emissions that can't be mitigated on site through a financial contribution (applicable for R and NR)
	CP3- Renewable Energy	This policy sets minimum level of renewable electricity and heat generation levels to achieve by 2029.
Placemaking Plan	SCR1- On-site Renewable Energy Requirement	In line with the CP2, SCR1 brings a requirement to maximise energy efficiency in all major developments (10 dwelling units/1,000 m^2 or more of floor space) by providing sufficient renewable energy generation to reduce carbon emissions. The rest of the policies outline the issues that required to be addressed within the developments.
	SCR2- Roof-mounted/Building-integrated Scale Solar PV	
	SCR3- Ground-mounted Solar Arrays	
	SCR4- Community Renewable Energy Schemes	
	Whole Life Cycle Carbon Assessment	This is a new policy introducing requirements for reducing whole life cycle carbon emissions of new buildings (*still in consultation*). Therefore, it is required for the following developments: • For large scale developments (more than 50 dwellings/5,000 m^2 or more of floor space) • For all major developments (10 dwelling units/1,000 m^2 or more of non-residential floor space).

Source: Bath & North East Somerset Council, Development Management Policies
https://beta.bathnes.gov.uk/local-plan-core-strategy-and-placemaking-plan-partial-update/development-management-policies

The new Local Plan encompasses requirements focused on embodied carbon assessment. It requires to attention on only for Substructure, Superstructure and Finishes among the building elements due to their high share of emissions. The Plan also advocates to have early involvement and discussion about embodied carbon at early design stages. Lastly, it also highlights the need for the availability of comprehensive databases to undertake accurate assessments. Within this policy (SCR8), it is required for large scale new-build developments to submit an embodied carbon assessment and comply with the newly introduced threshold limit of 900 $kgCO_2e/m^2$ (covering the embodied carbon impacts of substructure, superstructure, and finishes).

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Refurbishment Guide

Contents

1 Appold Street

Approximate Project Construction Cost: no information provided
Total Project Cost: no information provided

Location: London, UK
Planning Authority: City of London
Building Type: Office & Leisure
Project Type: Deep retrofit
RIBA stage: RIBA Stage 2

DESIGN TEAM
Client: Bluebutton Properties UK Limited
Developer: British Land
Project Manager: Opera
Architect: Piercy & Co

Structure: AKT II
MEP: MTT
Sustainability: Hilson Moran

Overview

Pre-refurb

Building Age: 1989

GIA: 28,992 m^2

NIA: *information not provided*

Clear height *: 3.8m

EPC: D

Heating fuel: Gas

Source: Piercy & Company

Page 259

Post-refurb

Completion Date: TBC

Status: RIBA Stage 2

GIA: 51,869 m^2

NIA: 31,834 (Office)
4,242 (Gym)
360 (Café)

Clear height *: 3.8m

EPC: A

Heating fuel: Electricity

Cat A: Shell & Floor

Cat B: N/A

Source: Piercy & Company

* Clear height means the finished floor level to ceiling height

Deep Retrofit

Scope of works

Comprehensive refurbishment and extension: The scheme comprises the repurposing of existing retail building to provide a commercial office building with leisure to the basement and some food and beverage spaces.

The scheme includes additional floors (5 additional storeys and a pavillion), additional balcony areas to each level and a replacement of the existing façade. With the aditional floors, the proposed superstructure consists of 13 storeys. A new public realm area to north of the building is being added.

75% of the structure is being retained. The basement is to be retained, and all existing foundations are to be reused. A new core is provided through the centre of the building to provide lateral stability with associate reinforce concrete piles. The plant rooms are relocated.

Retained and installed elements

0% retained

External Walls (1)
Recycled content in everything 'new', min 20% by value targeted. The facade will be replaced due to quality and the extent.

0% retained

Openings (2)
The existing facade is being replaced to minimise internal heat generation through energy efficient design (optimised glazing areas and solar control coating)

0% retained

Services (3)
The services will be demounted and set for recycling. New systems will be installed.

100% retained

Substructure (4)
Almost 100% retention. New piled foundations will be installed to support the RC core in the centre of the building.

0% retained

Roofs (5)
The roof will be demolished with the majority of materials set to recycling.

75% retained

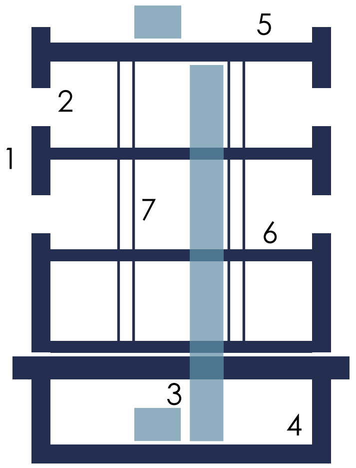
Floors (6)
Approximately 75% retention of upper floors. Additional supports to the floors, concrete C32/40 with 50% GGBS is proposed within the development.

99% retained

Frame (7)
Majority of the existing frame is being retained. Concrete frame system and reinforced concrete floors are being proposed for the extension areas and alterations on the existing frame.

100% installed

Low Carbon/Renewable Technologies
Installation of air source heat pumps and PV panels.



1 Appold Street

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**623.4*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**414.9*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**495.0*[1]** $kgCO_2$ e/m² GIA

*1 Based on British Land Whole Life Carbon Reporting template

Energy Use intensity (kWh/m²/yr (Based on NIA)	59.4 (landlord rated areas)
Heating Fuel type (heat network, electric)	100% electrified
Low and Zero Carbon Technologies	PV installation and Air Source Heat Pumps (heating & cooling)
Recycled Content % by Value	Min 20% targeted

WLC Assessment Method: RICS WLC and City of London compliance

WLC Assessment Scope: Modules A-C

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	15.6 17.3
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	185.1 259.0
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	118.6 123.4
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	7.7 9.6
Finishes	A1 A5 (excl. seq. carbon) A-C (incl. seq. carbon)	37.1 105.7
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	1.6 4.8
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	45.2 94.4
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	3.8 6.1

Certifications

Targeting BREEAM 2018 Office New Construction Shell and Core Outstanding rating

Targeting NABERS UK 5.0-5.5 Star rating

Key Insights

Insights

- Retention of existing structure and foundations.
- Optimising design for longevity, flexibility, adaptability, standardisation, leasing of products, disassembly, deconstruction and end-of-life (EoL), and recoverability.
- Increasing use of recycled content for new materials and maintaining materials at their highest value i.e., reuse or upcycle before recycling / downcycling and using materials and products that are appropriately durable and easily re-used at their end-of-life.
- Adoptation of Material Passport strategy, exploring the future reuse options of materials and components, and aiming 100% of materials not going waste.

Opportunities

- Enabling circular economy approach through the integration of circular design principles, investigation of secondary material market opportunity, early engagement with the main contractor, and the definition of materials' passport strategy.
- Embodied carbon savings with retention of existing foundations, and at least 70% of existing structure.
- Minimised cooling demand through passive measures and non-combustion-based energy solution.
- Installation of PV panels.
- WELL-enabled approach to enable tenant/s to achieve WELL Building Standard certification.
- Intensive green roof (biodiverse extensive) and greywater recycling.

Challenges

- Lightweight concrete in the composite slabs is critical to reduce the weight of the floors and limit the strengthening work of the existing structure. However this poses a challenge for the its embodied carbon as concrete mix with lightweight aggregates is considerably higher than traditional dense concrete and mitigation strategy must be implemented to meet the EC target.
- Circular economy is the biggest challenge for the scheme, as there is not enough experience in the industry. Many circular economy opportunities identified during the design stage are under the main contractor responsibility and this represents an uncertainty until the strip-out and construction processes start.
- Specifying reused elements (e.g., reused steel) is dependent on market availability at the time of construction. Reuse opportunities for the existing building's element depend on secondary market demand at the time of strip out and deconstruction.

3 Sheldon Square

Approximate Project Construction Cost: £20-50m
Total Project Cost: £20-50m

Location: London, UK
Planning Authority: Westminster City Council
Building Type: Office & Retail
Project Type: Refurbishment

RIBA stage: RIBA Stage 5
DESIGN TEAM
Client: British Land
Developer: U+I
Project Manager: Opera

Architect: Morris and Company
Structure: Heyne Tillet Steel (HTS)
MEP: Ramboll
Sustainability: Ramboll

Overview

Pre-refurb

Building Age: 2002

GIA: 17,543 m²

NIA: 13,355 m²

Clear height *: *information not provided*

EPC: D

Heating fuel: Gas

Source: British Land

Page 261

Post-refurb

Completion Date: 2024

Status: RIBA Stage 5

GIA: 17,543 m²

NIA: 13,463 m²

Clear height *: 3.8m

EPC: A

Heating fuel: Electricity

Cat A: Shell & Core

Cat B: N/A

Source: British Land

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

Refurbishment and reposition of the existing building: The works consist of replacement of main plant to deliver an 'all electric' building, addition of balconies to the retained façade and an internal refurbishment to the existing building, including upgrades to the reception, on floor and end of trip provision.

The existing superstructure consists of steel frame supporting composite concrete slabs cast on metal decking. The slabs are connected to the steel beams via through deck welded shear studs.

Steel balcony structures have been added as part of the 2023 refurbishment works which are supported on fabricated steel beam cantilevers and high tensile Macalloy bars.

The refurbished scheme benefits from an Electric Strategy whereby the existing gas fired boilers have decommissioned. Heating and Cooling will be provided via 4 pipe ASHP system to capitalise on the opportunities for heat recovery.

Retained and installed elements

100% retained — **External Walls (1)**
Existing curtain walling (aluminium spandrel glazing panels) is to be retained.

75% retained — **Openings (2)**
Minimising internal heat generation through energy efficient design (optimised glazing areas and solar control coating)

31% retained — **Services (3)**
The Schemes accentuates the opportunity for retaining and reusing MEP systems where deemed feasible.

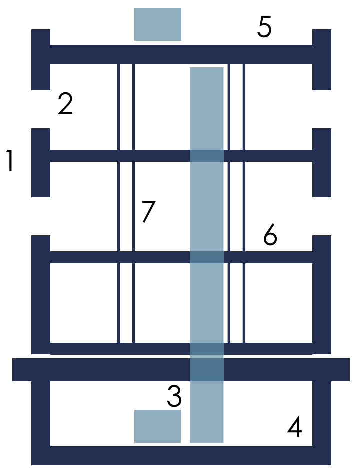
100% retained — **Substructure (4)**
The existing substructure is to be 100% retained..

100% retained — **Roofs (5)**
All roof finishes to be retained with minor interventions where new steel cantilever beams fix back to the existing building structure.

68% retained — **Floors (6)**
All structural floors are to be retained.

98% retained — **Frame (7)**
The works comprise the installation of a series of hanging Balconies to the facades facing onto the public square.

100% installed — **Low Carbon/Renewable Technologies**
Installation of air source heat pumps.



3 Sheldon Square

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**321.0*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**104.0*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**1,153.5*[1]** $kgCO_2$ e/m² GIA

*1 Figures based on the Stage 4 WLC Assessment report

Energy Use intensity (kWh/m²/yr (Based on NIA)	57.5 (estimated, excludes retail unit)
Heating Fuel type (heat network, electric)	Electricity
Low and Zero Carbon Technologies	4 Pipe Air Source Heat Pumps (heating & cooling) and PV panels
Recycled Content % by Value	N/A

WLC Assessment Method:
RICS WLC

WLC Assessment Scope:
Modules A1-A5, B3-B4, B6, C1-C4

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.0 3.6
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	29.8 50.8
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	1.6 73.5
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	5.7 15.6
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	17.1 37.2
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	Out of scope Out of scope
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	29.3 120.0
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	Out of scope Out of scope

Certifications

BREEAM 2014
RFO Outstanding
(Design Stage Certificate)

Targeting
NABERS 4.5
star rating

Targeting WELL
Pre-certification

Key Insights

Insights

- The retain & retrofit first approach. The project highlights the opportunities that retrofitting an existing 23yr old development to be fit for the our low carbon and circular economy future. Key success to this was having a clear sustainability brief from the outset that embedded the ambition and required outcomes from the project.
- Using materials and products that are appropriately durable and easily re-used at their end-of-life.
- Optimising design for adaptability and disassembly.
- Exploring the future reuse options of materials and components.
- Achieving better space utilisation and efficiency through tenant diversification.

Opportunities

- An estimated 80% reduction in embodied carbon emissions through re-use compared with a best-in-class new development (based on GLA Aspirational benchmark) in delivering the project to completion.
- Offsite production to reduce waste and strip-out material upcycled through local take back schemes.
- Enhanced planting to balconies and internal features to deliver a net biodiversity gain (100% Biodiversity Net Gain achieved).
- Installation of PV panels.

Challenges

- Difficulties in achieving exemplar NABERS/energy performance due to the limitation of the retained existing building fabric.
- Retention of pipework, while ensuring pipework and water quality are safeguarded.
- Existing fire-stopping material not meeting current regs. Condition of the existing dry lining meeting current regs.
- Tenant modifications to ductwork not aligning with proposals following removal of ceilings.
- Balancing the durability and performance of finishes and intumescent products with the requirements to deliver low / no VOC products throughout the building.
- Regarding circular economy there were some challenges reported around coordination of take back to some of the strip out materials. There were some 'no shows' reported.

50 Finsbury Square

Approximate Project Construction Cost: no information provided
Total Project Cost: no information provided

Location: London, UK
Planning Authority: London Borough of Islington
Building Type: Office & Retail
Project Type: Refurbishment

RIBA stage: RIBA Stage 6
DESIGN TEAM
Client: Great Portland Estates
Developer: Great Portland Estates
Project Manager: Blackburn & Co. Ltd.

Architect: Doone Silver Kerr
Structure: Heyne Tillet Steel
MEP: Hilson Moran
Sustainability: ARUP

Page 263

Overview

Pre-refurb

Building Age: 1999

GIA: 16,729 m^2

NIA: 11,749 m^2

Clear height *: 2.75 m

EPC: D

Heating fuel: Gas

Source: Foster + Partners

Post-refurb

Completion Date: 2023

Status: RIBA Stage 6

GIA: 17,181 m^2

NIA: 11,997 m^2

Clear height *: 2.85 m

EPC: A

Heating fuel: Electricity

Cat A: Shell & Core

Cat B: N/A

Photographer: Tudor McManus

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

Refurbishment of the existing building: 50 Finsbury Square is an existing 8-storey building with two basement levels plus plant level, comprising primarily commercial office (B1) use. Retail areas are provided at the ground floor fronting Finsbury Pavement

The works consist of the refurbishment of existing building including erection of single-storey roof-level office pavilion, repositioning of office entrance, reconfiguration of retail/office unit layout at ground floor, and flexible retail/leisure (Class B1/D2) at ground and lower ground level, installation of internal mezzanine infills to existing office atrium area, replacement of external stone cladding and associated works.

Retained and installed elements

99% retained

External Walls (1)
Plant screen was replaced, new external walls were added for the pavilion.

90% retained

Openings (2)
Ground floor/reception glazing including. entrance doors were fully replaced; pavilion glazing was added. Atrium glazing and all upper floor curtain walling retained.

100% installed

Services (3)
More efficient and larger plant and equipment were installed.

95% retained

Substructure (4)
Piling and majority of basement area were retained. Changes to underground drainage meant sections of the slab were removed and replaced.

50% retained

Roofs (5)
Roof slab was retained, all insulation/ finishes were replaced on main roof and plant room roof. Pavilion roof was added.

99% retained

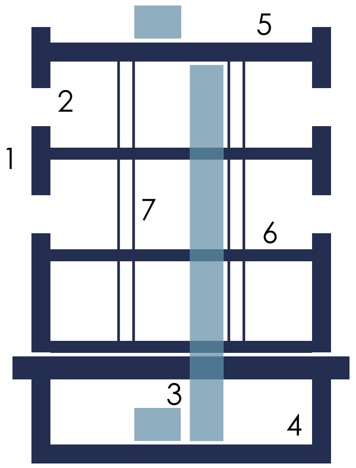
Floors (6)
Majority of floor was retained. New floor was added for the pavillion and floorplate extensions.

99% retained

Frame (7)
Majority of frame was retained. The car lift was removed and a new service core serving the lower levels was installed. New frame was added for the pavillion area.

100% installed

Low Carbon/Renewable Technologies
Installation of air source heat pumps.



50 Finsbury Square

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**1,041.0*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**270.0*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**261.0***[1] $kgCO_2$ e/m² GIA

1 Based on emission factors: 0.0376 $kgCO_2e/kWh$ for electricity (FES 2022)

Energy Use intensity (kWh/m²/yr (Based on GIA)	115.7 (excluding retail units)
Heating Fuel type (heat network, electric)	Electricity
Low and Zero Carbon Technologies	Air source heat pumps
Recycled Content % by Value	Information not available

WLC Assessment Method: RICS WLC and GLA compliant

WLC Assessment Scope: Modules A-C (excl. B6 & B7)

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	1.0 6.0
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	18.0 31.0
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	35.0 61.0
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	28.0 52.0
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	39.0 119.0
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	2.0 12.0
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	143.0 757.0
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	Out of scope Out of scope

Certifications

BREEAM 2014 RFO Excellent

Targeting WELL Pre-certification

Key Insights

Insights

- Increasing the office floorspace and improving the primary vertical circulation and the spatial relationship with the atrium.
- Creating an office building to meet highest possible sustainable standards through replacing the building services with new efficient systems and introducing high performance glazing and low carbon materials.
- Requirement of the repair and upgrade works on the existing facade to reduce cooling and lighting loads of the building.
- Requirement of a comprehensive replacement of mechanical and electrical services to upgrade the building performance.

Opportunities

- Saving on operational carbon through enhanced envelope performance and energy efficient systems for heating, cooling and ventilation.
- Having low embodied carbon footprint by retaining key elements of the building.
- Consideration of reduced waste and use of materials with low embodied carbon.
- Consideration of biodiversity; introducing green roofs and greening of walls.
- Offering an increase on office spaces and improved spatial relationship between them and the atrium.

Challenges

- LBI planning policy relating to building height and the conservation area, planning limitations on changing appearance of the façade and involving technical challenges of installation of the existing limestone clad external wall frame. Resistance to building the pavilion on the roof. Restrictions on roof plant making coordination.
- Difficulty in upgrading the thermal elements (e.g increasing the roof insulation) to meet Part L.
- Coordination a challenge as existing plantrooms and risers not designed to cater for modern services that require more space due to current energy and fire compliance needs.
- Due to limited space on the roof level and limitations on altering the façade, installation of PV panels was deemed unfeasible.

100 New Bridge Street

Approximate Project Construction Cost: no information provided
Total Project Cost: no information provided

Location: London, UK
Planning Authority: City of London
Building Type: Office & Retail
Project Type: Refurbishment
RIBA stage: RIBA Stage 2

DESIGN TEAM
Client: Helical
Developer: Helical
Project Manager: Avison Young
Architect: Gensler
Structure: ARUP and Watermans Group
MEP: L&P Group
Sustainability: L&P Group

Overview

Pre-refurb

Building Age: 1992

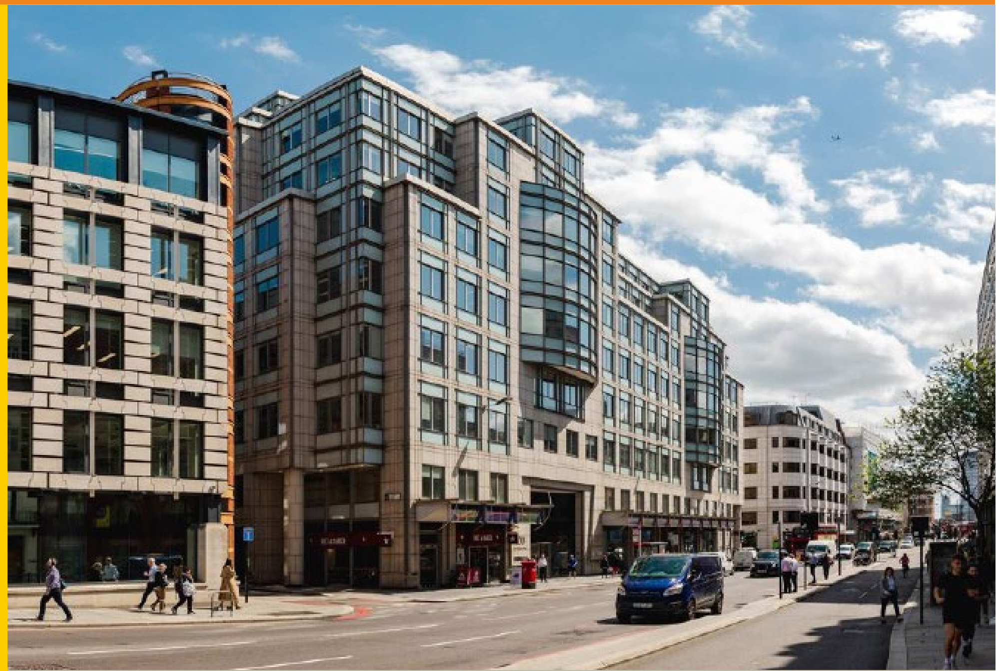
GIA: 15,517 m^2

NIA: *information not provided*

Clear height *: *information not provided*

EPC: D

Heating fuel: Gas



Copyright issue! Images are needed!!!

Post-refurb

Completion Date: 2025

Status: RIBA Stage 2

GIA: 23,047 m^2 (office)
346 m^2 (retail)

NIA: *information not provided*

Clear height*: *information not provided*

EPC: *information not provided*

Heating fuel: Electricity

Cat A: Shell & Core

Cat B: N/A

Copyright issue! Images are needed!!!

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

The existing building was 9 stories in height. The proposed development constitutes the comprehensive refurbishment and extension of the existing office building whilst retaining majority of the existing structure. The extension works comprise the provision of an additional floor of office accommodation at 10th floor level, alongside a revised approach to the massing which seeks to push out the building envelope at upper levels.

The existing basement structure is proposed to be retained and no additional basement excavation is proposed. The refurbishment works comprise the rationalisation of the existing floorplates, alongside the provision of new facades on the north, west and south elevations with the existing brick elevation to the west being retained.

Retained and installed elements

Data not available

External Walls (1)
85% of RC walls were retained. Minority of existing brick walls retained. Majority of them was renewed. Lightweight blocks for building envelope were proposed.

TBC% retained

Openings (2)
For the new glazing frames and cladding panels, aluminium frame with a 35% recycled content was proposed in the design.

TBC

Services (3)
The development proposes installation of air source heat pumps as heating, hot water, and cooling demands.

TBC% retained

Substructure (4)
100% retained, and no additional basement floor was proposed.

TBC% retained

Roofs (5)
The scope of works proposes an additional floor and roof terraces incorporating hard and soft landscaping for use by office tenants.

TBC% retained

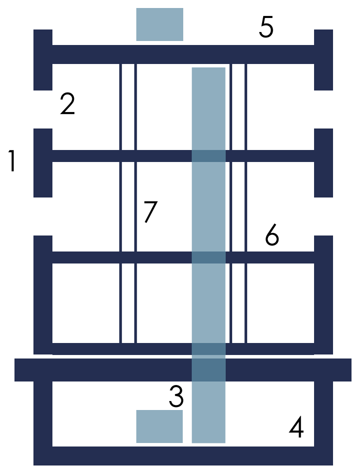
Floors (6)
Retaining 90% of metal deck floors. Majority of floors were retained because of that the existing building has already had generous floor to ceiling heights and a solid structure.

TBC% retained

Frame (7)
Majority of frame system was retained because of that the existing building has already had generous floor to ceiling heights and a solid structure. Using CLT for structural interventions.

TBC

Low Carbon/Renewable Technologies
Installation of PVs and air source heat pumps.



100 New Bridge Street

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**883.0*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**459.0*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**N/A*** $kgCO_2$ e/m² GIA

Energy Use intensity (kWh/m²/yr (Based on GIA)	79.8 (estimated, only for Office)
Heating Fuel type (heat network, electric)	Electricity
Low and Zero Carbon Technologies	Air source heat pumps and PV panels
Recycled Content % by Value	Min 20% targeted

WLC Assessment Method: RICS WLC and GLA compliant

WLC Assessment Scope: Modules A-C

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.0 0.0
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	115.0 127.0
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	101.0 196.0
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	Out of scope Out of scope
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	124.0 323.0
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	Out of scope Out of scope

Certifications

BREEAM 2018 New Construction 3.0 Outstanding

Targeting NABERS 5.5 star rating

The development also is required to be WELL Platinum and WiredScore enabled

Key Insights

Insights

- The retain & retrofit first approach.
- A material specification strategy that prioritises products with recycled components and Environmental Product Declarations (EPDs).
- Aiming to meet 95% reuse/recycling/recovery of construction and demolition waste.
- Proposing C32/40 20% cement replacement, and using steel reinforcement bars with 97% recycled content and using CLT for structural interventions.
- Optimising design for adaptability and flexibility, ensuring to keep a high quantity of materials and systems within the system, and adopting of Building as a Material Bank strategy.

Opportunities

- Reducing embodied carbon impacts through the significant proportion of retaining/reusing of the existing building structure.
- Proposing an air source heat pump system for heating, hot water, and cooling demands of the development and installation of PV panels.

Challenges

- Given the location of the site, there are no existing District Energy Networks immediately adjacent to the site, and a possible connection with the existing networks may not be available for several years.

The Kensington Building

Approximate Project Construction Cost: no information provided
Total Project Cost: £50m

Location: London, UK
Planning Authority: Royal Borough of Kensington and Chelsea
Building Type: Office & Retail
Project Type: Deep Retrofit

RIBA stage: RIBA Stage 6
DESIGN TEAM
Client:
Developer: Ashby Capital & Janson Urban
Project Manager:

Architect: Pilbrow & Partners
Structure: WSP
MEP: WSP
Sustainability:

Overview

Pre-refurb

Building Age: 1970

GIA: 10,534 m²

NIA: 8,052 m²

Clear height *: 3 to 5.5 m

EPC: F

Heating fuel: Gas

Source: Pilbrow & Partners

Page 267

Post-refurb

Completion Date: 2021

Status: RIBA Stage 6

GIA: 15,133 m² (office)
346 m² (retail)

NIA: 11,865 m²

Clear height *: 3 to 5.5 m

EPC: B

Heating fuel: Gas

Cat A: Shell & Core

Cat B: N/A

Source: Pilbrow & Partners

* Clear height means the finished floor level to ceiling height

Deep Retrofit

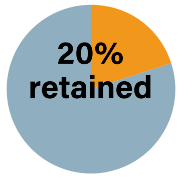
Scope of works

The scope of works is to transform a tired and bleak four-storey 1970s block into a six-storey mixed-use building providing next-generation office space and, through the creation of a new retail arcade, better connectivity to High Street Kensington Underground Station.

The development is designed to be six storeys high, and with ceiling heights up to 5.5m, the building combines 8,801 m² of office space with 1,145 m² of terraces on the three upper floors. 4 retail units are located on the ground floor, totalling 465 m², as well as a 2,787 m² retail unit.

The development proposed to use white roman brick on masonry support system with curtain wall infill windows to primary elevations. For the secondary elevations, metal rain screen panelling with punched window openings were proposed.

Retained and installed elements

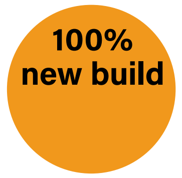


External Walls (1)
The existing basement perimeter walls were retained / 6.0m deep basement. New systems were proposed for the rest of external walls.

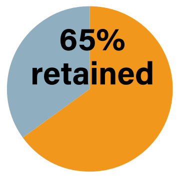
Openings (2)
New systems were proposed to provide good themal performance.

Services (3)
The buildings are served by a central heating system served by gas fired boilers only, with a seasonal efficiency of 92%.

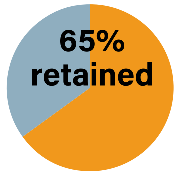
Substructure (4)
100% retained with micro-piling for the new foundations.



Roofs (5)
New roof was proposed.

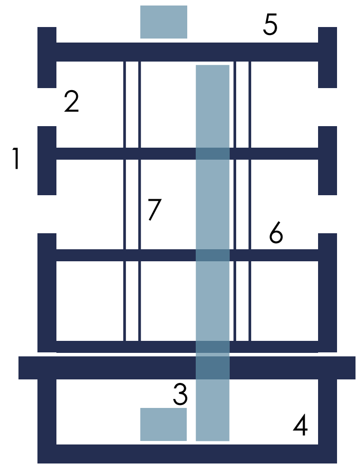


Floors (6)
The existing floors are 65% retained. Additional floors are of a thin 200mm post-tensioned composite deck slab.



Frame (7)
The existing concrete frame was 65% retained with minimal structural intervention through load-balancing to the structural capacity of the retained frame.

Low Carbon/Renewable Technologies
Installation of PV panels at roof.



The Kensington Building

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**1,050.0*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**700.0*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**1,237*[1]** $kgCO_2$ e/m² GIA

1 Based on emission factors: 0.21 $kgCO_2e/kWh$ for gas (Part L) and 0.0376 $kgCO_2e/kWh$ for electricity (FES 2022).

Energy Use intensity (kWh/m²/yr (Based on NIA)	88 (gas), 73 (electricity)
Heating Fuel type (heat network, electric)	Gas
Low and Zero Carbon Technologies	PV panels
Recycled Content % by Value	Information not available

WLC Assessment Method: RICS WLC and GLA

WLC Assessment Scope: Modules A-C (excl. B6 & B7)

Page 268

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	28.0 N/A
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	182.0 N/A
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	168.0 N/A
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	14.0 N/A
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	105.0 N/A
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	7.0 N/A
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	161 N/A
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	7 N/A

Certifications

BREEAM 2014 New Construction

WELL Gold

Key Insights

Insights

- Providing a sustainable building, reuse the construction programme.
- Mitigating any impacts to the London Underground Station.
- Creating an office and retail building fit for the contemporary market with longevity.
- Adapting a more architectural urbanistic response, satisfying the need to respond to the adjacent conservation area with a similar or equal material palette.

Opportunities

- Approximately 30% saving in embodied carbon through 100% retention of substructure and piling as well as nearly 80% retention of the upper concrete frame thanks to the good column grid and excellent floor to ceiling height of the existing building.
- Meeting 31% reduction on operational carbon through replacing completely the external envelope and the mechanical service which had reached the end of their service life.
- Installation of PV panels at roof level.
- Having excellent health and wellbeing standards, mitigating climate change and encouraging biodiversity through designed terraces and balcony areas.

Challenges

- Retaining and operating a retail store on site during the entire planning and construction period.
- Having a diffent superstructre and various set of bricks in each floor of the existing building as well as requiring to deal with special bricks in the existing building.
- Project site constraints: building directly adjacent to the TFL / Kensington High St Tube Station.
- Providing an enhanced fire rating to the façade abutting the TFL/ tube site.

Pall Mall

Approximate Project Construction Cost: £20-50m
Total Project Cost: £20-50m

Location: Manchester, UK
Planning Authority: Manchester City Council
Building Type: Office
Project Type: Deep Retrofit

RIBA stage: RIBA Stage 6
DESIGN TEAM
Client: Bruntwood
Developer: Bruntwood
Project Manager: Bruntwood

Architect: Sheppard Robson
Structure: DW Consulting
MEP: Ramboll
Sustainability: Ramboll

Overview

Pre-refurb

Building Age: 1969

GIA: 11,892 m²

NIA: 7,446 m²

Clear height *: 2.25 m

EPC: D

Heating fuel: Gas

Source: Bruntwood

Page 269

Post-refurb

Completion Date: 2025

Status: RIBA Stage 5

GIA: 11,904 m²

NIA: 7,724 m²

Clear height *: 2.25 m

EPC: A

Heating fuel: Electricity

Cat A: Mixed

Cat B: Only for office areas

Source: Bruntwood

* Clear height means the finished floor level to ceiling height

Deep Retrofit

Scope of works

The property will include 7,897 m² of office and hospitality space across three interlinked tower blocks. The building is structured using a reinforced concrete frame with original single-glazed windows and time-expired building services. The redevlopment constitutes providing all new building services and undertaking a complete internal refurbishment.

Although the building is Grade II listed, the design team obtained a consent for replacing the existing glazing/curtain walling with providing the energy modelling and net zero targets for the building. Due to listing, the curtain walling needs to replicate the existing layout and design team is unable to touch the mosaic tiling to the cores. This results in a slightly compromised building fabric performance, however, a significant reduction in energy demand compared with the original building was achieved.

The height of the main tower will remain the same. Part of the King Street wing (less than half of the roof space) will increase in height by two storeys following the addition of a plant room with plant deck above. The height of the Marsden Street wing will increase by one storey following the addition of a plant deck above a newly constructed floor of office space (the office space will be constructed in place of the old caretakers flat which is being demolished so net increase in height is one storey).

Retained and installed elements

100% retained — **External Walls (1)**
The existing external walls were 100% retained.

100% installed — **Openings (2)**
Existing glazing curtain walls were replaced.

100% installed — **Services (3)**
New services were proposed.

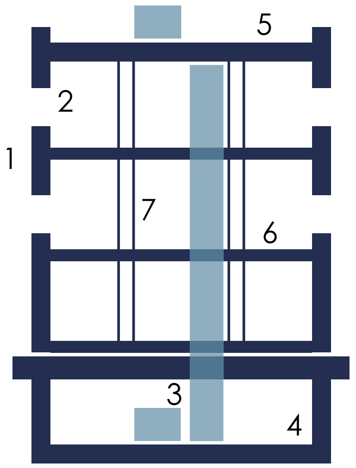
100% retained — **Substructure (4)**
The existing substructure was 100% retained.

100% retained — **Roofs (5)**
The existing roof structure was 100% retained. The new roof coverings were proposed.

100% retained — **Floors (6)**
The existing floors were 100% retained.

100% retained — **Frame (7)**
The existing frame was 100% retained.

100% installed — **Low Carbon/Renewable Technologies**
Installation of air source heat pumps.



Pall Mall

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**522.0*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**189.6*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**994.7*[1]** $kgCO_2$ e/m² GIA

1 Figures based on the Bruntwood Whole Life Carbon Reporting template.

Energy Use intensity (kWh/m²/yr (Based on NIA)	159 (estimated)
Heating Fuel type (heat network, electric)	Electricity
Low and Zero Carbon Technologies	Air source heat pumps
Recycled Content % by Value	Information not available

WLC Assessment Method:
RICS WLC

WLC Assessment Scope:
Modules A-C

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.0 0.0
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	1.2 1.9
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	58.9 86.2
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	5.0 8.8
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	24.3 65.5
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	Out of scope Out of scope
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	62.7 318.6
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.2 0.2

Certifications

BREEAM 2014
Refurbishment &
Fit Out

Key Insights

Insights

- The retain & retrofit first approach.
- Wellbeing as one of the key focusses.
- Protected and safeguarded the charactericrics of the existing building.
- Creating a robust piece of local townscape integrating and safeguarding the positive qualities of the immediate heritage context.
- The developer does not see ceiling height as a barrier for providing a quality product.

Opportunities

- Reducing embodied carbon impacts through the significant proportion of retaining/reusing of the existing building structure.
- Reducing operational carbon emissions through a switch from gas heating to hybrid VRF, with ASHP serving domestic hot water and AHU coils.
- Climate change adoptation thanks to new facade and glazing system.
- Deep retrofit opportunity as building vacant.
- Rental growth, retail amenities, and public realm improvement.

Challenges

- It's not possible to achieve 'Paris Proof' targets for operational carbon due to existing building constraints, particularly listed facade.

160 Old Steet

Approximate Project Construction Cost: no information provided
Total Project Cost: no information provided

Location: London, UK
Planning Authority: London Borough of Islington
Building Type: Office & Retail
Project Type: Refurbishment

RIBA stage: RIBA Stage 6
DESIGN TEAM
Client: Great Portland Estates and Great Ropemaker Partnership
Developer: Great Portland Estates

Project Manager: Jackson Coles
Architect: ORMS
Structure: Heyne Tillett Steel
MEP: Hilson Moran
Sustainability: Hilson Moran

Overview

Pre-refurb

Building Age: 1974

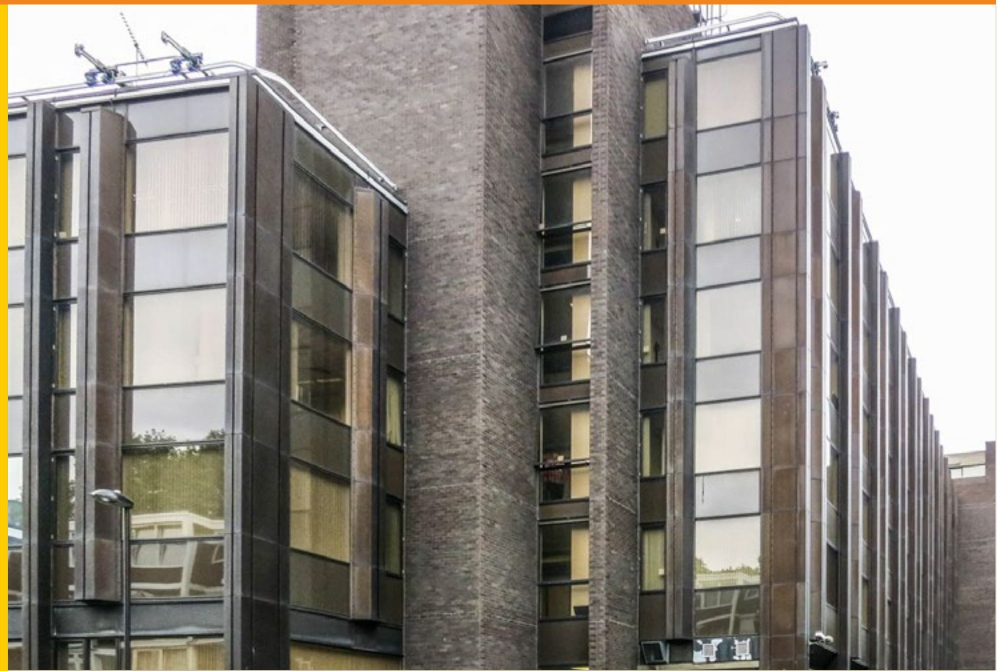
GIA: 13,462 m²

NIA: 7,985 m²

Clear height *: 2.15 m

EPC: G

Heating fuel: Gas



Source: Heyne Tillett Steel (HTS)

Post-refurb

Completion Date: 2018

Status: RIBA Stage 6

GIA: 14,544 m² (Office)
622 m² (Retail)

NIA: *information not provided*

Clear height *: 2.7 m

EPC: A

Heating fuel: Electricity and gas

Cat A: N/A

Cat B: Fully fitted

Source: Great Portland Estates (GPE)

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

The existing building was a 1974 conversion of the 1896 Bovril building (where only the basement perimeter structure was retained). The building, with poor quality office space and poor energy efficiency, did not meet modern occupier needs. The cladding and mechanical services were nearing the end of their life and needed replacing. Floor-to-floor heights were a slightly claustrophobic (3 m); internal spaces had low ceilings and old services.

The development retains the existing 1970s concrete frame, stripping away both the façade and a host of internal finishes to undertake an extensive retrofit, with consequent savings in embodied carbon. At the upper levels, the partial floorplate extensions along the spine of the building create good-quality office spaces with excellent daylight penetration, improving the form factor and helping create a rich variety of spaces suitable for the modern workplace. Two additional top storeys were added with four new retail units along the Old Street frontage. Basement areas were converted from carpark to office units.

Retained and installed elements

not provided — **External Walls (1)**
The existing façade was extensively replaced with subtle detailing of the white and dark brickwork panels.

100% installed — **Openings (2)**
Double glazed window with aluminium frame was proposed for the development.

100% installed — **Services (3)**
All MEP systems were new build and smart-enabled.

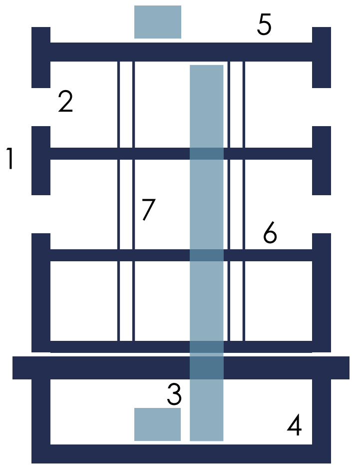
100% retained — **Substructure (4)**
100% retained. Basement car parks were converted to the office units.

not provided — **Roofs (5)**
Concrete roof deck was proposed, and the blue roof system was proposed.

not provided — **Floors (6)**
The existing floors were retained. For the new floors, it was used a lightweight composite solution of structural steelwork supporting metal decking.

100% retained — **Frame (7)**
The frame was retained. The concrete columns and vulnerable edges were repaired. For the additional floors, steel frame solution was used to minimise weight and loads.

100% installed — **Low Carbon/Renewable Technologies**
Installation of PV panels and air source heat pumps.



160 Old Steet

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**N/A*** $kgCO_2 e/m^2$ GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**N/A*** $kgCO_2 e/m^2$ GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**809.1*[1]** $kgCO_2 e/m^2$ GIA

1 Based on emission factors: 0.21 $kgCO_2e/kWh$ for gas (Part L) and 0.0376 $kgCO_2e/kWh$ for electricity (FES 2022).

Energy Use intensity ($kWh/m^2/yr$ (Based on NIA)	159.4 (electricity) and 22.6 (gas) Based on worst case scenario results (excl. retail and plant rooms)
Heating Fuel type (heat network, electric)	Electricity and gas
Low and Zero Carbon Technologies	Air source heat pumps and PV panels
Recycled Content % by Value	Information not available

WLC Assessment Method:
N/A

WLC Assessment Scope:
N/A

Building element	Lifecycle Module	Emissions ($kgCO_2 e/m^2$) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.3 0.5
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	162.0 184.0
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	141.0 195.0
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	28.0 57.0
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	30.0 169.0
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	8.0 39.0
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	94.0 248.0
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	7.0 13.0

Certifications

BREEAM 2011 Offices
Excellent rating

Key Insights

Insights

- Creating an office building to meet highest possible sustainable standards through improved performance of the building.
- Retention of existing building to save significant amount of embodied carbon.
- Flexible design to allow accomodating both single and multi-occupant configurations.
- Enhancing biodiversity and ecology.
- When the building was designed an completed, it was not typical to conduct embodied carbon analysis and therefore today the data related to carbon is not available.

Opportunities

- Achieving considerable embodied carbon reduction through the retention of existing building structure and minimising the application of internal finishes as well as a successful reduction on demolition of the existing structure.
- Achieving energy efficiency with the design of new cladding and glazing systems and installation of air source heat pumps, PVs, and green and blue roofs.
- Reduction on construction costs through retaining the existing building frame, improvement on internal rate reurn (IRR), and reduction on overall programme time.
- Rental growth with significant additional office area achieved by utilising the basement car park.
- Enhancing ecology through the design of a green roof and biodiverse surface finishes.

Challenges

- Resulting to design a quite large and open reception area due to that the original E shaped plan of the existing building did not allow to create flexible office space.
- Challenging task to solve problems resulting from the steel and concrete connection where steel frames were proposed for the new floors.

The Gilbert and One Lackington Street

Approximate Project Construction Cost: no information provided
Total Project Cost: no information provided

Location: London, UK
Planning Authority: London Borough of Islington
Building Type: Office & Retail
Project Type: Refurbishment

RIBA stage: RIBA Stage 6
DESIGN TEAM
Client: Brookfield Office Property Mgmt.
Developer: Brookfield Office Property Management

Project Manager: Jackson Coles LLP
Architect: Stiff + Trevillion
Structure: Heyne Tillett Steel
MEP: Hilson Moran
Sustainability: Hilson Moran

Overview

Pre-refurb

Building Age: 1928

GIA: *information not provided*

NIA: 13,657 m²

Clear height *: *information not provided*

EPC: E

Heating fuel: Gas

Source: Heyne Tillett Steel (HTS)

Page 273

Post-refurb

Completion Date: 2020

Status: RIBA Stage 6

GIA: 21,050 m²

NIA: 14,845 m²

Clear height *: 2.3-2.45 m

EPC: B

Heating fuel: Electricity and gas

Cat A: Offices

Cat B: N/A

Source: Brookfield Properties

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

Substantial refurbishment: Additional storey extension to the central wing and reframing of the mansard roof floors, reconfiguration and extension of the existing central core to provide additional vertical circulation, retaining five storeys of the existing façade around the core, which is to be reconfigured, strengthening of the original 1930s riveted steel columns and beams and provision of external rooftop terrace spaces.

Previously the building, called City Gate House, was a highly resilient building for Bloomberg's London headquarters. The existing structure consisted of a steel frame. The main façade of City Gate House fronted on to Finsbury Square and was predominately constructed from Portland stone. Other than the Lackington Street elevation the remainder of the building was generally clad in glazed brick. A large proportion of the building retained existing single glazing, some also with steel frames. Due to the conservation status it is not possible to alter the façade.

Retained and installed elements

100% retained — **External Walls (1)**
The existing brick and stone-faced external walls had poor thermal performance. However, they were retained due to the conservation status.

100% retained — **Openings (2)**
The original windows were refurbished and resealed due to the conservation status.

100% installed — **Services (3)**
New services were proposed.

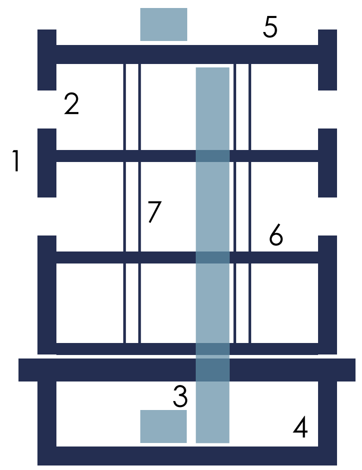
90% retained — **Substructure (4)**
Majority of the existing substructure was retained. Some reinforcement works were undertaken.

90% retained — **Roofs (5)**
The existing tiled mansard roofs were retained (repaired and re-layered where necessary). Inverted roof construction was proposed.

90% retained — **Floors (6)**
Some concrete repair works were undertaken. Steel decking lightweight concrete composite floors were proposed.

90% retained — **Frame (7)**
Majority of the existing frame was retained. Some strengthening works on columns were undertaken. Level 6 & 7 were partly demolished to provide additional space.

100% installed — **Low Carbon/Renewable Technologies**
Installation of air source heat pumps



The Gilbert and One Lackington Street

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**250.3*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**147.1*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**718.6***[1] $kgCO_2$ e/m² GIA

1 Based on emission factors: 0.21 $kgCO_2e$/kWh for gas (Part L) and 0.0376 $kgCO_2e$/kWh for electricity (FES 2022).

Energy Use intensity (kWh/m²/yr (Based on NIA)	49 (electricity) and 77 (gas)
Heating Fuel type (heat network, electric)	Electricity and gas
Low and Zero Carbon Technologies	Air source heat pumps
Recycled Content % by Value	Information not available

WLC Assessment Method:
UKGBC Net Zero Carbon

WLC Assessment Scope:
Modules A-C

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	15.9 18.3
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	67.1 (incl. internal walls) 83.6 (incl. internal walls)
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	6.7 11.3
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	reported above reported above
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	30.5 51.1
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	Out of scope Out of scope
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	26.8 86.0
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	Out of scope Out of scope

Certifications

BREEAM 2014
Non Domestic
Refurbishment and Fit-out
Very Good rating

Key Insights

Insights

- Upgrading the operational performance of the existing building through the energy efficient systems, upgrading the poor thermal performance of the historical facade.
- Preserving the historical heritage and prolonging the lifespan of the building.
- Providing more spaces and modern workplaces at market appropriate standards and usable terrace spaces for the occupants.
- Reducing the operational costs of the building.

Opportunities

- Achieving significant embodied carbon reduction through retention and reducing the operational energy costs.
- Extending the lifespan of the 1930s building and preserving architectural heritage with retaining 90% of the original structure.
- Creating open plan floorplates to provide occupants more usable and flexible office spaces.
- Improving wellbeing for occupiers.
- Providing outdoor spaces including a courtyard and seven terraces with views.

Challenges

- Due to the conservation status of the building, heat loss and leakage from the historical facade created a challenge to reduce heating related energy consumption and operational emissions.
- Due to the restrictions for the alterations on the historical facade, the development could not be operated fully electricity and it needed for a backup gas boiler. This impacted on operational emissions.
- Due to the constraints of the existing building, the air conditioning design was limited to installing an underfloor heating and cooling system to maximise the floor to ceiling heights and at the same time minimise the high level visual impact of a traditional fan coil and associated high level services distribution. This resulted to have a small reduction in office NIA.

Coal Drops Yard

Approximate Project Construction Cost: £80-100m
Total Project Cost: £100m+

Location: London, UK
Planning Authority: London Borough of Camden
Building Type: Retail & Public Space
Project Type: Refurbishment
RIBA stage: RIBA Stage 6

DESIGN TEAM
Client: King's Cross Central Limited Partnership (KCCLP)
Developer: KCCLP
Project Manager: Argent (Development Manager)

Architect: Heatherwick Studio (Concept), BAM Design (Delivery)
Structure: Arup
MEP: Hoare Lea (Concept), BAM Design (Delivery)
Sustainability: N/A

Overview

Page 275

Pre-refurb

Building Age: 1850s

GIA: 6,624 m²

NIA: *Information not provided*

Clear height *: 2.9-6.0 m

EPC: N/A

Heating fuel: Gas

No image provided

Post-refurb

Completion Date: 2018

Status: RIBA Stage 6

GIA: 12,715 m²

NIA: 8,468 m²

Clear height *: 2.8-8.0 m

EPC: E (shell spaces) *
Listed building, restricting performance

Heating fuel: Heat network (green gas)

Cat A: N/A (Fit out: Shell and Core)

Cat B: N/A

No image provided

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

The project comprises three heritage buildings; the Eastern Coal Drops (ECD) and Viaduct (ECDV) (both Grade II listed), the Western Coal Drops (WCD) and Viaduct (WCDV) and, the 'Western Wharf Road Arches' (WWRA). All three buildings (with their associated Viaducts) are located within the Regent's Canal Conservation Area.

The three existing buildings were converted from derelict warehouse spaces, formerly coal sorting and distribution spaces, into retail units forming the public heart of King's Cross. In between the buildings is a central yard that is curated for events, art installations and markets. Three new bridge structures were added to connect buildings together and overlook the central yard.

The largest intervention was the addition of an anchor retail space at the Upper Level between the ECD and WCD. This floorplate was formed to create the perception of the slate roofs 'peeling' away from the existing buildings and meeting at a single point above the central yard, whilst retaining the appearance of two individual buildings.

Retained and installed elements

90% retained — **External Walls (1)**
90% of brick and cast iron structure was retained.

not provided — **Openings (2)**
The existing metal and wooden framed windows were retained and refurbished.

100% installed — **Services (3)**
New services were proposed.

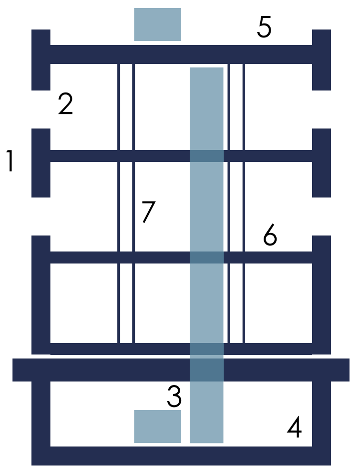
100% retained — **Substructure (4)**
Existing substructure was retained and reinforced, along with new piled foundations to support the new structure.

Not provided — **Roofs (5)**
The existing wooden roof trusses and sarking boards were partly retained. A new standing seam roof to new roof profile with aluminium rain-screen cladding.

20% retained — **Floors (6)**
Approximately 20% of the existing floors was retained, and replaced with new steel framed floor. The existing floor of the East Coal Drops had the removed and replaced at a different level.

90% retained — **Frame (7)**
Majority of the existing brick and cast iron structure were retained. New steel frame was added to support new roof structure.

N/A — **Low Carbon/Renewable Technologies**
The buildings were connected to a district energy system which has since moved to use green gas.



Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	N/A* $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	N/A* $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 25yr design life	N/A*[1] $kgCO_2$ e/m² GIA

1 Carbon figures could not be provided at the time, in 2018, due to lack of project data

Energy Use intensity (kWh/m²/yr (Based on NIA)	410 (including unregulated energy as well)
Heating Fuel type (heat network, electric)	District energy network - green gas
Low and Zero Carbon Technologies	N/A
Recycled Content % by Value	Information not available

WLC Assessment Method: N/A

WLC Assessment Scope: N/A

Page 276

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A

Certifications

BREEAM UK Refurbishment and Fit-Out 2014, Very Good

Key Insights

Insights

- The redevelopment aimed to provide a long-term, sustainable future for the buildings with sufficient flexibility for the building to further adapt as the retail market changes over time, preserving the Victorian spirit of industry and innovation.
- The addition of the top floor extension was driven by a need to create a critical mass of retail floorspace, which could not be provided by the existing buildings alone.
- The architectural design aimed to create something new and of note, to attract a wider pool of visitors to support the buildings' success as a retail destination into the future, and help create a sense of place, and discovery, within the wider King's Cross masterplan.
- When the building was designed and completed, it was not typical to conduct embodied carbon analysis.

Opportunities

- This development presented an opportunity to extend the life span of the buildings which were previously run-down and not accessible to the general public.
- The configuration of the buildings naturally created a central space between them, providing new public space activated by the surrounding retail.
- The cellular nature of the buildings derived from their original use as coal drops, was well suited to the retail use proposed, with each individual retail space able to showcase the historic fabric of the buildings for the public to appreciate.
- Achieving a reduction in operational carbon, by providing a connection to the King's Cross district energy network.

Challenges

- The existing levels of the Eastern and Western Coal Drops were complex and varied within and between buildings. This required careful consideration to provide inclusive and accessible spaces, whilst ensuring the buildings' historic use and form could still be read and understood.
- Due to the presence of the viaduct structures within the central yard, sightlines to upper levels from the central yard, key for its future retail use, were limited in some areas. The removal of existing structure to address this issue was balanced with the aim to retain as much historic fabric as possible.
- The existing building structures could not take any new loads; this necessitated designing the new structure independently of the existing buildings.
- Due to lack of basement and the inability to locate plant on the historic pitched roofs, there was not an obvious place for plant rooms to be positioned. This necessitated a creative approach to building services whereby service corridors utilised existing interim levels in the building. The corridors sit in between the upper and lower levels, allowing floorspace to be maximised.
- The cellular nature of the buildings and small size of the existing arch openings created constraints in construction, which elements of the design (eg, piles) needed to respond to.

International House

Approximate Project Construction Cost: £50m-£80m
Total Project Cost: £50m-£80m

Location: London, UK
Planning Authority: Ealing Council
Building Type: Office
Project Type: Refurbishment
RIBA stage: RIBA Stage 4

DESIGN TEAM
Client: British Land
Developer:
Project Manager: RPP
Architect: Barr Gazetas

Structure: Evolve
MEP: INsignis Consulting
Sustainability: INsignis Consulting

Overview

Pre-refurb

Building Age: 1980s

GIA: 12,329 m²

NIA: 9,502 m²

Clear height *: *information not provided*

EPC: Multiple (E-D)

Heating fuel: Gas

Source: British Land

Post-refurb

Completion Date: 2025

Status: RIBA Stage 4

GIA: 19,730 m²

NIA: 15,365 m²

Clear height *: 2.35-2.80 m

EPC: B (subject to achieve A)

Heating fuel: Electricity

Cat A: Offices

Cat B: N/A


Source: Bar Gazetas & British Land

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

The International House is a complex refurbishment at the heart of Ealing. The interventions include remodelling 5 floors of flexible office accommodation set above a live shopping centre (one of which is formed from a new roof extension). A new main entrance and arrival experience, atrium, end of trip facilities and two vibrant central courtyards add to the refurbishment.

Within the design proposals, a unique and welcoming arrival experience greets visitors as they are transported to the second-floor reception on escalators lined with a green wall. The new atrium is the heart of the scheme and has its own identity and function. Its roof offers a distinctive quality, and emphasises the relationship with the ground floor, connecting the two spaces. The atrium also opens directly into the courtyard, connecting inside and outside. The courtyards complement the architecture in a way that provides a seamless and multifunctional workspace and completes the design, delivering a class-leading, contemporary workplace environment.

Retained and installed elements

60% retained — **External Walls (1)**
The existing brick walls were retained. New aluminium curtain walling were porposed.

100% installed — **Openings (2)**
New windows and doors were proposed.

100% installed — **Services (3)**
New services and systems were proposed.

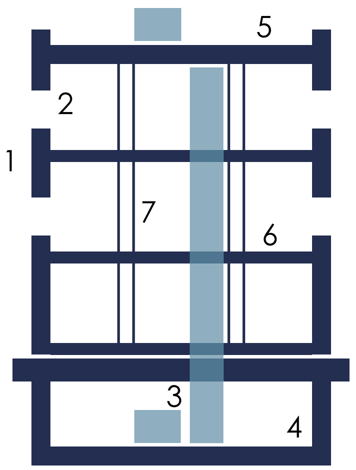
not provided — **Substructure (4)**
Retention rate of the existing substructure was not provided.

100% installed — **Roofs (5)**
New zinc cladded roof were proposed. New landscape green roofs to courtyards and sedum roof were proposed.

25% retained — **Floors (6)**
Increasing footprint by extending floor plate into courtyard areas. Refurbished RAF and new finishes for the office floor plates.

not provided — **Frame (7)**
Retention rate of the existing concrete frame was not provided.

100% installed — **Low Carbon/Renewable Technologies**
Installation of PVs and air source heat pumps.



Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**509.8*** $kgCO_2$ e/m^2 GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**322.3*** $kgCO_2$ e/m^2 GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**1,255.8*** $kgCO_2$ e/m^2 GIA

1 Figures based on the Stage 4 WLC Assessment report

Energy Use intensity ($kWh/m^2/yr$ (Based on NIA)	119 (for whole building)
Heating Fuel type (heat network, electric)	Electricity
Low and Zero Carbon Technologies	Air source heat pumps and PVs
Recycled Content % by Value	Calculation not completed

WLC Assessment Method: RICS WLC

WLC Assessment Scope: Modules A-C (excl. B6 & B7)

Page 278

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m^2) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.0 0.0
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	183.2 254.1
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	45.7 46.9
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	31.5 35.7
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	35.8 129.1
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.9 4.2
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	24.1 73.1
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	1.2 1.2

Certifications

BREEAM 2018 New Construction Outstanding

Targeting NABERS 5 star rating

Key Insights

Insights

- Establishing an open and refreshing new identity for the building using sustainable and contemporary materials throughout to revitalise the building, creating strong links between the internal and external spaces.
- Aiming to upgrade the thermal performance of the existing building through imporvements on fabric.
- Climate change resilience and biodiversity.
- Safeguarding heritage sites.
- 96.3% retention of concrete material from exising to final development.

Opportunities

- Achieving both considerable embodied carbon reductions through retention and operational energy and carbon reductions through high thermal performance and energy efficient building services specification.
- Renewables and onsite generation through 950 m^2 PV array.
- Targetting minimum 20% GGBS in most applications and zero waste to landfill.
- Proportion of materials with a reused or recycled content to be at least 20%.
- Development of the Material Passports and utilisation of Globechain platfor for strip-out recycling.
- Enhancement of occupier health and wellbeing through the adoption of WELL building standard design principles.

Challenges

- Challenges in meeting building fabric performance requirements for compliance with the 'Be Lean' stage of the London Plans Energy Hierarchy.
- Challenges in achieving carbon reductions required for sufficient BREEAM ENE 01 credits to ensure 'Outstanding' rating can be achieved.
- Challenges in achieving sufficient thermal comfort levels in the atrium due to high level of glazing. This was mitigated through appropriate ventilation and external shading measures.

One Exchange Square

Approximate Project Construction Cost: £100m+
Total Project Cost: £100m+

Location: London, UK
Planning Authority: City of London
Building Type: Workspace & Retail
Project Type: Deep Retrofit
RIBA stage: RIBA Stage 5

DESIGN TEAM
Client: Permodalan Nasional Berhad PNB and LaSalle Investment Management
Developer:
Project Manager: M3 Consulting

Architect: Fletcher Priest Architects
Structure: Heyne Tillett Steel
MEP: Sweco
Sustainability: Sweco

Overview

Pre-refurb

Building Age: 1989

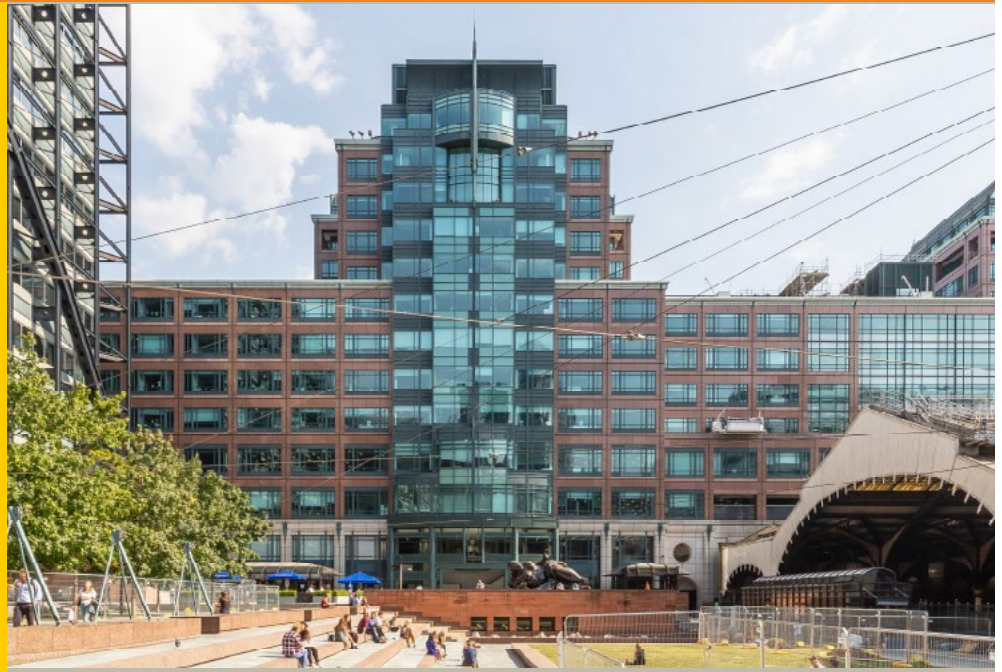
GIA: 49,987 m^2

NIA: 35,314 m^2

Clear height *: 2.75-3.65 m

EPC: E

Heating fuel: Gas



Source: Fletcher Priest Architects

Post-refurb

Completion Date: 2025

Status: RIBA Stage 5

GIA: 58,400 m^2

NIA: 42,000 m^2

Clear height *: 2.75-3.65 m (to underside of ceiling rafts)

2.7-3.4 m (exposed soffit option, revealing generous volumes above the exisitng suspended ceiling)

EPC: A

Heating fuel: Electricity

Cat A: Raised access floor only to all floors

Cat B: Amenity spaces only

Source: Fletcher Priest Architects

* Clear height means the finished floor level to ceiling height

Deep Retrofit

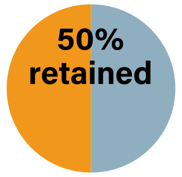
Scope of works

The major redevelopment project addresses the existing poor relationship with the park by positioning the principal entrance off this important public space at the base of a new 11 storey extension suspended above the square and NWR platforms below with an exoskeleton which creates visual depth and provides a fifth of the solar shading to this façade. Alongside retention of 90% of structural fabric this approach significantly reduces the building's embodied carbon.

The project further aims to minimise embodied and operational carbon through extensive reuse and enhancement of half of the existing façade whilst creating an intelligent envelope design to the Exchange Square façade presenting a new face to the City. It is targeting BREEAM Outstanding and WELL Platinum for the base build. The scheme aspires to be one of the first registered refurbishment projects in the UK to achieve NABERS UK Design for Performance 5 Star Rating at Design Stage.

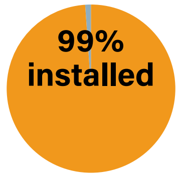
One Exchange Square will be 100% electric. The development uses intelligent façade design and mechanical services twinned with building management systems to limit operational energy use.

Retained and installed elements



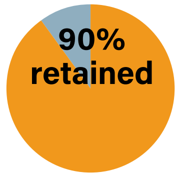
External Walls (1)
50% of the existing granite facade and associated supporting steelwork are retained. 17% of new facade consists of retained elements from existing facade

Openings (2)
New triple glazed windows with opening elements are installed within the existing granite facades.

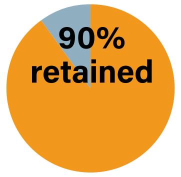


Services (3)
3 of the existing generators are retained and reused. New services are proposed.

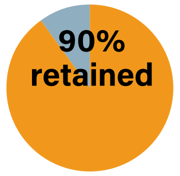
Substructure (4)
The existing substructure is 100% retained.



Roofs (5)
The existing roof finishes are removed. The slab becomes floor plate or terrace and was counted in the 90% retained structure.

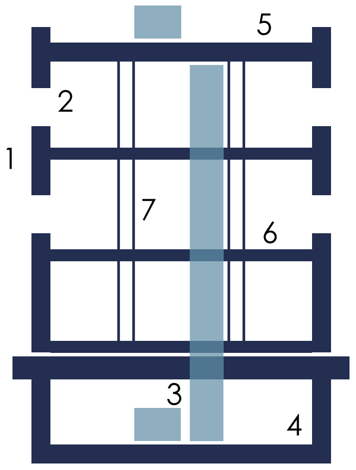


Floors (6)
90% of the floors are retained. Vertical and lateral extensions, as well as infills within retained floors adds c.4,400 m^2 GIA to the existing building.



Frame (7)
90% of structure is retained.

Low Carbon/Renewable Technologies
Installation of air source heat pumps and PVs.



One Exchange Square

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**939.0*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**525.0*** $kgCO_2$ e/m² GIA (target 469)
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**186.6*[1]** $kgCO_2$ e/m² GIA

1 Based on emission factors: 0.0376 $kgCO_2e$/kWh for electricity (FES 2022).

Energy Use intensity (kWh/m²/yr)	115 (for whole building)
Heating Fuel type (heat network, electric)	Electricity
Low and Zero Carbon Technologies	Air source heat pumps and PVs
Recycled Content % by Value	Information not available

WLC Assessment Method: RICS WLC

WLC Assessment Scope: Modules A-C (excl. B6 & B7)

Page 280

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.3 0.5
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	162.0 184.0
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	141.0 195.0
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	28.0 57.0
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	30.0 169.0
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	8.0 39.0
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	94.0 248.0
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	7.0 13.0

Certifications

Targeting BREEAM 2018 New Construction Outstanding

NABERS 5 star rating

WELL Platinum

WiredScore Platinum

Key Insights

Insights

- Redevelopment of the building into a new high quality workplace.
- Creating a contemporary and sustainable workspaces, enhancing the thermal comfort and reducing the operational carbon footprint and energy costs.
- Biodiversity and occupants' health and wellbeing, promoting circular resource use.
- The building will a 45% improvement than a new typical office building based on the standard GLA benchmark and is below the GLA's 'Apsirational' carbon targets of 650 $kgCO_2e$/m² GIA (upfront A1-5).
- Generous internal volumes, fresh air via opening windows and plant-filled entrances.

Opportunities

- Providing high quality public realm and repurposing the out-of-date work space.
- Achieving considerable embodied carbon reductions through retention and operational energy.
- Acheiving operational carbon reductions through energy efficient building services specification and passive solar shading design.
- Consideration of the demountability and reusability for the new facade elements to highlight future circularity and use of reclaimed materials.
- Promoting circularity though earmarking the existing building materials (steel, facade elements, marbles, carpet tiles, raised access flooring) to several building projects across the UK and Nigeria as well as art projects.

Challenges

- Challenges in increasing the NIA of the existing building due to the structural limitations of the building site as the building is above Liverpool Street Station.
- Challenge in repurposing the existing building due to its stong post-modern aesthetic.
- Challenge to create welcoming arrival experience due to multiple entrances at different levels to the existing building.
- Challenge of undertaking a heavy refurbishment that sits directly above Liverpool Street Station railway lines and platforms and London Underground's Central line.

Quay Quarter Tower

Approximate Project Construction Cost: no information provided
Total Project Cost: no information provided

Location: Sydney, Australia
Planning Authority: The City of Sydney
Building Type: Office & Mixed-use
Project Type: Redevelopment
RIBA stage: RIBA Stage 6

DESIGN TEAM
Client: AMP Capital Investors
Developer: AMP Capital
Project Manager:
Architect: 3XN

Structure: BG&E
MEP: Arup
Sustainability: Arup

Overview

Pre-refurb

Building Age: 1976

GIA: 57,000 m^2

NIA: 52,500 m^2

Clear height *: *XXXX*

EPC: *no certificate equivalent (Australia)*

Heating fuel: XXX

Source: 3XN

Page 281

Post-refurb

Completion Date: 2022

Status: RIBA Stage 6

GIA: 102,000 m^2

NIA: 88,500 m^2

Clear height *: 2.7 m

EPC: *no certificate equivalent (Australia)*

Heating fuel: Electricity and gas

Cat A: Shell only (Tower)

Cat B: Landlord areas (reception, lift lobbies

Source: 3XN

* Clear height means the finished floor level to ceiling height

Redevelopment

Scope of works

In 2014, the AMP Centre, completed in 1976, was nearing the end of its commercial life. The façade and building services were not performing well, and the relatively small floor plates did not appeal to prospective tenants, resulting in diminishing returns for the building owners. Although an important part of Sydney's history and once the tallest building in the city, it was no longer commercially viable and had become an unloved building. However, a solid superstructure and reasonable floor-to-floor heights meant that it had the potential to be transformed into something better.

The design and construction of Quay Quarter Tower uses much of the existing structure, extending the core and floorplates which are then wrapped in a new cladding.

The design adds approximately 45,000 m^2 of new construction, doubling the floor area and creating a new world-class high-rise office from an outdated, underperforming, and unloved building, becoming the most significant adaptive reuse high-rise ever completed.

Retained and installed elements

100% new build

External Walls (1)
New insulated aluminium system was proposed to minimise be functional, sustainable and elegant.

100% installed

Openings (2)
A new self-shading aluminium façade was proposed to reduce solar gain and conduction across the facade whilst maximising views out over Sydney.

100% installed

Services (3)
New systems were installed.

100% retained

Substructure (4)
The existing substructure was retained.

100% new build

Roofs (5)
The existing roof was removed and a new roof was installed.

65% retained

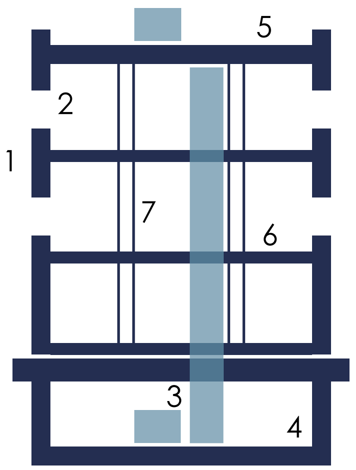
Floors (6)
With 65% retention, a series of vertical atria floors within each of the 'blocks' of the tower were preovided to be adaptable for future changing needs.

65% retained

Frame (7)
The design retains 65% of the beams and columns. For new structure, a hybrid steel and concrete construction were used.

N/A

Low Carbon/Renewable Technologies
The development does not include any low and zero carbon technologies (such as PVs and heat pumps).



Quay Quarter Tower

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**N/A*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**818.0*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 50yr design life	**N/A*** $kgCO_2$ e/m² GIA

Energy Use intensity (kWh/m²/yr (Based on NIA)	62.6
Heating Fuel type (heat network, electric)	Electricity and gas
Low and Zero Carbon Technologies	N/A
Recycled Content % by Value	*XXXX*

WLC Assessment Method:
TBC

WLC Assessment Scope:
TBC

Page 282

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A

Certifications

6-star Green Star Office v3 As-Built

NABERS 5.5 Energy for Office

WELL V1 Core Platinum

NABERS Water for Office (whole building)

Key Insights

Insights

- Saving considerable amount of embodied carbon as well as time and money by using the existing structure of the building.
- Improving the user experience and upgrading the existing building condition with enhancing the thermal performance and increasing the floor area.
- Creating a livelier public realm, providing spaces within the focus of social sustainability and occupiers' health and wellbeing.

Opportunities

- Providing a fully coordinated design and the reduced operational energy requirements whilst also providing best-in-class internal environment quality for users of the building.
- Providing a more sustainable construction through achieveing considerable amount of embodied carbon reduction which is rooted in the retention of the majority of building structure.
- Saving embodied carbon through 40% Portland cement reduction in new concrete.
- Using environmentally friendly building materials having recognised forest certifications, EPDs, and GreenTag certifications.
- Achieving Green Star compliance through selection of materials based on emission limits.

Challenges

- Challenges in the retention and subsequent extension of the existing tower core due to tying old and new concrete elements.

The Hickman

Approximate Project Construction Cost: no information provided
Total Project Cost: £20-50m

Location: London, UK
Planning Authority: Tower Hamlets Council
Building Type: Office & Retail
Project Type: Retrofit

RIBA stage: RIBA Stage 6
DESIGN TEAM
Client: Great Portland Estates
Developer: Great Portland Estates
Project Manager: Hush PM&C Ltd

Architect: DSDHA
Structure: Heyne Tillett Steel
MEP: Milieu Consult
Sustainability: Milieu Consult

Overview

Pre-refurb

Building Age: 1950s

GIA: *information not provided*

NIA: 4,180 m^2

Clear height *: 2.8-3.0 m

EPC: N/A

Heating fuel: Gas

Image credit: Derek Kendall ----- copyright issue (waiting for images)

Post-refurb

Completion Date: 2020

Status: RIBA Stage 6

GIA: 9,150 m^2

NIA: 6,972 m^2

Clear height *: 2.8-3.0 m

EPC: A

Heating fuel: Gas

Cat A: Shell & Core

Cat B: N/A

Image credit: The Hickman by GPE

* Clear height means the finished floor level to ceiling height

Retrofit

Scope of works

The Hickman is a complex refurbishment of a commercial building within the Whitechapel High Street Conservation Area, a neighbourhood with a rich industrial past. The existing site comprised six buildings patched together and reconstructed over time, each with varying structures, the earliest of which dates back to the 1800s. No record of the original structural information was available for the existing building.

The project was focused on adaptive reuse of the existing building. The former building was an amalgamation of five separate structures, some parts dating back to the late 19th century. The objective was to create a building designed for the new ways of working – with collaboration, creativity, digitisation and socialising at the core. The delivery of a flexible office building was a key component of the development. A new exposed concrete core was inserted in the middle of the existing structure and the building extended vertically, with three additional floors introduced beyond Level 4. Minimal strengthening of columns and foundations were required. This was achieved by using a lightweight exposed structural frame and composite deck floor slabs with 50% GGBS content.

Retained and installed elements

not provided — **External Walls (1)**
The retention rate of the existing external walls was not provided.

not provided — **Openings (2)**
Information not provided

100% installed — **Services (3)**
MEP design was subsequently overhauled, with an alternative system and core design, realising more NIA and cohesion.

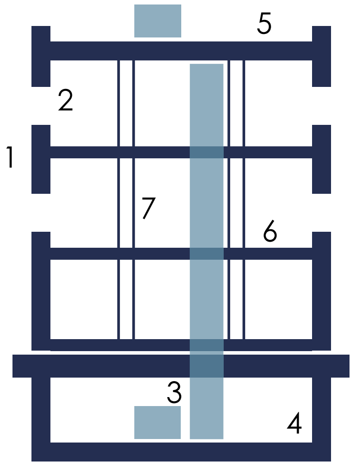
100% retained — **Substructure (4)**
The existing substructure was retained. Minimal strengthening was undertaken.

not provided — **Roofs (5)**
Information not provided

100% retained — **Floors (6)**
The existing floors were retained. For the new floors, a lightweight exposed structural frame and composite deck floor slabs with 50% GGBS content.

50% retained — **Frame (7)**
Approximately 50% of the existing frame was retained..

N/A — **Low Carbon/Renewable Technologies**
N/A



The Hickman

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**N/A*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**337.0*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**N/A*** $kgCO_2$ e/m² GIA

Energy Use intensity (kWh/m²/yr (Based on NIA)	124
Heating Fuel type (heat network, electric)	Gas
Low and Zero Carbon Technologies	N/A
Recycled Content % by Value	Information not provided

Page 284

WLC Assessment Method: information not provided

WLC Assessment Scope: information not provided

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A

Certifications

BREEAM 2014
New Construction - Excellent rating

SmartScore Platinum

WiredScore Platinum

Key Insights

Insights

- Considering sustainability, wellbeing and technology as core principles, delivery of a flexible office building providing options for customers.
- Saving considerable amount of embodied carbon by using the existing structure of the building and revealing the historical adaptation of previous occupiers.
- Upgrading the existing building condition through enhancing the thermal performance and increasing the floor area.
- Designing for future adaptive reuse and providing sustainable spaces that promote health and wellbeing.

Opportunities

- Achieveing to save significant amount of embodied carbon through retaining nearly 50% of original structure minimising the extend of demolition.
- Reducing operational carbon and energy through improving thermal performance of the external envelope.
- Improving air quality and biodiversity, increasing urban greening, installing a green roof, terraces and planting with the courtyard.
- Implementation of Digital Twin and GPE's sesame platforms to collect data regarding occupancy levels, temperature, light levels, air quality and energy use.

Challenges

- Challenges regarding the retention of former differing building structures due to the complicated structure of the existing building.

YY London

Approximate Project Construction Cost: no information provided
Total Project Cost: no information provided

Location: London, UK
Planning Authority: Tower Hamlets Council
Building Type: Office & Retail
Project Type: Refurbishment

RIBA stage: RIBA Stage 5
DESIGN TEAM
Client: Quadrant and Oaktree Capital
Developer: Quadrant
Project Manager: Avison Young

Architect: Buckley Gray Yeoman
Structure: Watermans Group
MEP: Hilson Moran
Sustainability: Hilson Moran

Overview

Pre-refurb

Building Age: 1991

GIA: 40,337 m^2

NIA: 28,156 m^2

Clear height *: 2.75 m

EPC: F

Heating fuel: Electricity

Source: Wikimedia Commons

Page 285

Post-refurb

Completion Date: 2022

Status: RIBA Stage 6

GIA: 48,997 m^2

NIA: 35,610 m^2

Clear height *: 3.13 m

EPC: A

Heating fuel: Electricity

Cat A: Shell & Core

Cat B: N/A

Source: Buckley Gray Yeoman (BGY)

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

The development of YY London involves a major refurbishment to reinvent the existing building to create a highly sustainable modern workspace, integrated seamlessly into the public realm as well as addition of three new floors. The existing building was 13-storey in height comprising a lower ground floor, ground floor, mezzanine and upper 10 floor levels. There were two storeys of enclosed plant above this.

In this development, the steel structures and slabs were retained as possible. The design includes a new façade to dramatically change the appearance, infill the atrium, relocate the cores, create natural lights on all sides, rearrange the ground floor and create a new entrance and increase the NIA of the building.

Within an aspiration to achieve net zero carbon in operation, the building design incorporates various measures to reduce energy demand and improve efficiency.

Retained and installed elements

100% new build — **External Walls (1)** The existing marble facade was removed and new glazing systems were installed.

100% installed — **Openings (2)** New glazed panels and high perfromance solar coatings on the facade were installed.

100% installed — **Services (3)** New high-efficiency systems were installed.

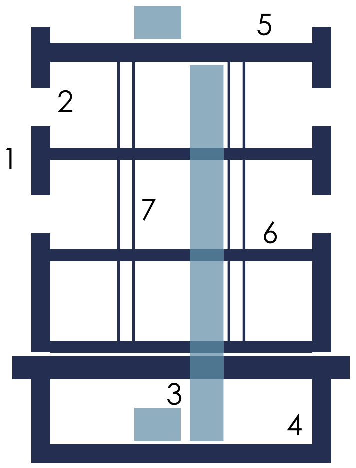
100% retained — **Substructure (4)** The existing piled foundations and basement were reused.

100% new build — **Roofs (5)** The existing roof was removed and a rooftop garden was designed.

84% retained — **Floors (6)** Majority of the existing floors was retained. Cellular plate girders have been used to form the new upper floors.

86% retained — **Frame (7)** Majority of the existing steel frame was retained. Steel frame was used for the extentions.

100% installed — **Low Carbon/Renewable Technologies** Air Source Heat Pumps with heat recovery systems and PVs were installed.



YY London

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**N/A*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**N/A*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**264.0*[1]** $kgCO_2$ e/m² GIA

1 Based on emission factors: 0.0376 $kgCO_2$e/kWh for electricity (FES 2022).

Energy Use intensity (kWh/m²/yr (Based on NIA)	133 (projected, office only)
Heating Fuel type (heat network, electric)	Electricity
Low and Zero Carbon Technologies	Air Source Heat Pumps and PVs
Recycled Content % by Value	25% (in new steel & concrete structures)

WLC Assessment Method:
N/A

WLC Assessment Scope:
N/A

Page 286

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	N/A N/A

Certifications

BREEAM 2018 Offices Outstanding

NABERS 4.5 star rating

Targeting WELL Platinum

Wired and SmartScore ratings

Key Insights

Insights

- Upgrading the existing building condition through enhancing the thermal performance to provide high levels of energy efficiency.
- Creating a modern, smart-enabled, and sustainable workplace considering health and wellbeing of the occupants.
- Utilising and reinventing the existing building structure and avoiding demolition to reduce the construction carbon footprint.
- Adopting an all-electric strategy to allow the project to achieve net zero carbon in operation through the procurement of 100% renewable REGO certified energy.

Opportunities

- Achieving operational carbon and energy savings through introducing passive design measures, energy efficiency, renewable technology as well as integrating operational energy monitoring and control systems.
- Optimising the building energy consumption and carbon emissions through the CO_2-controlled ventilation, energy monitoring and cloud-based analytics enable systems.
- Achieving significant reduction in embodied carbon through the retention of the existing structure of the building.
- Introducing terraces on every floor as secondary breakout spaces and increasing the biodiversity through the design of a planted rooftop garden to create additional space for wildlife as well as providing direct access to nature for the building's tenants.

Challenges

- Challenges in the addition of the new floors due to that the existing building sits over water and essentially built on stilts.
- Limitiations on the selection and use of materials for the structural works due to ensuring to keep the overall weight of the building down. Therefore, the only viable option was steel.
- Design for Performance modelling was undertaken at a very late stage this meant that there was very limited opportunity to feed into and provide recommendations of improving the design to improve operational carbon predictions.

62 Threadneedle Street

Approximate Project Construction Cost: £5-10m
Total Project Cost: £5-10m

Location: London, UK
Planning Authority: City of London
Building Type: Office & Retail
Project Type: Retrofit
RIBA stage: RIBA Stage 6

DESIGN TEAM
Client: Royal Sun Alliance Insurance
Developer: information not found
Project Manager: Jones Lang LaSalle
Architect: Rolfe Judd Architects

Structure: Watermans Group
MEP: Elementa
Sustainability: Mecserve Ltd

Overview

Pre-refurb

Building Age: 1970s

GIA: 6,632 m²

NIA: 4,908 m²

Clear height *: 2.55 m (1st floor ro 3rd floor and mezzanine) ; 3.95 m (ground floor)

EPC: D

Heating fuel: Gas

Source: Wikimedia Commons

Post-refurb

Completion Date: 2022

Status: RIBA Stage 6

GIA: 7,019 m²

NIA: 5,401 m²

Clear height *: 2.60 m (1st floor to 3rd floor); 2.65 (mezzanine); 4.76 (ground floor)

EPC: B

Heating fuel: Electricity (future-proofed)

Cat A: Offices

Cat B: N/A

Source: Rolfe Judd Architecture

* Clear height means the finished floor level to ceiling height

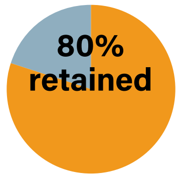
Retrofit

Scope of works

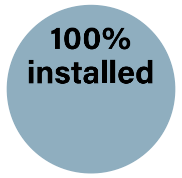
The development, comprising 2 basement levels and 8 upper floors including ground floor, is a refurbishment and extension of the existing 1970's office and bank building at 62-63 Threadneedle Street in the City of London. Although the planning approval obtained for the extensions up to 4th, 5th, 6th floors, the scope of refurbishment involves only basement floors, ground floor and 1st, 2nd and 3rd floors.

As part of the extension works new steelwork columns were introduced from basement level and founded on piled foundations as part of the primary support system for the new (extended) structural floors. The new main office entrance was moved to the centre bay of the Threadneedle Street façade. This gave the building a stronger street presence as well as increased the size of the lobby. The works to Levels 1, 2 & 3 incorporated rear extensions to expand the office floor plates offering a greater NIA and a series of external terraces. The structure allows for further upward expansion when upper leases align and is fully demountable if future change is required. The new steel framework and its interface with the existing concrete frame was left exposed and rafts were co-ordinated in line with BCO zoning to hide FCU whilst exposing ductwork and cable trays on a painted pot and beam soffit.

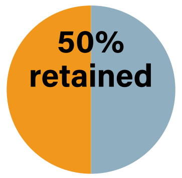
Retained and installed elements



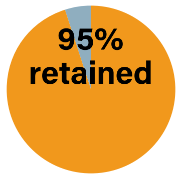
External Walls (1)
Majority of the existing walls were retained. The exiting fabric was enhanced where possible.



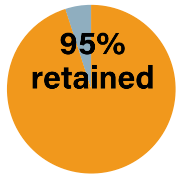
Openings (2)
New high performing double glazed units to ground floor and extension floors were installed.



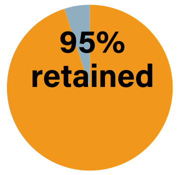
Services (3)
Utilising existing MEP systems and installing VRF systems were employed.



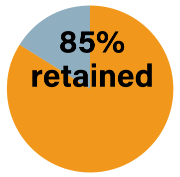
Substructure (4)
The existing foundations were utilised except for two new pile caps were formed to carry the extensions.



Roofs (5)
Majority of the existing roof was retained but new terraces were added.

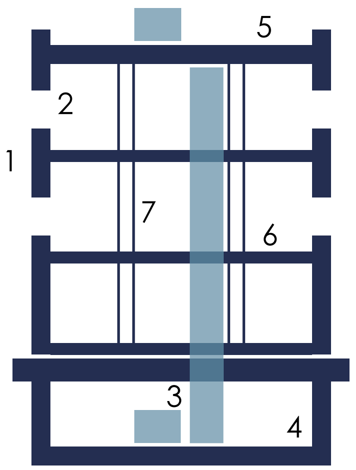


Floors (6)
Majority of the floor structure was retained. New build elements were limited to the extension areas.



Frame (7)
Majority of the existing frame was retained and exposed where possible. A steelwork solution was chosen to minimise loading path.

Low Carbon/Renewable Technologies
The scope of refurbishment involves future proved installation of high efficiency air source heat pumps.



62 Threadneedle Street

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**403.0*** kgCO_2 e/m^2 GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**192.0*** kgCO_2 e/m^2 GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**1,116.6***[1] kgCO_2 e/m^2 GIA

1 Figures based on the Stage 4 WLC Assessment report.

Energy Use intensity (kWh/m^2/yr (Based on GIA)	N/A
Heating Fuel type (heat network, electric)	Electricity (future-proofed)
Low and Zero Carbon Technologies	Future-proofed utilisation of air source heat pumps
Recycled Content % by Value	20% (for structural steel sections)

WLC Assessment Method:
RICS WLC

WLC Assessment Scope:
Modules A-C

Page 288

Building element	Lifecycle Module	Emissions (kgCO_2 e/m^2) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	5.0 5.3
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	47.9 50.5
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	16.2 29.3
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	10.6 20.8
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	72.3 196.8
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	Out of scope Out of scope
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	14.2 73.3
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.3 1.4

Certifications

BREEAM 2018
New Construction
Excellent

Key Insights

Insights

- Discounted initial option of proposing a new build which involved increased massing and height due to the unattractive increased carbon intensity and commercial spend implication.
- Contributing to the conservation area as a neutral building, with a darker coloured granite which contrasts with the other grade listed buildings of lighter colour making them stand out in the landscape.
- Bringing to life elements of the existing building that were hidden as well as extending the building lifespan and providing a series of spaces that focus on sustainability, wellbeing, flexibility, and reuse to reduce carbon at every opportunity. Upgrading the thermal and acoustic performance of the building façade. Enhancing the accessibility of the building to give it a stronger street presence.
- Building does not have continuous ceiling heights across all floors. The used of rafts gives the impression of a higher floor-to-ceiling heights.

Opportunities

- Achieving to improve thermal performance through replacing the single glazed units with double glazed units whilst retaining the original window frames. Improving the building lifespan and enhancing its commercial value.
- Achieving spatial improvements in the building plan with new arrangement of entrances, providing level access, and converting car park basement to the end-of-trip facilities (shower rooms, cycle stores).
- Introducing terraces on every floor as breakout spaces involving plants and greenery design and providing direct access for the building's tenants. Maximising natural light by introducing rooflights in specific floors.
- Designing the building with consideration of future enhancements onto the remaining floors outside of the redevelopment scope. These floors have been future proofed to enable redevelopment at the end of tenant lease. This would include transition to air source heat pumps and introduction of terraces.

Challenges

- Due to the age of the existing building, challenge in dealing with asbestos.
- Challenge in ensuring to prevent condensation due to the requirement of adding internal insulation layers in order to improve the thermal performance of the fabric.
- Maintaining a portion of the building operational during the redevelopment. Respecting and avoiding disruption to the services serving the tenants on top floors (retaining ductwork in the risers).
- Due to the site constraints and location, bringing materials such as steel onto the site was logistically challenging.
- Influencing entire design team and agent to welcome the design of exposed elements of the buildings such as columns, rough concrete finish and slabs.

Portland House

Approximate Project Construction Cost: £100m+
Total Project Cost: £100m+

Location: London, UK
Planning Authority: London Borough of Westminster
Building Type: Office & Retail
Project Type: Refurbishment

RIBA stage: RIBA Stage 5
DESIGN TEAM
Client: Landsec
Developer: Landsec
Project Manager: Opera

Architect: Buckley Gray Yeoman
Structure: Parmar Brook
MEP: Watkins Payne
Sustainability: Buro Happold

Overview

Pre-refurb

Building Age: 1962

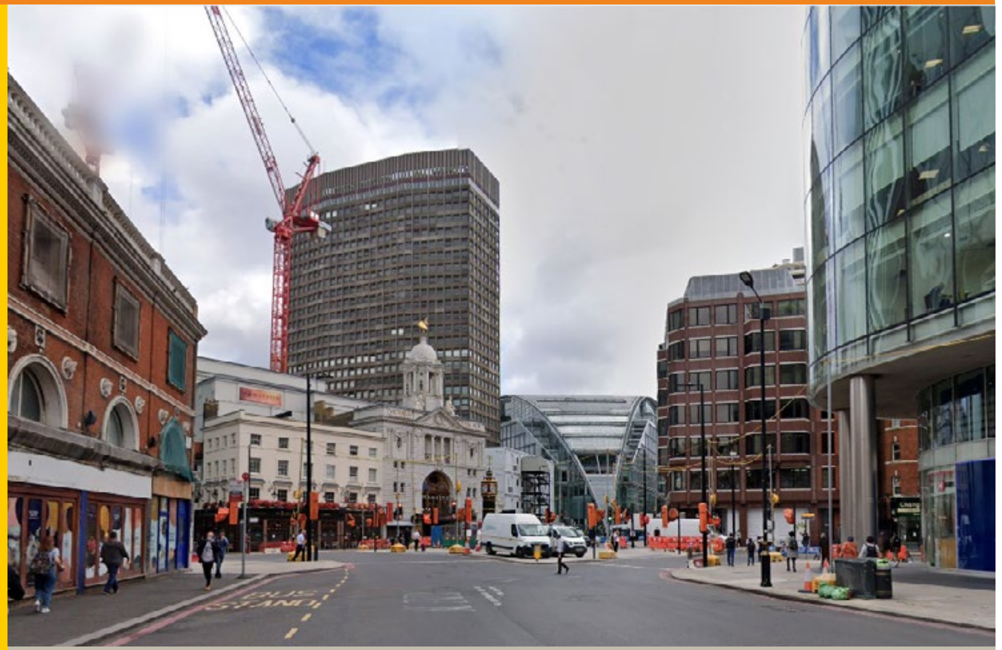
GIA: 45,026 m^2

NIA: 25,384 m^2

Clear height *: 2.9 m (unfinished slab to softfit)

EPC: E (some floors had D rating)

Heating fuel: Gas



Page 289

Post-refurb

Completion Date: 2025

Status: RIBA Stage 5

GIA: 46,179 m^2

NIA: 27,778 m^2

Clear height *: 2.7 m

EPC: A

Heating fuel: Electricity

Cat A: XXX

Cat B: N/A

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

Portland House is a large 29-story building which is largely in office use (Class B1) but other existing uses within the building include a private gym at basement level, retail at ground and first floor levels and mechanical plant at roof level. The building is fully clad in pre-cast concrete elements in a brutalist style that were fixed internally to avoid the need of scaffolding. With it being 60 years old with increasingly inefficient systems, a severely weathered façade and the need for additional capacity, Portland House is requiring refurbishment.

The comprehensive refurbishment scheme includes a new double height reception on Bressenden Place, a refurbished façade, new windows throughout and a Level 30 rooftop extension and installation of new modern efficient plant equipments to provide high quality of office space and improve the building's sustainability credentials.

Retained and installed elements

95% retained

External Walls (1)
Majority of the external walls are retained with new walls for the two storey extension.

5% retained

Openings (2)
Majority of windows and external doors are changed with new elements.

100% installed

Services (3)
Installation of hybrid VRF systems and traditional VRF systems are installed.

100% retained

Substructure (4)
The existing substructure is 100% retained.

100% retained

Roofs (5)
The existing roof is 100% reused but some elements will be removed. New roof will be constructed for the enten

100% retained

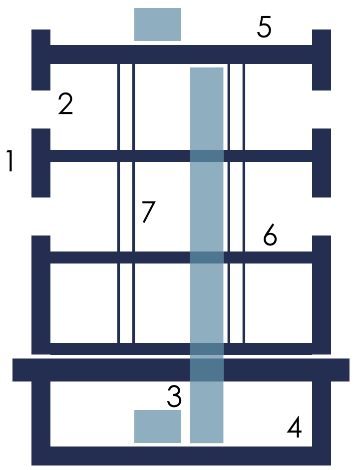
Floors (6)
The existing floors are 100% retained with some remedial works. For extention flroos, GGBS percentage is 36% to 65% with target of 66% to 80%.

100% retained

Frame (7)
The existing frame is 100% retained. New frame system is proposed for the extension floors.

100% installed

Low Carbon/Renewable Technologies
Installation of Air Source Heat Pumps.



Portland House

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**758.0*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**348.0*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**183.2***[1] $kgCO_2$ e/m² GIA

1 Based on emission factors: 0.0376 $kgCO_2e$/kWh for electricity (FES 2022).

Energy Use intensity (kWh/m²/yr (Based on NIA)	135
Heating Fuel type (heat network, electric)	Electricity
Low and Zero Carbon Technologies	Air source heat pumps
Recycled Content % by Value	Information not provided

WLC Assessment Method: RICS WLC

WLC Assessment Scope: Modules A-C

Page 290

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.0 0.0
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	48.0 63.0
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	62.0 119.0
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	27.0 41.0
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	61.0 122.0
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	11.0 12.0
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	100.0 353.0
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	2.0 2.0

Certifications

BREEAM 2014 RFO Bespoke Assessment Outstanding

Targeting NABERS 5 star rating

WELL Gold

Key Insights

Insights

- Refurbishing and remodelling the office space within the existing building to ensure it is attractive to modern office occupiers and improving the public realm around the site to make it more welcoming and accessible.
- Vastly improving the building's sustainability credentials through a series of measures, including new modern efficient plant equipment and the application of façade treatment to the existing building as well as the introduction of new windows throughout the building to improve the appearance of the building while respecting its existing character.
- Enhancing the biodiversity and air quality by introducing new urban greening on the proposed two storey extension and roof terrace.

Opportunities

- Achieving significant reductions in embodied carbon through the high retention of existing structure.
- Saving operational carbon through the replacement of the existing windows with new high-performance energy efficient windows, thermally insulated the internal perimeter walls and installation of modern and efficient all-electric renewable energy heating and cooling system.
- Increasing the biodiversity and occupants' health and wellbeing.
- Recycling the glass from the windows back into the supply chain to use on other developments.
- Prioritising the use of low carbon materials with high recycled content and responsibly sourced from the UK or Europe.

Challenges

- Challenges in meeting the embodied carbon targets due to the wall to floor ratio and the net to gross area ratio.
- Due to the limited roof space, challenges in meeting the Urban Greening Factor target and unfeasibility of PV installation.
- Challenges in façade intervention during the pre-planning process which resulted unfeasibility of on floor heating and cooling.
- Due to the amount of damage and weathering at the existing façade, challenges in reducing embodied carbon footprints sourced from the requirement of new protective coating and sealant instead of a cleaning treatment.

81 Newgate Street - Panorama St Pauls

Approximate Project Construction Cost: not disclosed
Total Project Cost: not disclosed

Location: London, UK
Planning Authority: City of London
Building Type: Office
Project Type: Refurbishment
RIBA stage: RIBA Stage 5

Design team:
Client: Orion Capital Managers
Development manager: Pella Real Estate Partners
Project Manager: Arcadis

Architect: KPF
Structure: AKT II
MEP: Chapmanbdsp
Sustainability: Chapmanbdsp

Overview

Pre-refurb

Building Age: 1984

GIA: 47,905 m^2

NIA: 28,081 m^2

Clear height *: 2.5 m

EPC: D

Heating fuel: Gas

Page 291

Post-refurb

Completion Date: April 2025 (estimated)

Status: RIBA Stage 5

GIA: 76,798 m^2

NIA: 54,965 m^2

Clear height *: avg. 2.7 m

EPC: A

Heating fuel: Electricity (heat pumps)

Cat A: Shell & Core by Developer, Cat A by Tenant

Cat B: Offices (by tenant)

* Clear height means the finished floor level to ceiling height

Refurbishment

Scope of works

81 Newgate Street is the location of the former 1980's office building which was home to the British Telecom's (BT) Headquarters. The building is being transformed to a contemporary mixeduse sustainable development that will feature flexible office, retail and leisure space. The Project will be one of the first net-zero carbon enabled office development within the City of London.

The scheme involves a part refurbishment and part demolition, excavation and redevelopment involving the erection of an additional four storeys to provide a ground plus 13 storey building with gym and swimming pool at basement levels, gym and flexible floor area uses at basement level, retail at ground floor level with access to offices and rooftop restaurant and public viewing gallery, office accommodation from levels 1-13 roof top restaurant (Use Class A3) and publicly and privately accessible roof terraces, and landscaping.

Retained and installed elements

70% retained

External Walls (1)
The existing Portland limestone façade will be reused.

0% retained

Roofs (5)

0% retained

Openings (2)
New double glazed units are going to be installed.

100% retained

Floors (6)
All 10 floorsof the existing structure are retained with an additional 3 constructred above.

0% retained

Services (3)
New services are going to be installed.

95% retained

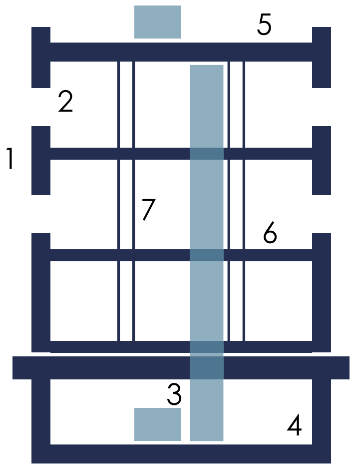
Frame (7)

70% retained

Substructure (4)

100% installed

Low Carbon/Renewable Technologies
Installation of Air Source Heat Pumps



81 Newgate Street

Key Performance Data

Whole Life Carbon *Module A-C (excl. B6 & B7)	**646*** $kgCO_2$ e/m² GIA
Upfront Embodied Carbon elements *Module A1-A5 (excl. seq. carbon)	**455*** $kgCO_2$ e/m² GIA
Operational Carbon *Module B6 (excl. seq. carbon) across 60yr design life	**672*** $kgCO_2$ e/m² GIA

Energy Use intensity (kWh/m²/yr (Based on NIA)	47.1 (base build) 125.3 (whole building)
Heating Fuel type (heat network, electric)	Electricity
Low and Zero Carbon Technologies	Air Source Heat Pumps
Recycled Content % by Value	76% of the existing strcuture saving of circa 465 $kgCO_2/m^2$

WLC Assessment Method:
RICS WLC, GLA, and City of London compliant

WLC Assessment Scope:
Modules A-C, excl. B6 & B7

Building element	Lifecycle Module	Emissions ($kgCO_2$ e/m²) GIA
Substructure	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	9.20 9.43
Superstructure (frame, upper floors, roof, stairs & ramps)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	213.42 228.77
Superstructure (external walls, windows & external doors)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	66.57 67.42
Superstructure (internal walls and partitions)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	11.43 15.45
Finishes	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	67.22 216.51
Fittings, furnishings, and equipment (FF&E)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	0.00 0.00
Services (MEP)	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	46.01 66.76
External works	A1-A5 (excl. seq. carbon) A-C (incl. seq. carbon)	10.72 10.76

Certifications

BREEAM 2018 Assessment Outstanding

NABERS 5 star rating

WELL Platinum

Key Insights

Insights

- Shell & Core by Developer and Cat A/B by Tenant.
- All electric building to enable zero carbon operation (i.e. Air Source Heat Pumps).
- High efficiency heat recovery with air handling plant.
- Grey Water and Rain water Harvesting offset the non-potable water demand as they contribute to flushing, irrigation and washdown.
- Façade Re-use of stone (Existing 483m³, Reused 417m³).
- Introduction of cyclist facilities inside the building (both short and long stay, monitored by security and key card access) as well as introduction of sports hall and swimming pool at Level B2.

Opportunities

- Retained structure, approximately 20,600t of CO2 savings will be made which the equivalent to approximately 50 acres of woodland.
- 417m³ of the origional 483m3 stone façade is being reused. The design team have aimed to maximise the re-use of stone from the original 1980s facades, effectively using the original building as a quarry. By doing so, it was possible to make very substantial carbon savings over newly quarried stone. The proportion of new stone required for the building has been minimised and is only limited to areas where the existing stone could not be-used.
- The aim is to deliver a net zero operational carbon strategy for the base building energy consumption, targeting 2050 Paris Proof target by 2024.

Challenges

- St Pauls Heights Grid Policy which forms part of the 2012 Protected Views SPD. The relationship with Christchurch Greyfriars Church Garden. Pixellated approach to the new build portion in response to view restriction and context. Renewal of facades.
- Improved building efficiency by infill of the existing atrium. Inserting new main core within existing atrium void.
- Selective changes to the existing structure to improve floor plate efficiency and occupier experience.
- An east west route through the site to centralise office access and tie the building in to its emerging context.
- Mechanical and electrical strategies and an extension of basements to free roof space for people.

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Committee(s)	Dated:
Planning & Transportation Resources Allocation Sub Committee	5 March 2024 11 March 2024
Subject: Transport for London - Local Implementation Plan funded schemes 2024/25	Public
Which outcomes in the City Corporation's Corporate Plan does this proposal aim to impact directly?	1, 9, 12
Does this proposal require extra revenue and/or capital spending?	N
If so, how much?	£
What is the source of Funding?	External funding
Has this Funding Source been agreed with the Chamberlain's Department?	N/A
Report of: Executive Director Environment	For DECISION
Report author: Samantha Tharme, City Operations	

Summary

This report covers the provision of Transport for London (TfL) Local Implementation Plan (LIP) funding to the City of London Corporation for the year 2024/25.

In current City Corporation allocation for 2024/25 is:

- Corridors and Neighbourhoods: £400,000
- Borough Cycling (Cycleways Network Development): £30,000.
- Cycle Training £30,000
- Cycle Parking £54,000

Details of the projects and programmes to be funded through these allocations are provided in Table 1 and Appendix 1.

We are awaiting details of the allocation for Principal Road Renewal (i.e. resurfacing).

Recommendations

Members are asked to:

- Approve the allocations up to the maximum set out in Table 1(£514,000), for financial year 2024/25.
- Delegate authority to the Executive Director Environment, in consultation with the Chairs and Deputy Chairs of the Planning & Transportation Committee and of the Streets & Walkways Sub Committee, to allocate any additional funds which are made available by TfL in 2024/25 financial year.
- Approve to spend any funds awarded for Principal Road Renewal for the year 2024/25.

- Delegate authority to the Executive Director Environment to reallocate the TfL grant between the approved LIP schemes should that be necessary during 2024/25 up to a maximum of £150,000.

Main Report

Background

1. This report covers the provision of Transport for London (TfL) Local Implementation Plan (LIP) funding to the City of London Corporation for the year 2024/25.
2. Under Section 159 of the Greater London Authority Act 1999, TfL is empowered to provide grants to London boroughs and the City of London Corporation for the provision of safe, efficient and economically viable transportation facilities and (or) services to, from or within Greater London. In 2022 an outline the 3-year Local Implementation Plan for the City Corporation was submitted to TfL and approved in principle, although given TfL's more constrained funding position annual amounts are approximately half previous awards.
3. In November 2023 we submitted our Annual Spending Submission to TfL. At that point TfL had indicated that our new annual allocation would be in the region of £400k for Corridors and Neighbourhoods and therefore our submission was in line with this allocation. All schemes are in line with the previously approved LIP and the Transport Strategy.

Current Position

4. Funding has been allocated to the City Corporation from the current funding settlement for:
   - Corridors and Neighbourhoods: £400,000
   - Borough Cycling (Cycleways Network Development): £30,000.
   - Cycle Training £30,000
   - Cycle Parking £54,000

5. Details of the specific projects and programmes that will be funded through this year's allocation are set out in Table 1 below.

Table 1. Local Implementation Plan – TfL allocations for 2024/25

Project	**Summary information**	**Allocation for 2024/25 from TfL LIP funding £**
Strategic Transport programme	Data collection, research and strategic work	50,000
Vision Zero behaviour change	Behaviour change activities including in partnership with the City of London Police	25,000
Healthy Streets minor schemes programme	Programme of smaller scale projects to improve the walking experience, enhance accessibility and reduce road danger (including feasibility investigations and development of the 2024/25 programme).	325,000
Cycle network development	Cycleways network phase 1 Route 2 Aldgate Blackfriars	30,000
Cycle parking	New cycle parking schemes and making temporary cycle parking permanent.	54,000
Cycle training	To deliver cycle training in line with TfL programme	30,000
Total		**514,000**

6. In addition to the above, ring fenced funding for Principal Road Renewal is anticipated but the amount is not yet confirmed. This report therefore seeks approvals to spend any amount allocated. Principal Road Renewal allocation in recent years (before covid-19) was usually around £100k.
7. We are still in discussion with TfL on the final allocation for the Cycle Network development. Spending on these schemes will go through the gateway and committee decision process.

Corporate & Strategic Implications

8. The LIP funded projects and activities detailed above support delivery of:
    - Corporate Plan outcomes 1, 9 and 12
    - The Transport Strategy
    - The Climate Action Strategy
    - Mitigation of Environment Department risk ENV-CO-TR 001 – Road Safety.

Conclusion

9. Members are asked to approve the allocation up to the maximum in the submission as set out in table 1 (£514,000) and any allocation for Principal Road Renewal (i.e. resurfacing).

10. Given the nature of programming works and the fact that some projects still in feasibility stages it is recommended that approval is given to allow the Executive Director Environment flexibility to make decisions on reallocating funding as necessary during the year, up to a maximum of £150,000.

11. Where appropriate project spending is also subject to the usual Gateway reporting approvals process.

Appendices

Appendix 1: Details of proposed LIP projects and programmes

Background papers
City of London Transport Strategy –
https://www.cityoflondon.gov.uk/assets/Services-Environment/city-of-london-transport-strategy.pdf

Report author
Samantha Tharme, Head of Strategic Transport, Environment Department

E: Samantha.tharme@cityoflondon.gov.uk
T: 07542 228918

Appendix 1: Details of proposed LIP projects and programmes 2024/25

Corridors and Neighbourhoods

Strategic Transport programme (£50,000)
Data collection, research and strategic work. Includes Transport Strategy Review, annual data report, specific research projects.

Vision Zero behaviour change (£25,000)
Behaviour change activities to support Vision Zero and reduce road danger including City Corporation campaigns and events; support for City of London Police campaigns and engagement.

Healthy Streets Minor schemes (£325,000)
Healthy Streets minor schemes programme for 2024/25. A series of small-scale improvement measures, such as raised carriageway, kerb build-outs, to improve the quality of the walking environment and reduce road danger at targeted points. This programme also includes feasibility investigations at several locations and development of the 2025/26 programme. The prioritised locations are:

- Healthy Streets minor schemes site investigation
- HSMS Moor Lane by Silk Street
- Silk St by Milton St
- New Fetter Lane
- Coleman Street - Basinghall Avenue
- Shoe Lane by Charterhouse St
- Staining Lane by Gresham St
- Bread St by Queen Victoria Street

Cycle network development (£30,000)
Cycleways network phase 1 Rte 2 Aldgate Blackfriars – scheme development
The cycle route will link Aldgate to Blackfriars junction, Cycleway 2 (& TfL's Mansell Street route) with Cycleway 6 (and Cycleway 3). The measures will involve mostly bi-directional segregated cycle lanes, cycle early release, and alterations to various traffic signal junctions.

Cycle parking (£54,000)
To deliver new cycle parking in addition to replacing temporary cycle parking (introduced under the temporary covid-19 transport measures) with permanent cycle parking infrastructure

Cycle training (£30,000)
To deliver cycle skills training with expert instructors, in line with TfL programme to people who work, study or live in the City of London.

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Committee(s): Planning and Transportation Committee	**Dated:** 5 March 2024
Subject: Draft High-Level Business Plan 2024/25 – Environment Department	**Public**
Which outcomes in the City Corporation's Corporate Plan does this proposal aim to impact directly?	9, 10, 11, 12
Does this proposal require extra revenue and/or capital spending?	No
Report of: Bob Roberts, Interim Executive Director Environment	**For Decision**
Report author: Joanne Hill, Business Planning and Compliance Manager	

Summary

This report presents the draft high-level Business Plan for the Environment Department for 2024/25. Due to the complexity and scope of the department, three separate high-level Business Plans have been produced to reflect our three key Committee 'clusters'. The plan presented in this report (Appendix A) covers the service areas which fall within the remit of the Planning and Transportation Committee.

The draft high-level Business Plan is being presented for approval, subject to the incorporation of any changes sought by the Committee. Once approved, the Plan will become the final version and will be adopted from April 2024.

Recommendation

Members are asked to:

i. Note the factors taken into consideration in compiling the Environment Department Business Plan; and

ii. Approve, subject to the incorporation of any changes sought by this Committee, the departmental Business Plan 2024/25 (Appendix A) which covers the service areas for which the Planning and Transportation is responsible.

Main Report

Background

1. As part of the new framework for corporate and business planning, departments were asked to produce standardised high-level, two-page Business Plans for the first time in 2017 for the 2018/19 year. Members generally welcomed these high-level plans for being brief, concise, focused and consistent statements of the key ambitions and objectives for every department.

2. For 2024/25, the high-level Business Plan has further evolved to describe the funding and people resources associated with each priority workstream. As a

high-level plan, this document does not capture the granularity of departmental work but gives the overall picture of activity, priorities, stakeholder engagement, trends where applicable, and direction of travel. The Corporate Strategy and Performance Team is working closely with departments to ensure that all Departmental Business Plans are aligned with Corporate Plan 2024-29.

3. The high-level Business Plans of each department follow a corporately mandated format and set of contents. This enables cross-departmental comparison and identification of dependencies and silos. The Environment Department's high-level Business Plans have been reviewed by a corporate Strategic Planning Group and have been approved by the Executive Leadership Board before being presented to Committees.

Draft final high-level Business Plan for 2024/25

4. This report presents, at Appendix A, the draft high-level Business Plan for 2024/25 for the services of the Environment Department which fall within the remit of the Planning and Transportation Committee, ie:
   - Planning and Development
   - District Surveyor's Office
   - Highways, Transportation and Parking

5. Please note that the Business Plan includes the SME Delivery Team. However, as that Team reports to Policy and Resources Committee, the content of the Business Plan which relates to it does not need to be considered by Planning and Transportation Committee.

   a. Prioritisation

   The priority workstreams for 2024/25 were identified by the Environment Department's Senior Leaders and their management teams, in consultation with other members of staff. The establishment of these core workstreams enables management teams to set appropriate objectives and action plans to achieve the overarching goals during the year ahead.

   The workstreams were selected to reflect key strategic links and priority projects as well as the statutory duties of the services. However, due to the high-level nature of the Plan, the workstreams do not include all elements of the teams' work; there is a significant amount of 'business as usual' activity that will continue alongside the priority workstreams.

   This year's Business Planning process included a pilot exercise to assign one of thirteen prioritisation categories to each workstream, as shown on pages 3-5 of the Plan. However, please note that the workstreams have not been ranked, or presented, in order of priority.

   b. Resources utilised

   As part of the pilot prioritisation exercise, in the 2024/25 high-level Business Plans, every City Corporation department was required to include an estimation of the budget and people resource associated with each workstream. These figures are expressed as percentages of the overall revenue budget and Full-Time Equivalent (FTE) staff.

It has not been possible to determine accurate allocation of financial or people resources for each workstream; very few are discrete projects with specific budgets, and very few members of staff spend specific proportions of their time on one workstream. Therefore, the figures shown in the Business Plan are very much estimates. Should this exercise be repeated in future years, accurate methodology will need to be designed and applied in order to ensure consistency across and within departments.

c. Performance measurement
Progress made against priority workstreams is measured by monitoring key performance indicators and achievement of milestones. Performance is reviewed regularly by Directors and their Management Teams and is reported to your Committee every four months to enable Member scrutiny.

In addition, the top-level workstreams identified in this plan flow down to local team management plans and the individual performance plans of members of staff, which provide further methods of assessing progress. This also enables individual officers to fully understand how their work feeds into divisional, departmental and corporate activities, aims and objectives.

d. Synergies and combatting silos
Workstreams have been linked to corporate priorities wherever possible, and Page 7 demonstrates how the work of the service areas aligns with core strategies and policies, including the new Corporate Plan 2024-29.

Page 9, 'Our People' contains information which relates to the whole of the Environment Department. Colleagues across the department are working collaboratively to identify synergies and break down siloed working practices. The Department's Business Services Division works to align common processes and procedures to achieve consistency. This Division leads cross-departmentally on areas including business planning; risk management; health and safety; workforce planning; Equality, Diversity and Inclusion; communications and engagement; information and data management; and GIS mapping.

Departmental Operational Property Assets Utilisation Assessment

6. The Environment Department's staff are based across 25 sites throughout London and the south-east. It holds approximately 340 physical assets, almost 270 of which are at its Natural Environment sites.

7. The Executive Director is represented by the City Operations Director on the Board for the Corporation's Operational Property Review Programme. As part of this Programme, the Department is undertaking a critical review of all its physical assets, including operational property. A Departmental 'Task and Finish' group has been established and meetings are taking place to progress this project.

8. The initial stage of the project will be to identify the resources required to undertake a full analysis and in-depth review of all physical assets held by the

department, including baselining operational requirements, financial position and state of repair.

9. Following this, officers will work with the City Surveyor's Department to establish a detailed project plan and realistic timeline. An update on the status of the assets relevant to this Committee will be reported, including any that are identified as surplus to requirements.

Corporate & strategic implications - The Environment Department is working to align to the developing Corporate Plan, through continued engagement and participation in the Strategy Forum, Strategic Planning Group and so on. It will shape its strategies and services appropriately to ensure they support achievement of the City Corporation's outcomes. Future Business Plans will be fully informed by the mission, aims and outcomes in the Corporate Plan 2024-29.

The Business Plan lists other key City of London strategies we are helping to deliver. We will review any new strategies as they are approved and consider how our services can and will support their delivery. This will include the new Corporate Plan and the People Strategy.

Financial implications - The high-level Business Plan has been produced in liaison with Chamberlain's Department and takes into consideration opportunities to reduce expenditure and increase income in order to make necessary savings.

Public Sector Equality Duty (PSED) - The Department has established an Equality, Diversity and Inclusion (EDI) Working Group. The Group is currently developing a Departmental EDI Plan which will align with the Corporate EDI Plan. Members of the group will lead on a range of EDI actions, including those set out in the Business Plan, to ensure compliance with the PSED across the department.

Resourcing implications - Any changes to resources will be brought to the relevant Committee(s).

Security implications - None.

Conclusion
This report presents the draft high-level Business Plan for 2024/25 for the services of the Environment Department which fall within the remit of the Planning and Transportation Committee for Members to consider and approve. Once approved, the Plan will be updated in line with any changes requested by this Committee and will become the 'final version' adopted in April 2024.

Appendices
Appendix A – Draft Environment Department high-level Business Plan 2024/25.

Joanne Hill
Business Planning and Compliance Manager, Environment Department
joanne.hill@cityoflondon.gov.uk

Planning and Development Division, including the District Surveyor's Office and SME Delivery Team
City Operations Division: Highways, Transportation and Parking Services

The Environment Department shapes future environments and protects current ones.

It is the largest department in the organisation and provides a diverse range of services to London and the South East.

Within the 'square mile' we deliver many local authority and regulatory functions including planning and development; building control; engineering; highways and transportation; cleansing and waste; environmental health, licensing and trading standards. The SME Delivery Team provides advice and guidance for start-ups and small businesses which are located in, or visit, the City.

Further afield, we manage over 11,000 acres of stunning open spaces worth billions of pounds which capture thousands of tonnes of carbon a year and attract an estimated 25 million visitors.

We run the City of London Cemetery and Crematorium; operate the Heathrow Animal Reception Centre; provide animal health services London-wide; and, as the London Port Health Authority, undertake controls on imported food and feed through London's ports.

Due to the complexity and scope of the department, three separate high-level Business Plans have been produced to reflect our three key Committee 'clusters'. This plan covers the service areas which fall within the remit of the Planning and Transportation Committee and includes the SME Delivery Team.

What's changed since last year... *(to October 2023)*:

- Introduction of the new Building Safety Act 2020 – the Building Control team has had to adapt to meet the requirements of the new legislation.
- Front line services continued to respond effectively to support the City's post-pandemic recovery.

Major achievements and awards 2023/24 *(to October 2023)*:

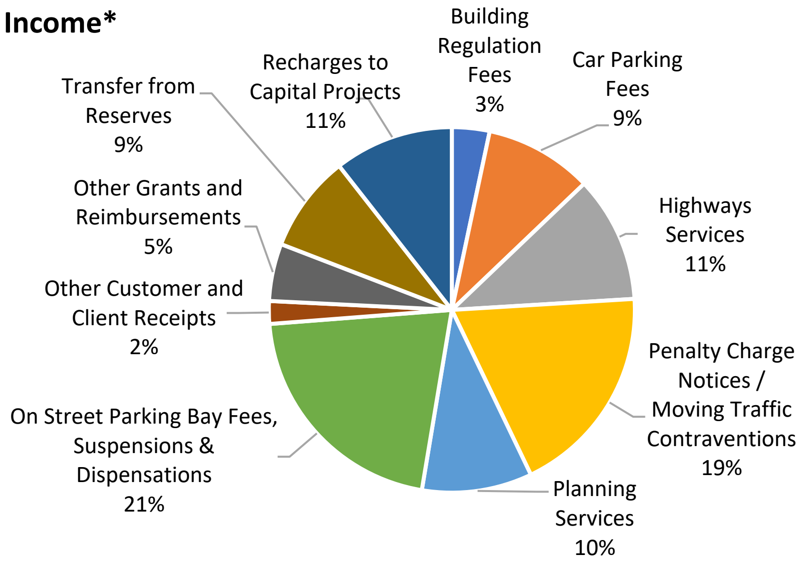
- Completed refresh of the Transport Strategy based on comprehensive consultation with key stakeholders and the public.
- Launched the Utility Infrastructure Strategy which will provide valuable input to development and minimise roadwork disruption.
- The Highways Team was the winner in the category of '*Outstanding small cell technology in commercial use*' in collaboration with its delivery partner, Freshwave, at the Small Cell Forum Industry Awards.
- The Policy and Projects Team won the *'Best Practice in Diversity, Inclusivity and Accessibility Award"* at the National Transport Awards for the [The City of London Street Accessibility Tool (CoLSAT)].
- The Planning Service was named the 2023 Royal Town Planning Institute's 'London Planning Authority of the Year'.
- At the 2023 Building London Building Awards, the Planning Service won the Best Borough led project category for their project: 'Putting the Public on Top: A view for All — Elevated Public Realm in the City of London.'

Where our money comes from and what we spend it on

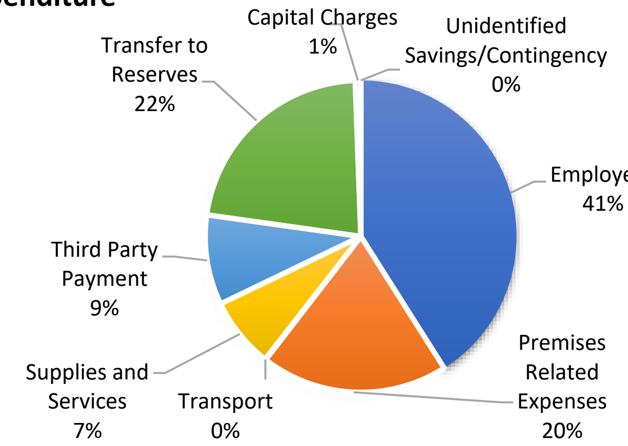
Total 2024/25 budget estimate allocation is £18.364m *

Total FTE within scope of this Business Plan: 202.3 *(28.09.2023)*

Income*



Expenditure*



***N.B:** **This financial information does not include the SME Delivery Team budget. The charts are based upon 2023/24 approved budgets at Sept. 2023.**

CITY OF LONDON

Our 2024/25 timeline planner: priority workstreams and key milestones

Q1 2024/25			Q2 2024/25			Q3 2024/25			Q4 2024/25			Beyond 2024/25	
Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	2025/26	2026/27

Adopt the City Plan 2040
- Submission to Secretary of State (Aug/Sept)
- Examination in public (Oct-Dec)
- Inspector's report (April 2025)

Development Management
- Negotiation of cultural, visitor and heritage uses within major developments to meet Destination City objectives (2024-29)
- Secure, review and revise PPA income annually to meet the needs of the planning service in general (2024-29)
- Delivery of floorspace projections (2025-29)

Transport Strategy
- Deliver the Transport Strategy (2024-2044)

Parking Service
- Deliver an effective, compliant and accessible Parking Service

Highways management
- Deliver an effective, high quality, Highways management service

Building Control
- Adapt the service to meet the requirements of the Building Safety Act 2022.
- Embed the new London District Surveyors' Association (LDSA) HUB.
- Adopt new performance targets and adapt QMS accordingly.

Climate Action Strategy
- Cool Streets & Greening Project (completion: March 2026)
- Square Mile Programme (completion: March 2027)
- Mainstream Climate Resilience Programme (completion: March 2027)

SME Delivery Strategy
(P&R Committee)
- Implement the SME Delivery Strategy (2024-2028)

Our major workstreams this year will be…

Workstream Name	Funding allocation % *(of 2023/24 total revenue budget)*	People resource % *(of FTE within scope of this plan)*	Prioritisation category	Dependencies	Outcomes/ Impacts	KPI	Update Schedule	24/25 Target	22/23 Baseline
Adopt the City Plan (by Autumn 2025) • Submission to Secretary of State (Aug/Sept 2024) • Examination in public (Nov/Dec 2024) • Inspector's report (April 2025)	4%	3%	1. Duty and Statutory	• A large volume of evidence documents, produced by the Planning Policy and Strategy team. • City Plan 2040 is closely related to and assists in the delivery of several City Corporation strategies. • The implementation of the vision set out in the City Plan relies on projects and strategies across the Corporation, including Destination City, Transport Strategy and allocation of CIL funds.	Policies in the adopted City Plan reflect City Corporation priorities for the future of the Square Mile.	Submission to Secretary of State	Sep 2024	Aug/Sep 2024	n/a
						Examination in public	Dec 2024	Nov/Dec 2024	n/a
						Inspector's report	Year end	April 2025	n/a
Development Management • Secure, review and revise PPA income annually to meet the needs of the planning service. (2024-29) • Delivery, post-decision, of floorspace projections to meet the business City, 'Destination City' and economic development objectives as developments come online. • Negotiation of cultural, visitor and heritage uses within major developments to meet Destination City objectives (2024-29).	18%	16%	2. Duty and Discretionary	• Corporate-wide liaison, e.g. City Surveyor's Department asset planning. • Destination City; City Plan; Transport Strategy; Climate Action Strategy. • Legal and operations: s106 and s278 legal agreements to deliver onsite and offsite public realm and highways improvements. • Number, scale and timing of planning applications submitted.	• The City maintains and improves its national global standing. • The Business City is maintained and strengthened through the delivery of the highest quality floorspace to meet employment projections though the City Plan. • The City has diversified its leisure and cultural offer to increase footfall and spend. • Income will rise through application and PPA fees allowing the service to meet corporate and industry expectations.	Planning Performance Agreement income.	Annual	£1.7m	£1m
						Square metres of office floorspace in the City.	Annual	100,000 sqm	100,000 sqm
						Cultural and community floorspace secured.	Annual	10,000 sqm	N/A - new KPI in 2023/24

Continued…

Workstream Name	Funding allocation % *(of 2023/24 revenue budget)*	People resource % *(of FTE within scope of this plan)*	Prioritisation category	Dependencies	Outcomes/ Impacts	KPI	Update Schedule	24/25 Target	22/23 Baseline
Transport Strategy • 25-year Strategy adopted in May 2019. • Sets out how the City proposes to design and manage its streets to ensure the Square Mile remains a great place to live, work, study and visit. • Forms part of a Local Implementation Plan for our delivery of the Mayor of London's Transport Strategy. • Updated annually, the Strategy includes a rolling 5-year delivery plan.	21%	16%	2. Duty and Discretionary	• Climate Action Strategy • Destination City • s278 planning agreements.	The City's streets are safer, more accessible and more attractive places to walk, cycle and spend time.	The number of people killed and seriously injured on our streets (KSI, 7am-7pm), baseline 54 in 2017.	Annually *(calendar year)*	16 by 2030 0 by 2044	54
						Number of kilometres of pedestrian priority streets , baseline 25km (25%) in 2017.	Annually	35km/(35%) by 2030 55km/(55%) by 2044	26.3km/ (+5%)
						Reduction in all-day motor vehicle traffic volumes, baseline 185k in 2017.	Annually	139k (-25%) by 2030 93k/(-50%) by 2044	137k/ (-26%)
Parking Service • Deliver an effective, compliant and accessible Parking Service in accordance with statutory guidelines and regulations.	35%	10%	1. Duty and Statutory	• Changes to the Highway which may impact resource and service requirements. • Core Planning and Transport Strategies. • Services are delivered out of some operational facilities which are maintained by City Surveyor's Department.	• Fulfilment of statutory duties. • Reduction in road danger and congestion. • Provision of essential facilities in line with the City's Transport Strategy. • The Service will adapt to meet changing demands, including those arising from the core Transport Strategy and impacts, such as events and Destination City.	Parking contract management – *adherence across all five contracts*	Every four months	95%	93%
						Processing efficiency for challenges and appeals of Penalty Charge Notices (PCNS). Respond to 95% of PCN correspondence within 15 working days.	Every four months	15 working days	19 working days
						Car Park - EV Charging Utilisation	Every four months	12%	4.5%
Highways management • Deliver an effective, high quality, Highways Management Service • Ensure highways, footways and carriageways are well maintained. • Reduce carbon emissions by improving lighting efficiency and use.	15% (plus £10m capital spend)	25%	1. Duty and Statutory	• Changes to legislation and regulation. • Energy reduction initiatives. • Requests for filming/events. • Highways Service is a key enabler to Public Realm development and the Transport Strategy.	• Fulfilment of statutory duties. • Well maintained, safe, roads, footways and infrastructure. • The Service will adapt to meet changing demands, including those arising from implementation of the Destination City, Climate Action and Transport Strategies. • Contractual KPI's are monitored.	Street lighting energy usage (kWh).	Annually	1.8m kWh	1.85m kWh
						% of insurance claims awarded.	Annually	=< 5%	5%
						% of carriageway in need of repair.	Annually	=< 10%	12%

Workstream Name	Funding allocation % *(of 2023/24 revenue budget)*	People resource % *(of FTE within scope of this plan)*	Prioritisation category	Dependencies	Outcomes/ Impacts	KPI	Update Schedule	24/25 Target	22/23 Baseline
Building Control • Adapt the Building Control service to meet the requirements of the Building Safety Act 2022. • Embed the new London District Surveyors' Association (LDSA) HUB. • Adopt the new performance targets set by the Building Safety Regulator (BSR) and adapt the Quality Management System accordingly.	0.58%	1%	1. Duty and Statutory	• Requests sent to the HUB by the Building Safety Regulator. • Any further changes to legislation.	• The Building Control Service will achieve statutory compliance. • Ensure people are safe in and around buildings in the City.	Number of full plans assessed within 5 weeks.	Every four months	95%	88%
Climate Action Strategy • Cool Streets and Greening Programme (CS&GP) (completion: March 2026). • Mainstream Climate Resilience. Programme (MCRP) (completion: March 2027) • Square Mile Programme (SqMP) (completion: March 2027).	4%	4%	7. Climate Action	Collaboration with all Environment Department divisions; City Surveyor's Department; and the Climate Action Team.	Delivery of the Strategy will ensure the Corporation meets its target of being Carbon neutral by 2027 (Square Mile Programme) and is resilient to climate change (Cool Street and Greening Programme).	Number of pilot projects completed (CS&GP).	Annual	4-7 projects	1 project
						Number of resilience measures incorporated (CS&GP).	Annual	6-8 measures	4 measures
						Number of upskilling sessions run (MCRP).	Annual	4-6 sessions	4 sessions
						Number of projects completed (SqMP).	Annual	7 projects	3 projects
						Number of engagement sessions with Square Mile stakeholders (SqMP).	Annual	10 sessions	5 sessions
SME Delivery Strategy • Implement the SME Delivery Strategy, subject to approval of the Policy and Resources Committee, February 2024. • This strategy will provide a short-medium term set of objectives to build the foundations for future SME projects that will form part of the Inward Investment workstream. *(N.B. This workstream is within the remit of Policy and Resources Committee)*	*n/a SME budget is held separately as it reports to Policy and Resources Committee.*	6%	12. Political priority/Key strategic outcome	• Approval of the Policy and Resources Committee. • Confirmation of funding.	• Provide co-ordinated business support and training for SMEs in the City and beyond. • Use its position as governing body of the Square Mile to unlock social and economic assets to provide more opportunities for SMEs to be successful. • Showcase the City as an open, inclusive place for start-ups and SMEs and encourage more to locate in the City. • Work more collaboratively with a range of internal and external stakeholders to enhance growth opportunities for SMEs.	KPIs will be defined within the final version of the SME Delivery Strategy.			

Continued…

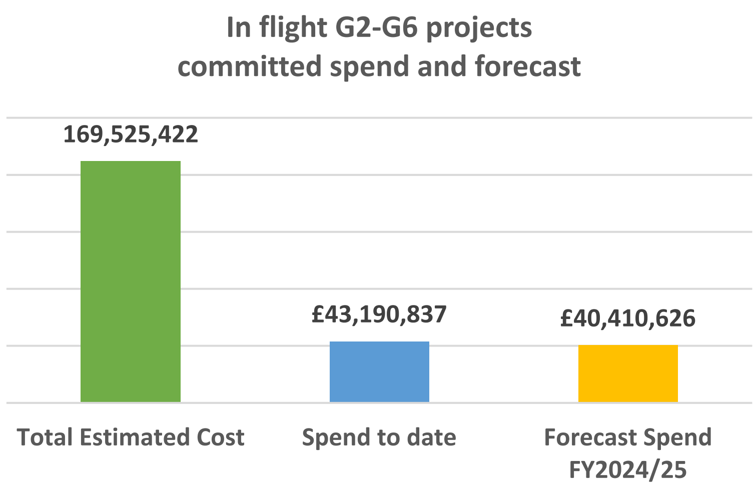
Page 310

Medium Term Plans under consideration (2025/26 and 2026/27)

Priority list (e.g. new legislation, services, projects, automation)	2025/ 2026	2026/ 2027	Funded or Unfunded
Adopt City Plan	x		Funded
Core Contractor Procurement Review	x	x	Funded (BAU)

In-flight Capital Projects (Gateway 2-6)

Total no. of projects: 83



Operational Property requirements

The Environment Department's staff are based across 25 sites throughout London and the south-east. We hold approximately 340 physical assets, almost 270 of which are at our Natural Environment sites.

As part of the Corporation's Operational Property Review Programme, the Environment Department is undertaking a critical review of all its physical assets, including operational property. A Departmental 'Task and Finish' group has been established and meetings are taking place to progress this project. The initial stage of the project will be to identify the resources required to undertake a full analysis and in-depth review of all physical assets held by the department, including baselining operational requirements, financial position and state of repair.

Following this, we will work with the City Surveyor's Department to establish a detailed project plan and realistic timeline. An update on the status of the assets relevant to this Committee will be reported, including any that are identified as surplus to requirements.

Operational Property Utilisation Assessment

Asset name	Assessment Complete?
Guildhall complex	Initial Workplace Survey completed June 2023. Detailed utilisation assessment to be considered as part of the OPR Programme
Car Parks	Review in progress in relation to long term aims and objectives of the Transport Strategy and Cyclical Works Programme requirements.

Key risks

Details were accurate at January 2024 but are subject to continual review and change.

Our highest risks are listed in the table below. The matrix shows the overall business risk profile for the Planning and Development Division, and the Highways and Transportation services.

Risk Title	Score
Road Safety	RED, 24
Car Parks: Fire safety	RED, 16
Car Parks: Repairs and maintenance	AMBER, 12
Adverse planning policy context	AMBER, 12
Transport and public realm projects not delivered due to lack of funding	AMBER, 12
The District Surveyor's (Building Control) Service becomes too small to be viable	AMBER, 12
Inspecting dangerous structures (Building Control)	AMBER, 8
Working in Service/Pipe subways (confined spaces)	AMBER, 8

Risk profile

Impact

Likelihood	Minor	Serious	Major	Extreme
Likely				
Possible		6	4	1
Unlikely			1	1
Rare		1	2	4

CITY OF LONDON

Our Strategy and Cross-cutting strategic commitments

Climate Action Strategy
- Embed climate resilience as a key component in decision making.
- Strengthen our planning guidance on climate resilience measures for new developments.
- Use our planning role to influence others to embed carbon analysis and circular economy principles in capital projects.
- Make the Square Mile public realm more climate change ready by increasing green spaces; urban greening; flood resistant road surfaces; adaptable planting regimes; and heat resistant materials.
- Deliver the Pedestrian Priority Programme, reduce motor traffic and encourage and enable zero emission vehicles.

Transport Strategy
- Prioritise and provide more space for people walking and making the City's streets more accessible.
- All Change at Bank, St Paul's Gyratory and the Healthy Streets Programme.
- Freight and servicing, including last mile delivery hubs and consolidation.
- Work collaboratively to align the new Transport Strategy and City Plan, and work on Healthy Streets Action Plans.

City Plan 2040
- Produce a revised City Plan following 2021 consultation and updated evidence base.
- Progress the Plan through the formal consultation, submission, examination and adoption stages.

Destination City
- Work closely with Destination City colleagues to embed Destination City principles into the new City Plan.
- Improve the quality of streets and public spaces to create a more attractive and welcoming public realm.
- Events activation and wayfinding.

SME Delivery Strategy
- Provide a co-ordinated range of support business support and training for SMEs in the city and beyond.
- Showcase that the City of London is an open and inclusive place for start-ups and SMEs to do business and encourage more SMEs to locate in the City.
- Work more collaboratively with a range of internal and external stakeholders to enhance the growth opportunities for SMEs.

Corporate Plan

We are working to align to the developing Corporate Plan, through continued engagement and participation in the Strategy Forum, Strategic Planning Group and so on. We will shape our strategies and services appropriately to ensure they support achievement of the City Corporation's outcomes.

Our future Business Plans will be fully informed by the mission, aims and outcomes in the 2024-29 Corporate Plan.

We will actively work to deliver, and provide advice on, other relevant Corporate strategies, policies and programmes, including (but not limited to):

- Lighting Strategy
- Sustainability SPD
- Secure City/Protect Duty/ Martyn's Law
- Utility Infrastructure Strategy
- Biodiversity Strategy
- Circular Economy Strategy
- Air Quality Strategy
- Noise Strategy
- Contaminated Land Strategy
- Licensing Policy
- Street Trading Policy
- The Safer City Partnership Strategy
- Social Mobility Strategy
- The Recovery Taskforce
- Health, Safety and Wellbeing Strategy
- Housing Strategy
- Sports Strategy
- Responsible Business Strategy
- Corporate Volunteering Strategy

We will review any new strategies as they are approved and consider how our services can and will support their delivery during 2024/25 and in future years. This will include the new **Corporate Plan** and the **People Strategy**.

Our stakeholders

We have a wide range of stakeholders and delivery partners including, but not limited to, those shown here.

Neighbouring boroughs City businesses
City of London staff
Government and their agencies
The transport sector
Regulators
The GLA
Members of the public
London Councils
Historic England
Developers TfL
Third-sector organisations
PLA
City Bridge Foundation
City Property Association
Other CoL Departments
CoL Police
SMEs
City visitors CoL Committee Members
BIDs
Neighbourhood Forum
City residents
Our contractors
Utility companies Industry bodies

Our Impacts

9.44m square metres of office space

26.3km of pedestrian priority streets

Hold **26%** building control market share

Support **130+** SME members of SBREC

In 2022/23 we…

Decided **1,008** planning applications

Installed **6** off-street EV charging points in car parks

Provided **68** additional on-street cycle parking spaces

Planted **35** trees as part of the Cool Streets and Greening programme

Stakeholder engagement

We continue to communicate with our stakeholders appropriately. For example:

- **Planning consultations –** We undertake statutory public consultation on planning applications within the Square Mile. The views of respondents are taken into consideration when making final decisions on applications.
- **Transport Strategy Review –** The Transport Strategy review was informed by a programme of engagement with City workers, residents, students and other stakeholders, including focus groups and one to one discussions. Public consultation on changes to the Strategy's vision, outcomes and proposals was undertaken in late 2023.
- **City Plan 2040 –** As part of a series of engagement activities, in June 2023 we carried out informal public consultation with stakeholders on the emerging City Plan. This public engagement included a series of workshops on the key policy areas and the key areas of change. The responses received were used to inform the future planning policies for the Square Mile.
- **Utility Infrastructure Strategy –** We have consulted on the development of this strategy, using the feedback to inform the service priorities and key objectives for our highway and public realm infrastructure.
- **Public realm -** We regularly consult on proposed changes to the public realm, such as the St Paul's Gyratory Transformation Project.
- **SME Survey -** This survey was undertaken in Autumn 2023 to gain an invaluable insight into how London-based SMEs operate their businesses and what support they would like to see in the future. The results were used to inform the content of the new SME Delivery Strategy. There will be ongoing engagement with SME partners during 2024/25 and beyond.

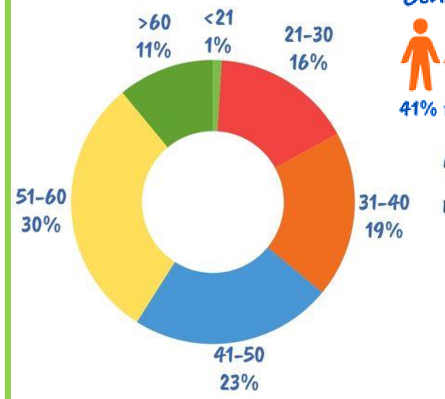
Our People

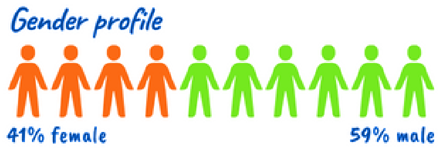
The data and information on this page relates to the whole of the Environment Department, not just to the services covered by this business plan. *All data correct at 28/09/2023.*

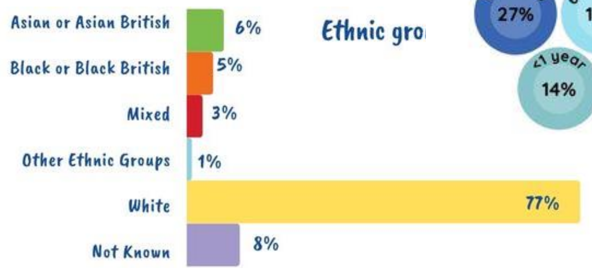
Workforce representation

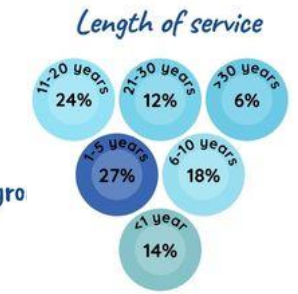
Current staffing levels: 679.1 FTE (headcount: 714)

No of Apprentices: 35









Developing our people

The first three priorities of our Departmental Workforce Plan for 2024/25 are:

- Improve staff communication and engagement.
- Increase people management skills and team building.
- Undertake a skills mapping audit.

We are increasing staff engagement through:

- Collaboration with corporate working groups and staff networks.
- Hosting staff network visits to our sites.
- Publishing a monthly departmental newsletter.
- Maintaining and promoting our departmental SharePoint site
- Our Departmental Working Groups which comprise representatives from all divisions (Communications; EDI; Health & Safety; Workplace; IT).
- Celebrating success, e.g. many nominees for the Celebrating our People Awards 2023.

We are developing capability and managing our talent through offering:

- Departmental induction sessions for new joiners.
- ILM Talent Management Programme.
- Supervisory training for managers.
- Specific training, e.g. 'Investigation' training for managers and 'Finance for non-financial managers' courses, which support corporate financial and HR objectives.
- Mentoring of apprentices and ILM candidates (and training for mentors).

Equality, Diversity and Inclusion

- The Environment Department is committed to driving forward the City of London Corporation's Equality, Diversity and Inclusion (EDI) agenda. The department's Senior Leadership Team, with the help of their Equalities Champions, seek to identify equality and inclusion priorities, develop appropriate actions to address inequalities and foster good relations between diverse groups.
- The Department's EDI Working Group consists of representatives (Champions) from across the department and is responsible for developing and ensuring compliance with the Departmental EDI Action Plan, and that actions support the CoL's overall Equality duties.
- The Group is currently developing a Departmental EDI Plan which will align with the Corporate EDI Plan.

The first three priorities of our Departmental EDI Action Plan for 2024/25 are to ensure that:

1. Our staff have a clear understanding of the Equality Act 2010, particularly the PSED, and how it applies to them both in terms of service provision and working with colleagues. We will achieve this by ensuring staff undertake mandatory equality training and other relevant training, such as EQIAs and management skills.
2. Our Equality Champions actively support and advise managers and colleagues on EDI matters.
3. EQIAs are undertaken, recorded, and the results taken into consideration when making decisions on service delivery.

Health and Safety

The first three priorities of our Departmental Health and Safety Action Plan for 2024/25 are:

1. Mental Health – Stress Risk Assessments: Assess stress factors for all teams across the department, to determine the most effective actions to promote staff wellbeing.
2. Departmental Audit process: Implement a cross divisional Health and Safety compliance audit to share best practise and develop a departmental H&S culture.
3. Front line staff, including lone workers: Audit local processes, to ensure adequate controls are in place for vulnerable staff including lone workers.

Our work locations

Total Environment Department people resource: 679.1 FTE

(N.B. data is accurate at 28/09/2023 but is subject to continual change.)

Guildhall complex	268.2 FTE
Walbrook Wharf	13 FTE
London Gateway Port	55 FTE
River Division Office (Denton)	6 FTE
Heathrow Animal Reception Centre	47 FTE
CoL Cemetery & Crematorium	53.9 FTE
Old Bailey (Coroner's service)	2 FTE
Epping Forest	52.8 FTE
Hampstead Heath, Highgate Wood, Queen's Park (Several different buildings across these sites.)	105.8 FTE
West Ham Park	12.5 FTE
Keats House	2.9 FTE
Ashtead Common	6 FTE
Burnham Beeches and Stoke Common	14.2 FTE
West Wickham and Coulsdon Commons	11.8 FTE
City Gardens, Depot	28 FTE

The Environment Department

Shaping sustainable future environments

The Environment Department is the largest in the organisation and provides a diverse range of services to London and the South East.

Within the 'square mile' we deliver many local authority and regulatory functions including planning and development; building control; highways and transportation; cleansing and waste; environmental health, licensing and trading standards.

Further afield, we manage over 4,500 hectares of green spaces; run the City of London Cemetery and Crematorium; operate the Heathrow Animal Reception Centre; provide animal health services London-wide; and, as the London Port Health Authority, undertake controls on imported food and feed through London's ports. The Department's aims, activities and vision are presented in the diagram below.

Committee(s): Planning and Transportation Committee (for decision) Markets Board (for information)	Dated: 05/03/2024 13/03/2024
Subject: City Corporation Managed Car Parks – Tariff changes	**Public**
Which outcomes in the City Corporation's Corporate Plan does this proposal aim to impact directly?	1, 2, 9, 11
Does this proposal require extra revenue and/or capital spending?	**N**
If so, how much?	**N/A**
What is the source of Funding?	**N/A**
Has this Funding Source been agreed with the Chamberlain's Department?	**N/A**
Report of: Bob Roberts, Interim Executive Director Environment	**For Decision**
Report author: Olivia Reed, Environment Department	

Summary

Planning and Transportation and Markets Committee Members were last asked in 2020 to approve changes to car parking tariffs for the four car parks within the Environment Department (Baynard House, Minories, Tower Hill and London Wall) and the one car park within Markets (Smithfield). Members approved a three-year pricing strategy for the car parks with tariffs increased on an annual basis from January 2021 to January 2023.

This report seeks to gain approval for a change in approach going forward to an emissions-based charging system for visitors as has operated on-street in Pay & Display parking bays since 2017, and also proposes new tariff levels for a three-year period.

The changes recommended in this report take into account:

- That the City Corporation continues to seek to improve air quality and conditions for people walking and cycling through a reduction in overall vehicle traffic, as outlined in the Transport Strategy;
- That tariffs should be competitive with our neighbouring authorities & commercial operators;
- That car parks need to generate sufficient income to manage and operate the car parks, for the Environment Department.

Recommendation(s)

- **Planning & Transportation Committee** (for Baynard House, London Wall, Minories and Tower Hill car parks) are asked to approve:

  - a change in approach to the car park tariff to encourage a shift towards less polluting or zero-emissions capable vehicles;
  - a three-year pricing strategy for parking charges in these public car parks as set out in paragraph 12 of this report from 2024.

- **Markets Board** (for Smithfield) are asked to note the report, as the board has delegated authority to the Smithfield General Manager, in consultation with the Smithfield Market Tenants Association to make decisions about tariff pricing within Smithfield car park.

Main Report

Background

Responsibilities

1. The City Corporation operates five public car parks in the Square Mile, four of which (Baynard House, London Wall, Minories and Tower Hill) are under the responsibility of the Environment Department reporting to Planning & Transportation Committee, with Smithfield the responsibility of the Markets Board. The Barbican Centre operates a further public car park aimed at its customers and visitors.

2. Given that all car parks are public and ideally should be aligned to the same corporate policies, hourly parking tariffs and residential parking rates in all five facilities have been aligned for several years, with the exception of specific concessionary tariffs offered at Smithfield for market traders and night-time customers.

3. P&T and Markets Board approved a three-year pricing strategy for the car parks in 2020, which increased tariffs on an annual basis from January 2021 to January 2023. Markets Board have delegated authority to change parking tariffs to the Smithfield General Manager in consultation with the Smithfield Market Tenants Association. Recommendations in this report have been proposed in discussion with Markets officers.

Policy

4. The City's Transport Strategy outlines aims and objectives around reducing both the most polluting vehicles from the City, along with achieving a reduction in overall traffic, and an increase in tariffs is in line with these objectives.

5. Emissions-based tariffs were agreed and introduced in 2017 for the City's on-street parking bays with the aim of encouraging the use of more environmentally friendly vehicles and to help improve air quality in the Square Mile.

6. With similar technology now available in the City's public car parks, it is now possible and appropriate to introduce car park tariffs, that mirror the on-street approach of emissions-based rates, reflecting age and vehicle type.

7. The City's public car parks must also seek to generate sufficient income from visitors and season tickets to cover their operational costs & overheads. On occasion, the On-Street Parking Account has been needed to cover a net loss from the service, so an increase in income will ensure this is less likely in future, particularly given payments to our contractors linked to RPI are rising faster than the central uplift in local risk budgets.

Current Position

On-street parking bays

8. On-street parking charges in the City currently operate on a flat rate by duration, with different tariffs dependent on vehicle type and age (i.e. emissions-based) during the week; Saturday morning is a flat rate for all vehicles; with motorcycles parking for free at all times. The current on-street parking tariffs are shown in the table below.

Table 1: Current On-Street Parking Bay Tariffs

Monday to Friday 8am-7pm		
Vehicle Type	**per 15 minutes**	**per hour**
Electric or hydrogen or hybrid	£1.20	£5.00
Petrol vehicles registered from 2005	£1.65	£7.20
Diesel vehicles registered from 2015	£1.65	£7.20
Other vehicles	£2.25	£10.00
Blue badge holder	Relevant vehicle tariff applies with one extra hour free	Relevant vehicle tariff applies with one extra hour free
Red badge holder	Free	Free

Saturday Sunday and Bank holidays		
Day	**Period**	**Charge**
Saturday	8am-11am	£2.00 for any duration (any vehicle)
Saturday	After 11am	Free
Sunday	All day	Free
Bank holiday	All day	Free

Car Parks

9. Off-street tariffs should be set to provide slightly cheaper rates than on-street to encourage parking in car parks reducing circulating traffic and leaving space for other priorities on-street.

10. Benchmarking against the other car parks (commercially run; NCP, Citipark) in the Square Mile and several NCPs in the City of Westminster, suggests that the City's tariffs mostly remain below those offered elsewhere (see Appendix 1), making them a relatively attractive parking option. Longer term objectives for car parks in line with the City's Transport Strategy will be considered as a strategic decision in the context of longer-term land use and traffic management decisions.

11. Current car park tariffs at Baynard House, London Wall, Minories and Tower Hill are set at a flat hourly rate weekdays and flat rate per visit after 1:30pm on Saturday and all day Sunday, for all vehicles (with the exception of motorcycles and bicycles which park for free). Commercial tickets are charged per quarter, as shown in Table 2.

Table 2: Current tariffs, City of London Car Parks

Time period	**Charge (£)**
Baynard House, London Wall, Minories and Tower Hill	
Monday to Friday 6am-7pm and Saturday 6am-1.30pm	£4.50 per hour
At all other times and Bank and public holidays	£4.50 per visit
Commercial season tickets	£2,500 per quarter
Smithfield	
Every day between 9pm-10am up to 3 hours (concessionary tariff)	£1.50 per visit
Every day between 9pm-10am over 3 hours (concessionary tariff)	£3.00 per visit
At all other times	£4.20 per hour

Proposals

Visitor parking

12. The proposal is to introduce charging in car parks as currently on-street, i.e., with an emissions-based structure, relating to age and vehicle type. Parking for the most polluting vehicles costing the most and electric or zero emission capable vehicles costing the least.

13. This report recommends that a new tariff structure is introduced in 2024 with subsequent annual increases for the next two years. For approximately 90% of car park users, the recommended yearly uplift is between 6-11% (in line with inflation), with the more polluting vehicles paying a larger surcharge. A full breakdown of the percentage increases in tariffs is shown in Appendix 2.

14. The proposed tariffs reflect the hourly rates Monday to Friday 6am-7pm and Saturday 6am-1.30pm, and the per visit rates at all other times and Bank and public holidays for the four Environment car parks with a slightly different charging structure at Smithfield, as outlined in Table 2.

15. The 3-year pricing strategy still ensures that off-street tariffs remain lower than those on-street. The lowest rate for vehicles in the electric hydrogen or hybrid category, matches the existing tariff, so those vehicles see no change. Table 3 outlines the 3-year pricing strategy proposal for all car parks (including Smithfield), and Table 4 indicates the proposal for how to manage concessionary rates which solely apply overnight at Smithfield.

Table 3: Current and Proposed 3-year pricing strategy for City of London Car Parks – London Wall, Baynard House, Minories, Tower Hill and Smithfield

Proposed tariff increases, Baynard House, Tower Hill, London Wall, Minories (£)					
Vehicle type	**Current on-street tariff**	**Current car park tariff**	**2024**	**2025**	**2026**
Electric or hydrogen or hybrid	£4.50	£4.50	£4.50	£4.50	£4.50
Petrol vehicles registered from 2005	£7.20		£5.00	£5.30	£5.80
Diesel vehicles registered from 2015	£7.20		£5.00	£5.30	£5.80
Any other vehicle	£10.00		£7.00	£7.30	£8.10

Table 4: Proposed 3-year pricing strategy for Smithfield Car Park

Proposed overnight concessionary tariff increases, Smithfield (£)								
	Up to 3 hours	**Over 3 hours**	**Up to 3 hours**	**Over 3 hours**	**Up to 3 hours**	**Over 3 hours**	**Up to 3 hours**	**Over 3 hours**
Vehicle type	**Current**		**2024**		**2025**		**2026**	
Electric or hydrogen or hybrid	£1.50	£3.00	£1.80	£4.00	£1.80	£4.00	£1.80	£4.00
Petrol vehicles registered from 2005			£2.00	£4.00	£2.30	£4.60	£2.80	£5.60
Diesel vehicles registered from 2015			£2.00	£4.00	£2.30	£4.60	£2.80	£5.60
Any other vehicle			£3.50	£7.00	£3.70	£7.30	£4.10	£8.10

16. Smithfield car park hourly rate is currently 30p lower than that at the other car parks, and an overnight rate at £1.50 for up to three hours and £3.00 for over 3 hours, between the hours of 9pm-10am daily is currently available for market users. This is a historic concessionary fee aimed at market traders and customers which hasn't been increased in a number of years.

17. At Smithfield, it is proposed to bring daily tariffs in line with the other car parks listed. The overnight tariffs are recommended to be adjusted in line with the approach for all other car parks, with an emissions-based tariff, but retaining a concession to market customers when compared to nearby NCPs, and on-street parking tariffs.

Commercial season tickets

18. The proposal for commercial season ticket tariff is to increase in line with hourly parking tariffs. On the same basis, the charge for electric, hydrogen and hybrid vehicles is not proposed to increase, while the more polluting vehicles pay a surcharge.

19. Commercial season tickets are based on the hourly tariff, scaled up to a full quarter basis. As such, the proposed tariff structure is proposed:

Table 5: Proposed 3-year commercial season ticket pricing strategy

Proposed commercial season ticket prices, per quarter (£)				
Vehicle type	Current	2024	2025	2026
Electric or hydrogen or hybrid	£2,500.00	£2,500.00	£2,500.00	£2,500.00
Petrol vehicles registered from 2005		£2,650.00	£2,800.00	£3,000.00
Diesel vehicles registered from 2015		£2,650.00	£2,800.00	£3,000.00
Any other vehicle		£3,650.00	£3,800.00	£4,200.00

Resident season tickets

20. It should be noted that a change in pricing for the resident reason tickets for car parks is also under consideration, and work is currently underway to further understand the impacts of doing so, and to develop an incremental strategy for implementation. Whilst this is not presented within this report, it is likely that a future report setting out the future pricing of resident season tickets will be brought to committee later in 2024.

Corporate & Strategic Implications

Strategic implications

21. The delivery of this strategy supports the delivery of Corporate Plan outcomes 1, 2, 9 and 11.

Resource implications

22. The City's contract for running and managing the car parks is with Saba. The change to the way that we charge different types of vehicles based on their registration number at machines in the car parks will be managed by Saba, who have undertaken similar work elsewhere and have the capability to introduce variable tariffs based on emissions using the current equipment in the car parks.

Financial implications

23. As noted in the background section of this report, on occasion, the On-Street Parking Account has been needed to cover a net loss from the provision of off-street car parks, so an increase in income will ensure this is less likely in future.

24. The additional income is anticipated to be between £200k to £500k per annum for Environment (and £85k to £150k for Markets) with the range provided reflecting elasticities based on demand for parking and likely shifts towards less polluting vehicles. This income will close this existing gap discussed above.

25. As mentioned above, some changes are required to ensure the payment machines can charge vehicles variable tariffs according to engine type. This is fairly straightforward but will incur a small additional fee to install the technology to cross reference vehicle registrations. The costs to Saba (our management contractor) will be met from existing budgets. The lead in time for this is approximately 3 months.

Equalities implications

26. The City Corporation recognises that disabled people are likely to experience more barriers to travel than able bodied people and recognises the importance of removing those barriers where possible. It is acknowledged that increasing car park tariffs for visitors and residents may disproportionally affect those people who rely on their car for travel as a result of their disability or impairment. Availability of space is deemed more important than price for disabled drivers and passengers. Seeking to protect that space, whilst providing some additional time for disabled drivers is considered an appropriate concession.

27. In City car parks, normal rates apply for Blue Badge holders, however, the City provides over 200 on-street bays which are available for free, provided the badge and clock are displayed. These can be used for up to four hours on weekdays. Around St Bartholomew's Hospital the bays can be used for up to six hours on weekdays. There is no time limit on Saturday and Sunday. Additionally, Blue Badge holders can park for an extra hour, for free, at payment parking bays after the expiry of purchased time.

28. The Corporation runs its own Red Badge parking concession scheme, valid only in the City of London, for people with disabilities who are permanent workers in the City or City residents.

Climate implications

29. Delivery of the emissions-based car park tariffs will help support carbon reduction through discouraging the most polluting vehicles from driving into and parking in the City, as we currently do on street. By introducing uniformity with the on-street approach we introduce financial incentives to switch to lower emission vehicles which achieves reduction in Scope 3 emissions as outlined in the Climate Action Strategy.

Security implications

30. There are no security implications for the Corporation resulting from this policy.

Conclusion

31. The above proposals enable the continued provision of reliable and effectively managed off-street parking places in accordance with the City's Transport, Climate Action & Air Quality Strategies to reduce traffic, encourage motorists to opt for low emission vehicles and improve air quality in the City.

32. As the lead in time for changes to the technology to assess vehicle registration numbers from the provider is 3 months, the timeline for implementation of this policy is July 2024, with subsequent incremental tariff changes to occur on an annual basis thereafter.

Appendices

- Appendix 1 – Commercial car park tariffs in the City and Westminster
- Appendix 2 – Percentage increases proposed

Background Papers

- Planning and Transportation Committee, 12th December 2017
  Committee Report (cityoflondon.gov.uk)

- Planning and Transportation Committee, 6th October 2020
  Item 7 - Parking Tariff Changes for Jan 2021 - Final PT.pdf (cityoflondon.gov.uk)

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Appendix 1 - Commercial Car Park Tariffs in the City and Westminster (Short Stay) (£)

Hours	NCP London Vintry	NCP Finsbury Square	Barbican	CitiPark London Barbican	Q Park Oxford Street	NCP Brewer Street Soho	Covent Garden Multistorey
	App	App	Pay station	In app/at pay station	Pay on exit	App	App
0-1	3.95	7.95	6.00	3.00	10.00	9.95	7.50
1-2	7.90	15.90	9.00	6.00	20.00	19.90	12.50
2-3	11.85	23.95	12.00	12.00	30.00	29.85	N/A
3-4	15.80	23.95	14.50	12.00	40.00	39.80	N/A
4-5	19.75	34.95	18.00	18.00	50.00	49.75	N/A
5-6	23.70	34.95	22.00	18.00	55.00	N/A	N/A
6-9	N/A	N/A	29.00	N/A	N/A	N/A	N/A
9-12	N/A	N/A	35.00	N/A	N/A	N/A	N/A
Up to 24	N/A	N/A	40.00	N/A	N/A	49.95	22.50
6-24	34.95	34.95	N/A	24.00	60.00	N/A	N/A
Annual season ticket	3,704.75	4,474.90	2,400	N/A	N/A	12,000	N/A

Appendix 2 – Yearly percentage increase in emissions-based tariffs

Proposed tariff increases - percentage change (%)					
	For information		Proposed increases		
Tariff	**Current on-street tariff**	**Current car park tariff**	**2024**	**2025**	**2026**
Petrol vehicles from 2005	£7.20	£4.50	£5.00	£5.30	£5.80
% change	-	-	11%	6%	9%
Diesel vehicles from 2015	£7.20	£4.50	£5.00	£5.30	£5.80
% change	-	-	11%	6%	9%
Electric, hydrogen or hybrid	£4.50	£4.50	£4.50	£4.50	£4.50
% change	-	-	0%	0%	0%
Any other vehicle	£10.00	£4.50	£7.00	£7.30	£8.10
% change	-	-	56%	4%	11%

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Committee(s)	Dated:
Planning and Transportation Committee	05/03/2024
Subject: City Corporation response to government consultations on brownfield land prioritisation and permitted development rights	**Public**
Which outcomes in the City Corporation's Corporate Plan does this proposal aim to impact directly?	**1,2,3,4**
Does this proposal require extra revenue and/or capital spending?	**No**
If so, how much?	**n/a**
What is the source of Funding?	**n/a**
Has this Funding Source been agreed with the Chamberlain's Department?	**n/a**
Report of: Bob Roberts, Interim Executive Director of Environment	**For Decision**
Report author: Gudrun Andrews, Head of Planning Policy	

Summary

The government has recently launched two new consultations relating to strengthening planning policy within the National Planning Policy Framework (NPPF) for brownfield development, and changes to Permitted Development (PD) rights in relation to air source heat pumps, electric vehicle (EV) charging and residential extensions. The consultations conclude on 26 March and 2 April 2024 and the outcomes of which may be reflected in future versions of the NPPF or confirmed PD changes.

This paper sets out the proposed consultation responses highlighting areas of interest or concern to the City Corporation, which are included in full in Appendix A and B.

Recommendation

Members are asked to:

- Agree the proposed responses at Appendix A and Appendix B to the government's consultations on: Changes to various permitted development rights and Strengthening planning policy for brownfield development

Main Report

Background

1. The government frequently consults upon changes to planning regimes including proposed changes to the NPPF or permitted development (PD) rights. The most recent amendments to the NPPF were made in December 2023 which introduced changes in relation to housing targets and supply, concluding a consultation which closed in early 2023.

2. This report proposes responses to two government consultations relating to brownfield land and changes to permitted development (PD) rights. These consultations conclude on 26 March 2024 and 9 April 2024, respectively.

3. The brownfield land consultation seeks views on how the government may strengthen national policy in relation to brownfield land, including through amendments to the 'presumption in favour of sustainable development' within the NPPF, and proposals to review the threshold for referrable applications to the Mayor of London. These proposals respond to comments the government received within the Spring 2023 NPPF consultation and the outcomes of an expert panel report into the London Plan commissioned by the government in late 2023.

4. The permitted development rights consultation proposes changes to PD rights in relation to air source heat pumps, EV charging and residential extensions with the aims of boosting housing delivery and facilitating the uptake of lower carbon technologies.

Proposal

5. It is proposed that the responses to the two government consultations as included within Appendix A and B are submitted on the government's consultation portal on behalf of the City Corporation. Key messages are included below.

Strengthening planning policy for brownfield development- amendments to presumption in favour of sustainable development

6. The definition of brownfield (or previously development land) is set out in Annex 2 of the NPPF. The full consultation response included at Appendix A highlights some uncertainty around proposed flexibility in the application of policies and highlights potential unintended consequences resulting from any housing delivery trigger-point changes. Further detail is set out below.

7. Section 2 of the consultation proposes flexibility in the application of policies relating to residential internal layouts. This would mean applying the same

degree of flexibility being currently afforded in relation to daylight and sunlight policies (see NPPF, paragraph 129c). In the absence of further detail, the response queries whether nationally described space standards (applied in London through the London Plan) would be subject to such flexibility (see questions 2 and 3).

8. Section 3 proposes a new presumption in favour of sustainable development on previously developed land for urban 'uplift' areas, which includes the whole of Greater London. This would introduce a 'tilted balance' in favour of sustainable housing development on brownfield land where the housing delivery test (HDT) results fall below 95% of the target over the previous three years. For brownfield land only, this is a significant increase from the current 75% of the housing requirement.

9. As set out in the consultation response (see question 7) the City Corporation is confident that it will be able to deliver the required housing over the plan period. However, the HDT measures over a three-year period and the annual results can be variable, ranging from between 32% to 330% of the target over the last five years. Therefore, if the 95% trigger is introduced it is possible that a future HDT measure could trigger the presumption. The application of the presumption would have negative implications on the ability to support and promote office and other development within the square mile, risking the aims of the City Plan and other Corporation strategies (see question 8). The response to question 9 concludes that if this new trigger and presumption is included then this should apply nationally.

10. Section 4 relates to increasing the threshold of residential applications referrable to the Mayor (currently 150 homes). The response at question 13 concludes that this should remain unchanged, as due to the type of planning applications received this will have negligible impact on the City Corporation.

Permitted Development Rights consultation

11. The full consultation response is included at Appendix B. This consultation proposes some changes in relation to residential extensions and the scope of buildings which allow residential upwards extension, and rebuilding; electric vehicle (EV) charging and siting; and air source heat pumps and siting. The response agrees with the scope of the changes proposed, subject to some additional safeguards to protect amenity.

12. The consultation contains proposed changes to enable the construction of larger extensions and outbuildings to existing dwellinghouses. Given the nature of the residential stock of the square mile it is considered that the impacts will be negligible, so no comments have been included for a majority of the questions. Responses are however provided to in relation to whether permitted development rights should also apply to flatted development, the location of residential bike stores in conservation areas and the age of buildings which could benefit from upwards residential development (see questions 15, 19 and 25).

13. The consultation also proposes some additional flexibility in relation to the installation of electric vehicle charging outlets and supporting equipment. It is considered that these changes are unlikely to impact upon the city due to the lack of surface car parking, therefore no comments have been included for section 5 (questions 36 to 43).

14. Other matters proposed within the consultation relate to the removal of imitations in relation to the citing of air source heat pumps near boundaries. The response agrees with the removal of boundary restrictions, subject to appropriate siting, integration into the design and noise attenuation (see questions 44 to 52).

Next Steps

15. Responses will be submitted to the two consultations (see Appendix A and B) before the closing dates of 26 March and 2 April on the government's consultation portal.

Corporate & Strategic implications

16. The response to the consultation has been prepared to ensure the aims of the emerging City Plan 2040 and adopted Local Plan are not compromised by changes to the planning regime at a national level. The City Plan has been prepared to contribute to corporate objectives.

Risk management reporting

17. There are no risk implications relating to the content of the response.

General implications

18. There are not considered to be any financial, resource or legal implications relating to the content of the response.

Equalities implications

19. There are no equalities issues raised as a result of the consultation response. However, the response at Appendix A does suggest that the government may wish to further consider equalities issues as it progresses with the outcomes of the consultation.

Conclusion

20. The report sets out the main content of the proposed City Corporation response to the two government consultations. It raises some concerns about potential implications of proposed changes to the presumption in favour of sustainable development on brownfield land. Any application of the presumption could have negative impacts on the ability to deliver the wider aims of the City Plan and

other corporate strategies to protect and support office development within the square mile.

Appendices

- Appendix 1 – Proposed response to the permitted development rights consultation
- Appendix 2 – Proposed response to strengthening planning policy for brownfield development consultation

Report author

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Appendix A- Response to the Strengthening planning policy for brownfield development consultation

Q.1: Do you agree we should change national planning policy to make clear local planning authorities should give significant weight to the benefits of delivering as many homes as possible [yes/**no**]? If not, why not?

It is considered that the NPPF already provides sufficient weight to the delivery of housing. It is also important to remember that there are some places, such as the City of London, where planning for uses other than residential are more important.

Q.2: Do you agree we should change national planning policy to make clear local planning authorities should take a flexible approach in applying planning policies or guidance relating to the internal layout of development [yes/**no**]? If not, why not?

Nationally described space standards are currently adopted by many local planning authorities. It is unclear from the consultation material whether reference to policies relating to internal layouts would include the application of these standards or are intended to apply to other policies (e.g. dual aspect design). In combination these policies are intended to protect the amenity of residential occupiers, and additional flexibility could have unintended negative impacts upon the health and wellbeing of future occupiers.

Q.3: If we were to make the change set out in question 2, do you agree this change should only apply to local policies or guidance concerned with the internal layout of developments [**yes**/no]? If not, what else should we consider?

As above. Additionally, the proposed scope of future national development management policies (NDMP) is also currently unknown. It is unclear whether these are likely to introduce additional or update existing standards in relation to internal layouts. Under this scenario the application on the NDMP should remain consistent, so should only apply to applicable local policies.

Q.4: In addition to the challenges outlined in paragraph 13, are there any other planning barriers in relation to developing on brownfield land?

No response.

Q.5: How else could national planning policy better support development on brownfield land, and ensure that it is well served by public transport, is resilient to climate impacts, and creates healthy, liveable and sustainable communities?

No response.

Q.6: How could national planning policy better support brownfield development on small sites?

No response.

Q.7: Do you agree we should make a change to the Housing Delivery Test threshold for the application of the Presumption in Favour of Sustainable Development on previously developed land [yes/**no**]?

On a national level the presumption in favour of sustainable development on previously developed land would assist in steering development to the most sustainable locations within existing settlements and away from greenfield sites in the first instance. The greatest impact of the introduction of this policy approach could be felt in areas outside the 'urban uplift' areas where the availability of brownfield land as a proportion of supply is likely to be lower.

However, there may also be some unintended consequences of this approach for the 'urban uplift' areas. Further focus on housing delivery could impinge on the ability to deliver wider economic development requirements, including those that are vital to the national economy, such as office development within the City of London.

Although the City Corporation is confident in its ability to provide for its overall housing requirements, however, as the HDT is measured over a three year period delivery can be variable. Under a 'tilted balance' scenario applying significant weight to the delivery of homes on brownfield land could inhibit wider strategy aims for the City of London as a global finance and business hub.

Q.8: Do you agree the threshold should be set at 95% [yes/**no**]? Please explain your answer.

As above, on a national level a trigger appears appropriate, however 95% is high, with a significant increase from the current 75% trigger. Alongside the introduction of the 4-year housing supply measure could be unnecessarily unwieldy. If an additional trigger is introduced it should apply to all local planning authorities.

Q.9: Do you agree the change to the Housing Delivery Test threshold should apply to authorities subject to the urban uplift only [yes/**no**]? If not, where do you think the change should apply?

As above, the proposed changes to the housing delivery test threshold should apply nationally to have the greatest desired impact.

Q.10: Do you agree this should only apply to previously developed land within those authorities subject to the urban uplift [**yes**/no]?

Q.11: Do you agree with the proposal to keep the existing consequences of the Housing Delivery Test the same [**yes**/no]? If not, why not?

Q.12: For the purposes of Housing Delivery Test, the cities and urban centres uplift within the standard method will only apply from the 2022/23 monitoring year (from the 2023 Housing Delivery Test measurement). We therefore propose to make a change to the policy to align with the publication of the Housing Delivery Test 2023 results. Do you agree [**yes/**no]? If not, why not?

Q.13: Do you think the current threshold of 150 residential units for referral of a planning application of potential strategic importance to the Mayor of London is the right level? [yes/no].

No response.

Q.14: If no, what would you set as the new threshold? [300/500/750/1000/other] Please explain your answer.

No response.

Q.15: We continue to keep the impacts of these proposals under review and would be grateful for your comments on any potential impacts that might arise under the Public Sector Equality Duty as a result of the proposals in this document.

Further analysis may be required of the effects of further densification of 'urban uplift' areas against other non-urban areas and the impacts on those with protected characteristics residing within these areas.

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Appendix B: Response to the Changes to Permitted Development rights consultation

Q.1 Do you agree that the maximum depth permitted for smaller single-storey rear extensions on detached homes should be increased from 4 metres to 5 metres?

- Yes
- No
- **Don’t know**

Please provide your reasons.

No comment

Q.2 Do you agree that the maximum depth permitted for smaller single-storey rear extensions on all other homes that are not detached should be increased from 3 metres to 4 metres?

- Yes
- No
- **Don’t know**

Please provide your reasons. **No comment**

Q.3 Do you agree that the maximum depth permitted for two-storey rear extensions should be increased from 3 metres to 4 metres?

- Yes
- No
- **Don’t know**

Please provide your reasons. **No comment**

Q.4 Do you agree that the existing limitation requiring that extensions must be at least 7 metres from the rear boundary of the home should be amended so that it only applies if the adjacent use is residential?

- Yes
- No
- **Don’t know**

Please provide your reasons. **No comment**

Q.5 Are there are any circumstances where it would not be appropriate to allow extensions up to the rear boundary where the adjacent use is non-residential?

- Yes
- **No**
- Don't know

Please provide your reasons.

No comment

Q.6 Do you agree that the existing limitation that the permitted development right does not apply if, as a result of the works, the total area of ground covered by buildings within the curtilage of the house (other than the original house) would exceed 50% of the total area of the curtilage (excluding the ground area of the original house) should be removed?

- Yes
- No
- **Don't know**

Please provide your reasons. **No comment**

Q.7 Should the permitted development right be amended so that where a two-storey rear extension is not visible from the street, the highest part of the alternation can be as high as the highest part of the existing roof (excluding any chimney)?

- Yes
- No
- **Don't know**

Please provide your reasons. **No comment**

Q.8 Is the existing requirement for the materials used in any exterior work to be of a similar appearance to the existing exterior of the dwellinghouse fit for purpose?

- Yes
- **No**

- Don’t know

Please provide your reasons. **No comment**

Q.9 Do you agree that permitted development rights should enable the construction of single-storey wrap around L-shaped extensions to homes?

- Yes
- No
- **Don’t know**

Please provide your reasons. **No comment**

Q.10 Are there any limitations that should apply to a permitted development right for wrap around L-shaped extensions to limit potential impacts?

- Yes
- No
- **Don’t know**

Please provide your reasons. **No comment**

Q.11 Do you have any views on the other existing limitations which apply to the permitted development right under Class A of Part 1 which could be amended to further support householders to undertake extensions and alterations?

- Yes
- No
- **Don’t know**

Please provide your reasons. **No comment**

Q.12 Do you agree that the existing limitation that any additional roof space created cannot exceed 40 cubic metres (in the case of a terrace house) and 50 cubic metres (in all other cases) should be removed?

- Yes
- No
- **Don’t know**

Please provide your reasons. **No comment**

Q.13 Do you agree that the existing limitation requiring that any enlargement must be set back at least 20 centimetres from the original eaves is amended to only apply where visible from the street, so that enlargements that are not visible from the street can extend up to the original eaves?

- Yes
- No
- **Don't know**

Please provide your reasons. **No comment**

Q.14 Should the limitation that the highest part of the alteration cannot be higher than the highest part of the original roof be replaced by a limitation that allows the ridge height of the roof to increase by up to 30 centimetres?

- Yes
- No
- **Don't know**

Please provide your reasons. **No comment**

Q.15 Do you agree that the permitted development right, Class B of Part 1, should apply to flats?

- Yes
- **No**
- Don't know

Please provide your reasons. **There are likely to be other freeholder or covenant restrictions to development within a flatted development. These matters would therefore be best dealt with via a planning application.**

Q.16 Should the permitted development right be amended so that where an alteration takes place on a roof slope that does not front a highway, it should be able to extend more than 0.15 metres beyond the plane of the roof and if so, what would be a suitable size limit?

- Yes
- No
- **Don't know**

Please provide your reasons. If you have answered yes, please provide your alternative suggestion and any supporting evidence. **No comment**

Q.17 Should the limitation that the highest part of the alteration cannot be higher than the highest part of the original roof be amended so that alterations can be as high as the highest part of the original roof (excluding any chimney)?

- Yes
- No
- **Don't know**

Please provide your reasons. **No comment**

Q.18 Do you agree that bin and bike stores should be permitted in front gardens?

- **Yes**
- No
- Don't know

Please provide your reasons. **No comment**

Q.19 Do you agree that bin and bike stores should be permitted in front gardens in article 2(3) land (which includes conservation areas, Areas of Outstanding Natural Beauty, the Broads, National Parks and World Heritage Sites)?

- Yes
- **No**
- Don't know

Please provide your reasons. **The siting of bin and bike stores could have some negative impacts on the streetscene for very sensitive locations, eg World Heritage Sites, therefore should be subject to planning applications.**

Q.20 Do you agree that bin and bike stores in front gardens can be no more than 2 metres in width, 1 metre in depth and up to 1.5 metres in height?

- Yes
- No
- **Don't know**

Please provide your reasons. **No comment**

Q.21 Are there any other planning matters that should be considered if bin and bike stores were permitted in front gardens?

- Yes
- No
- **Don’t know**

Please provide your reasons. **No comment**

Q.22 Should the existing limitation that in Areas of Outstanding Natural Beauty, the Broads, National Parks and World Heritage Sites development situated more than 20 metres from any wall of the dwellinghouse is not permitted if the total area of ground covered by development would exceed 10 square metres be removed?

- Yes
- **No**
- Don’t know

Please provide your reasons. **Need to ensure no negative impacts on very sensitive locations, eg World Heritage Sites.**

Q.23 Should the permitted development right be amended so that it does not apply where the dwellinghouse or land within its curtilage is designated as a scheduled monument?

- **Yes**
- No
- Don’t know

Please provide your reasons.

Q.24 Do you think that any of the proposed changes in relation to the Class A, B C and E of Part 1 permitted development rights could impact on: a) businesses b) local planning authorities c) communities?

- Yes
- No
- Don’t know

Please provide your reasons. It would be helpful if you could specify whether your comments relate to a) business, b) local planning authorities, or c) communities, or a combination and which right or rights your comments relate to.

Q.25 Do you agree that the limitation restricting upwards extensions on buildings built before 1 July 1948 should be removed entirely or amended to an alternative date (e.g. 1930)?

- Yes – removed entirely
- Yes – amended to an alternative date
- No
- **Don't know**

Please provide your reasons. If you have chosen an alternative date, please specify**. It is unclear from the consultation material why an alternative date is being proposed.**

Q.26 Do you think that the prior approvals for the building upwards permitted development rights could be streamlined or simplified?

- Yes
- No
- **Don't know**

Please provide your reasons. If you have responded yes, please provide your suggestion and justification, and specify which right(s) you are referring to.

Q.27 Do you have any views on the operation of the permitted development right that allows for the construction of new dwellinghouses on a freestanding block of flats (Class A of Part 20)?

- Yes
- No
- **Don't know**

Please provide your reasons.

Q.28 Do you agree that the existing limitations associated with the permitted development right for building upwards on a freestanding block of flats (Class A of Part 20) incorporates sufficient mitigation to limit impacts on leaseholders?

- Yes
- No
- **Don't know**

Please provide your reasons

Q.29 Do you think that any of the proposed changes in relation to the Class AA of Part 1 and Class A, AA, AB, AC and AD of Part 20 permitted development rights could impact on: a) businesses b) local planning authorities c) communities?

- Yes
- No
- **Don't know**

Please provide your reasons. It would be helpful if you could specify whether your comments relate to a) business, b) local planning authorities, or c) communities, or a combination and which right or rights your comments relate to.

Q.30 Do you agree that the limitation restricting the permitted development right to buildings built on or before 31 December 1989 should be removed?

- Yes
- No
- **Don't know**

Please provide your reasons.

Q.31 If the permitted development right is amended to allow newer buildings to be demolished, are there are any other matters that should be considered?

- Yes
- No
- **Don't know**

Please provide your reasons.

Q.32 Do you agree that the permitted development right should be amended to introduce a limit on the maximum age of the original building that can be demolished?

- Yes – it should not apply to buildings built before 1930
- Yes – it should not apply to buildings built before an alternative date
- No
- **Don't know**

Please provide your reasons. If you have chosen an alternative date, please specify.

Q.33 Do you agree that the Class ZA rebuild footprint for buildings that were originally in use as offices, research and development and industrial processes should be allowed to benefit from the Class A, Part 7 permitted development right at the time of redevelopment only?

- Yes
- No
- Don’t know

Please provide your reasons.

Q.34 Do you think that prior approvals for the demolition and rebuild permitted development right could be streamlined or simplified?

- Yes
- No
- **Don’t know**

Please provide your reasons and examples where possible.

Q.35 Do you think that any of the proposed changes in relation to the Class ZA of Part 20 permitted development right could impact on: a) businesses b) local planning authorities c) communities?

- Yes
- No
- **Don’t know**

Please provide your reasons. It would be helpful if you could specify whether your comments relate to a) business, b) local planning authorities, or c) communities, or a combination.

Q.36 Do you agree that the limitation that wall-mounted outlets for EV charging cannot face onto and be within 2 metres of a highway should be removed?

- Yes
- No
- **Don’t know**

Please provide your reasons.

Q.37 Do you agree that the limitation that electrical upstands for EV charging cannot be within 2 metres of a highway should be removed?

- Yes
- No
- **Don’t know**

Please provide your reasons.

Q.38 Do you agree that the maximum height of electric upstands for EV recharging should be increased from 2.3 metres to 2.7 metres where they would be installed in cases not within the curtilage of a dwellinghouse or a block of flats?

- Yes
- No
- **Don’t know**

Please provide your reasons.

Q.39 Do you agree that permitted development rights should allow for the installation of a unit for equipment housing or storage cabinets needed to support non-domestic upstands for EV recharging?

- Yes
- No
- **Don’t know**

Please provide your reasons.

Q.40 Do you agree that the permitted development right should allow one unit of equipment housing in a non-domestic car park?

- Yes
- No
- **Don’t know**

Please provide your reasons. If you think that the permitted development right should allow for more than one unit of equipment housing or storage cabinet, please specify a suitable alternative limit and provide any supporting evidence.

Q.41 Do you agree with the other proposed limitations set out at paragraph 60 for units for equipment housing or storage cabinets, including the size limit of up to 29 cubic metres?

- Yes
- No
- **Don’t know**

Please provide your reasons.

Q.42 Do you have any feedback on how permitted development rights can further support the installation of EV charging infrastructure?

- Yes
- No
- **Don’t know**

Please provide your reasons.

Q.43 Do you think that any of the proposed changes in relation to the Class D and E of Part 2 permitted development right could impact on: a) businesses b) local planning authorities c) communities?

- Yes
- No
- **Don't know**

Please provide your reasons. It would be helpful if you could specify whether your comments relate to a) business, b) local planning authorities, or c) communities, or a combination and which right or rights your comments relate to.

Q.44 Do you agree that the limitation that an air source heat pump must be at least 1 metre from the property boundary should be removed?

- **Yes**
- No
- Don't know

Please provide your reasons.- Kerstin

The removal of the 1m limitation is considered beneficial to encourage the uptake of air source heat pumps. However, this should be subject to appropriate noise attenuation and integration into the design, including potential screening.

Q.45 Do you agree that the current volume limit of 0.6 cubic metres for an air source heat pump should be increased?

- **Yes**
- No
- Don't know

Please provide your reasons. If you have answered yes, please provide examples of a suitable size threshold, for example, in cubic meters or a height limit, including any supporting evidence. **Subject to appropriate siting, context of the location and ensuring it is well integrated to the design and not contrary to visual amenity.**

Q.46 Are there any other matters that should be considered if the size threshold is increased?

- Yes
- No
- Don't know

Please provide your reasons.

Q.47 Do you agree that detached dwellinghouses should be permitted to install a maximum of two air source heat pumps?

- Yes

- No
- **Don’t know**

Please provide your reasons.

Q.48 Do you agree that stand-alone blocks of flats should be permitted to install more than one air source heat pump?

- **Yes**
- No
- Don’t know

Please provide your reasons. In the context of changing technologies the aim should be for the best and most efficient working solution for each site. This should also be subject to appropriate siting and noise attenuation.

Q.49 Do you agree that the permitted development right should be amended so that, where the development would result in more than one air source heat pump on or within the curtilage of a block flats, it is subject to a prior approval with regard to siting?

- **Yes**
- No
- Don’t know

Please provide your reasons. **Yes, subject to visual amenity and noise attenuation.**

Q.50 Are there any safeguards or specific matters that should be considered if the installation of more than one air source heat pump on or within the curtilage of a block of flats was supported through permitted development rights?

- **Yes**
- No
- Don’t know

Please provide your reasons. **Yes, subject to visual amenity and noise attenuation.**

Q.51 Do you have any views on the other existing limitations which apply to this permitted development right that could be amended to further support the deployment of air source heat pumps?

- Yes
- **No**
- Don’t know

Please provide your reasons.

Q.52 Do you think that any of the proposed changes in relation to the Class G of Part 14 permitted development right could impact on: a) businesses b) local planning authorities c) communities?

- Yes
- No
- Don’t know

Please provide your reasons. It would be helpful if you could specify whether your comments relate to a) business, b) local planning authorities, or c) communities, or a combination.

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