5.4 Ground Floor Activation

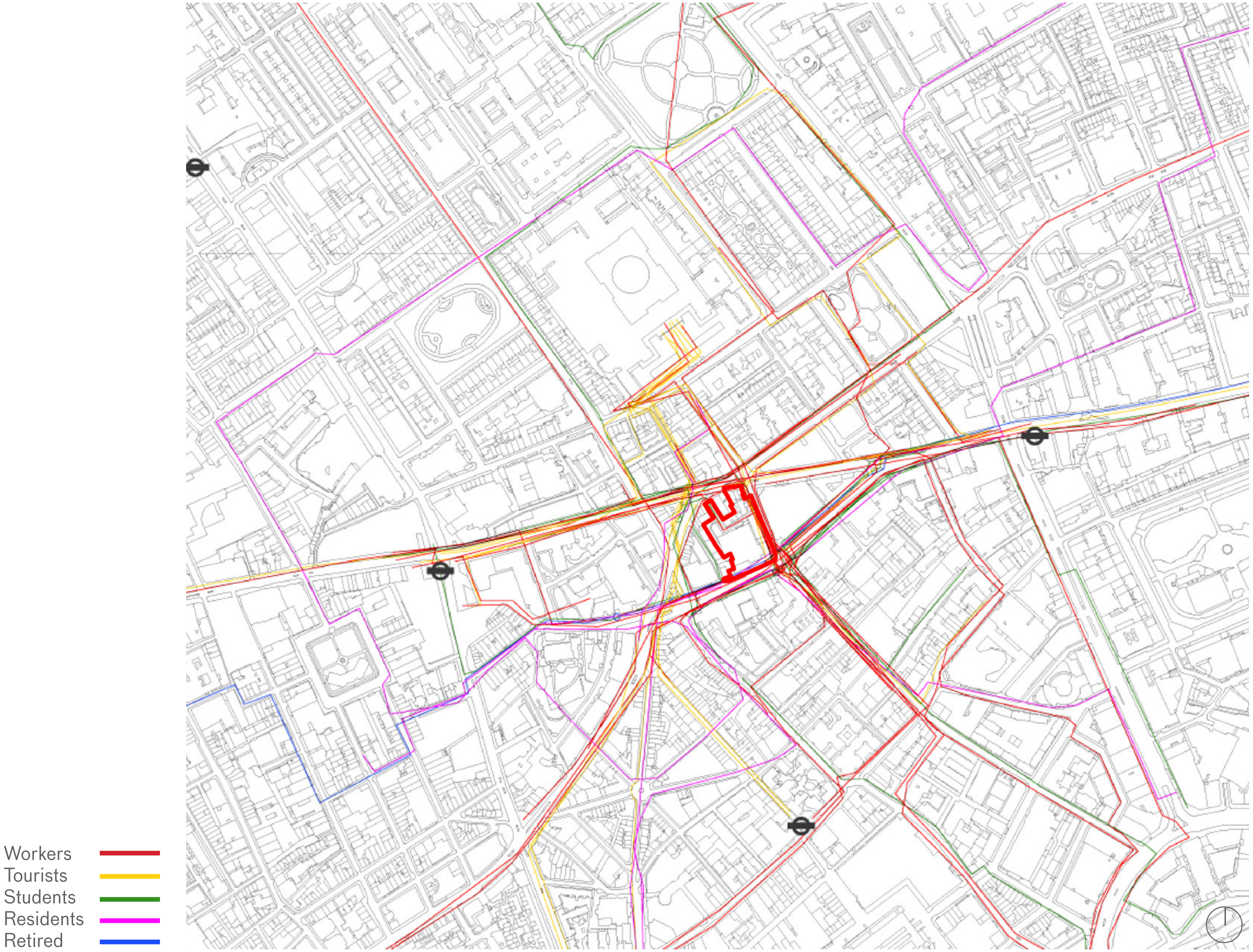
Active frontages refers to street frontages where the ground and upper floors have windows and doors onto the street which create interest and activity. This allows passers-by and visitors to engage with the uses inside the building and contributes to security and safety in the surrounding area by enabling natural surveillance (i.e. those in the buildings can see what's happening outside and vice versa). Typical approaches to creating active frontages include through building entrances and windows across the ground floor perimeter, as well as the potential to extend uses and allow them to spill out. The frontages across much of Selkirk House are currently largely inactive with the exception of Dominos, a small defunct entrance to the Travelodge and Car Park access. This lack of active frontage is considered a contributing factor to the anti-social behaviour that the area experienced while in use and currently experiences still.

To assess the options against this criteria we have considered

- The ability to deliver active frontages, particularly along High Holborn and Museum St that experience significant pedestrian flows, and along West Central Street to address the current challenges of anti-social behaviour associated with lack of natural surveillance
- How the options would improve the existing active frontage condition.

The delivery of activated ground planes will contribute towards the provision of public benefits set out for the site by the council, namely:

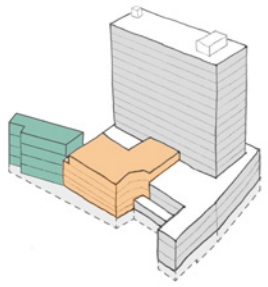
- Improved public realm
- Active frontages that support more lively and active streets
- Increased passive surveillance
- Attraction of new economic activity, jobs, retail and other uses

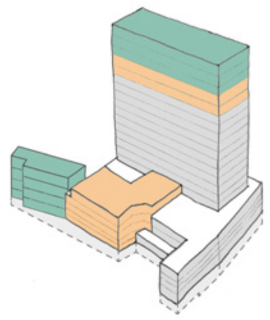


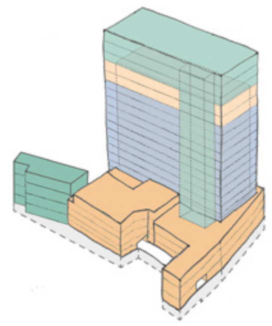
'100 Journeys' map based on interviews undertaken at various locations immediately surrounding the site in 2019 to gain insights about the use of the site by locals and visitors and to map the way in which people move between the streets and public areas

5.0 Development Options Sustainability Assessment

5.4 Ground Floor Activation

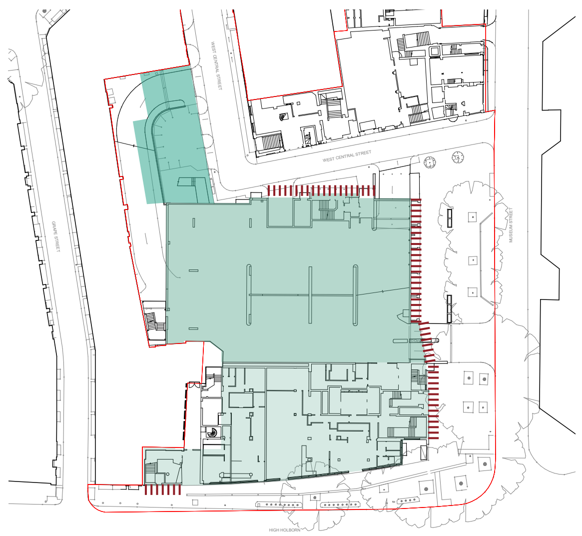


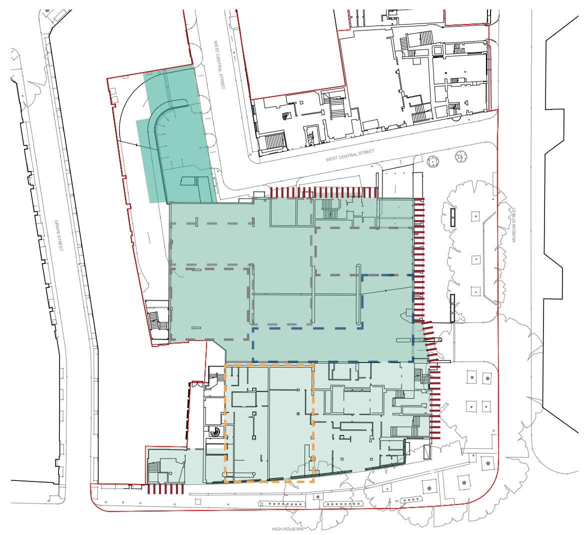




3. GROUND FLOOR ACTIVATION	Option 1 - Maximum Retention & Retrofit	Option 2 - Maximum Retention & Extension	Option 3 - Partial Retention & Extension
Active Frontages **Deliveries Access**	- Current inactive street frontages largely remain on West Central Street, Museum Street and High Holborn - Access to the building will remain of poor quality. - Deliveries and servicing (loading bay area and waste facilities) would still happen on West Central Street which will result in increased traffic and inactive frontage	- Current inactive street frontages largely remain on West Central Street, Museum Street and High Holborn - Access to the building will remain of poor quality. - Deliveries and servicing (loading bay area and waste facilities) would still happen on West Central Street which will result in increased traffic and inactive frontage	- Some additional active frontages are introduced on West Central Street. However, street frontages will remain fragmented. - Deliveries and servicing would be possible on High Holborn allowing West Central Street to be more pedestrian focused - Introduction of a covered pedestrian route between High Holborn and New Oxford Street (Vine Lane) would allow additional active frontages along this route (and increased permeability)

Ground Floor

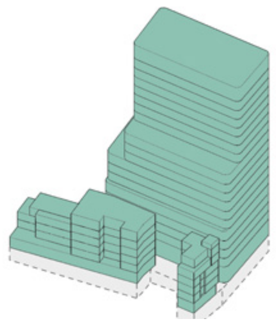


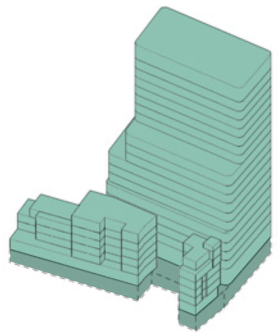


Retained & Retrofit | Demolished & New-Build | Extended floorplates | New-Build | New-Build (Basement) | Inactive frontages

5.0 Development Options Sustainability Assessment

5.4 Ground Floor Activation





3. GROUND FLOOR ACTIVATION	Option 4 - Basement Retention & New Build	Option 5 - New Build
Active Frontages **Deliveries Access**	- Increase in active street frontages all around the site with the introduction of town centre uses along High Holborn, Museum Street and Vine Lane. Office cycle entrance located on West Central Street. - Introduction of a public pedestrian route between High Holborn and New Oxford Street (Vine Lane) would allow additional active frontages along this route (and increased permeability) - Deliveries on High Holborn allow West Central Street to be more pedestrian focused	- Increase in active street frontages all around the site with the introduction of town centre uses along High Holborn, Museum Street and Vine Lane. Office cycle entrance located on West Central Street. - Introduction of a public pedestrian route between High Holborn and New Oxford Street (Vine Lane) would allow additional active frontages along this route (and increased permeability) - Deliveries on High Holborn allow West Central Street to be more pedestrian focused

Ground Floor

Retained & Retrofit | Demolished & New-Build | Extended floorplates | New-Build | New-Build (Basement) | Inactive frontages

5.0 Development Options Sustainability Assessment

5.5 Floorspace provision and Employment capacity uplift

As mentioned in criteria (1) local, regional and national planning policy seeks to focus development on brownfield sites with good public transport links. The London Plan 2021, the National Planning Policy Framework, and Camden's Local Plan emphasise the importance of making efficient use pf land, by optimising existing brownfield sites to create space to accommodate expected growth in residential and working populations. The uplift in space should therefore be able to accommodate a commensurate uplift in the employment capacity of the site.
Uplift in employment capacity is associated with employment opportunities for local residents and increased spend in the local area from employees. local spend. Camden Council's S106 incorporates targets and financial contributions for supporting local residents into work based on the total number of jobs any uplift in development could be expected to provide.
It could reasonably be expected that the new jobs created will primarily fall within the retail and office/ professional services. This sector mix would support jobs at a range of skill levels to provide employment opportunities for local and London residents and help to diversify the local economy.

Factors that influence this capacity include the level of lift provision and building services (Mechanical and Electrical Provision or MEP). BCO 2019 guidance recommends a workspace density (NIA per workspace) between 8-10m2.
For example, option 1 retains the existing cores and based on the level of lift provision that these can accommodate, this provision would fall well short of current design standards and would therefore limit the occupational capacity allowed for the tenants of the building (as set out in section 2.0).

To assess this criteria we have considered:

- The amount of workspace each option could provide compared to the existing building
- The efficiency of the floorspace
- The occupancy capacity associated with each option
- The associated number of jobs the building could be expected to accommodate

The precise number of jobs arising from the proposed development will depend on the final mix of uses and the end-users that occupy the scheme.

Methodology notes:
In order to calculate the total number of jobs associated with each option we have established an occupation capacity for each of the options based on the estimated capacity of the indicative designs for options 1-3 and the planning application scheme for options 4-5; see table below for further details. This is then applied to the net internal office area (NIA) produced by each option. The results can be seen in table included on page 77.

For reference, the existing Selkirk House building, excluding the car park provides 7,519sqm NIA; the car GIA is 8,036sqm.

It should be noted that the socio-economic assessment submitted with the planning application scheme uses a generic approach to estimating employment capacity, based on a standard occupational density ratio of 1:12 per sqm of GIA as opposed to actual design capacity. This produces an estimate of c.1,750 jobs within Selkirk House. They are therefore not directly comparable.

	Option 1 **Maximum retention and retrofit (no extension)**	**Option 2** **Maximum retention and extension**	**Option 3** **Partial Retention and extension**	**Option 4** **Basement retention and new build (planning submission)**	**Option 5** **New Basement and new build**
Floorspace and uplift (workspace GIA/NIA)	- 12,676 sqm (GIA) and c. 9,507 sqm (NIA) of workspace provided - Minimal uplift associated with car park conversion	- 14,644 sqm (GIA) and c.9,254 sqm (NIA) of workspace provided - Some uplift associated with car park conversion and more efficient new upper floors partially replacing existing	- 16,076 sqm (GIA) and c.10, 372 sqm (NIA) of workspace provided - Modest – some additional floorspace created through extension and replacement of car park	21,491 sqm (GIA) and c.15,707 m2 sqm (NIA) of workspace provided - Substantial – 65% uplift in NIA compared to option 1	21,491 sqm (GIA) and c.15,707 m2 sqm (NIA) of workspace provided - Substantial – 65% uplift in NIA compared to option 1
Floorspace efficiency (GIA:NIA ratio)	75% (estimated) for office space - good efficiency	60% (estimated) for office space – poor efficiency. Notable below modern design expectations	62% (estimated) for office space – poor efficiency. Notable below modern design expectations	73% for office space - good efficiency	73% for office space - good efficiency
Viable occupational density	1:20 extremely poor. BCO guidance targets between 8-10 employees per m2 of NIA. Building can safely accommodate less than half compared to the other options and well below market expectations. This renders the scheme practically unviable to deliver.	Employment density meets BCO standards. Building can safely be occupied at 1:8 or 1:10 density	Employment density meets BCO standards. Building can safely be occupied at 1:8 or 1:10 density	Employment density meets BCO standards and flexibility in design to adapt to changing market requirements. Building can safely be occupied at 1:8 or 1:10 density in line with BCO guidance.	Employment density meets BCO standards and flexibility in design to adapt to changing market requirements. Building can safely be occupied at 1:8 or 1:10 density in line with BCO guidance.
Employment capacity	Low - safe office capacity of c.592 workers. Selkirk house element would accommodate just 359 of these.	Office capacity of c.925 workers based on 1:10 occupancy. Selkirk house element would accommodate 692 of these.	Office capacity of c.1,037 based on 1:10 occupancy, of which 804 would be in Selkirk House.	Standard occupancy would result in capacity of c.1,571 with opportunity to occupy at great densities.	Standard occupancy would result in capacity of c.1,571 with opportunity to occupy at great densities

5.5 Floorspace provision and Employment capacity uplift

Floorspace estimates and occupational capacity workings

	Option 1 Maximum retention and retrofit (no extension)		**Option 2 Maximum retention and extension**		**Option 3 Partial Retention and extension**		**Option 4 Basement retention and new build (planning submission)**	**Option 5 New Basement and new build**	**Methodology notes**
	Selkirk H.	Car park	Selkirk H.	Car park	Selkirk H.	Car park			
GIA (m2) office only**	9,562	3,114	11,530	3,114	12,962	3,114			Excludes retail uses and basement for all options. For options 1-3 calculations for 'GIA office only' excludes retail and Basement areas on both Selkirk House and car park and ground floor areas on car park only and assumes current car park area as office space.
Total	12,676		14,644		16,076		21,491	21,491	For options 4 and 5 GIA is as measured for Planning based on IPMS, with key Exclusions: Plant spaces, loading bay, typically uninhabited BOH, covered terraces, external circulation and amenity roof terraces
GIA:NIA efficiency	75%	75%	60%	75%	62%	75%	73%	73%	NIA for Options 1-3: Average % efficiency used are an assumption based on indicative floor plans. Options 4 and 5 are actually NIA based on planning application scheme. Car Park space assumed 75% efficiency across all retained options
NIA (m2)	7,172	2,336	6,918	2,336	8,036	2,336			Estimated for options 1-3 based on above efficiency assumption. Actual for options 4 and 5
Total	9,507		9,254		10,372		15,707	15,707	
Occupancy density ratio	1:20	1:10	1:10	1:10	1:10	1:10	1:10	1:10	Safe capacity estimated for option 1 based on lift and stair provision. Typical office occupancy of 1:10 utilised for all other options as most likely scenario, however it would be possible to safely occupy options 2-3 at a greater density of 1:8 and options 4-5 at 1:6.
Projected workspace employment capacity	359	234	692	234	804	234			NIA divided by the occupancy density ratio for relevant floorspace
Total	592		925		1,037		1,571	1,571	

5.6 Public Realm Enhancements

Planning policy for Museum Street seeks a development approach that addresses the current public realm challenges and makes a positive contribution to the local and wider area through public realm enhancements, increased site permeability as well as biodiversity and Urban Greening Factor (UGF).

To assess this criteria we have considered

– The net uplift in public realm created by each option compared to the current site
– The ability to introduce Vine Lane, a new public pedestrian route connecting High Holborn and New Oxford Street

Public realm enhancements will contribute towards the provision of public benefits set out for the site by the council, namely:

- Provision of new public space
- Provision of new public route through the site
- Improved urban greening

Public Open Space (POS) includes public footpaths, areas of hardscape and softscape (i.e. trees and planting). Details on the calculations for the existing and proposed POS are included on the Design and Access Statement part of the planning submission.

Note: *An assessment of the uplift in biodiversity and Urban Greening factor for each options was not undertaken, as this would require a full design for each option to enable an accurate assessment, and this is outside the scope of this report. However, for the planting, biodiversity and UGF proposals for the planning application scheme are substantial and can be viewed in the relevant sections of the submitted Design and Access Statement and the landscaping drawings.*

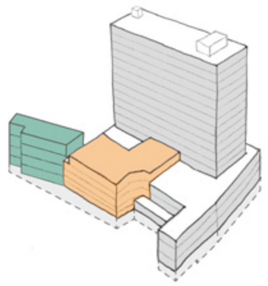
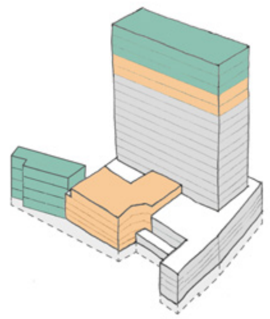
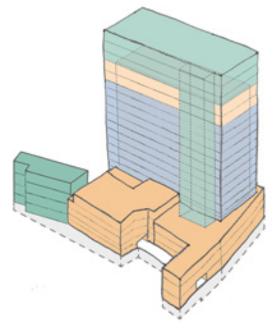
The public realm and highways improvements of the West End Project were an essential contextual springing points for the proposed scheme. An understanding of the changing context around the site needs to form the basis of proposals, ensuring that the masterplan principles are in harmony with Camden's strategy for creating a new pedestrian-focused sense of identity for the area. A key focus is permeability, traffic calming and the commandeering of new public space in a bold urban gesture, that sets the scene for the years to come.

Proposed plan of Princes Circus, part of Camden's West End Project

Proposed view of Princes Circus

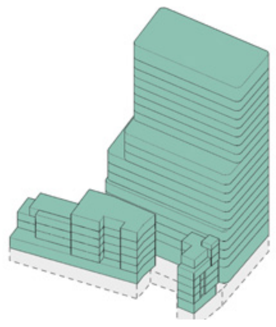
Key
1. ‘The Woodland Glade’ - A place to sit and relax
2. Vehicular and cycle route defined by low kerb
3. Existing trees retained
4. Shade tolerant and biodiverse planting
5. Al fresco seating/spill out
6. Improved pedestrian crossings

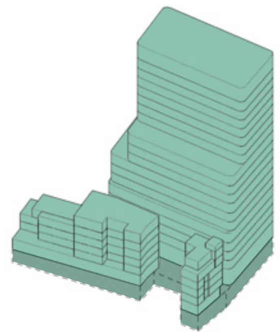
5.6 Public Realm Enhancements

			
5.6 PUBLIC REALM	**Option 1 - Maximum Retention & Retrofit**	**Option 2 - Maximum Retention & Extension**	**Option 3 - Partial Retention & Extension**
Increase in Public Realm **Ability to introduce Vine Lane**	- No increase to existing public open space [1331sqm POS] - Minor public realm improvements due to inactive street frontages retained - Some improvements to biodiversity and access to nature could be provided via podium level and roof [Note that UGF was not calculated for this option]	- No increase to existing public open space [1331sqm POS] - Minor public realm improvements due to inactive street frontages retained - Some improvements to biodiversity and access to nature could be provided via podium level and roof [Note that UGF was not calculated for this option]	- Some increase to public open space with the introduction of new passageway (partly covered), which will allow some public realm improvements - Potential for public realm improvements along Vine Lane and some associated uplift in UGF expected - Some improvements to biodiversity and access to nature could be provided via podium level and roof [Note that UGF was not calculated for this option]
Ground Floor			

5.0 Development Options Sustainability Assessment

5.6 Public Realm Enhancements





5.6 PUBLIC REALM	Option 4 - Basement Retention & New Build	Option 5 - New Build
	- Public open space area increase by 38% to 1842sqm - New public pedestrian route - Vine Lane - connecting New oxford Street / West Central Street and High Holborn - Public realm improvements along Museum Street, West Central Street and Vine Lane - Improvements on biodiversity and access to nature with new office terrace areas - Increased UGF [0.3 within the red line] - Incorporation of SUDs and blue roofs	- Public open space area increase by 38% to 1842sqm - New public pedestrian route - Vine Lane - connecting New oxford Street / West Central Street and High Holborn - Public realm improvements along Museum Street, West Central Street and Vine Lane - Improvements on biodiversity and access to nature with new office terrace areas - Increased UGF [0.3 within the red line] - Incorporation of SUDs and blue roofs

Ground Floor

Public Open Space

5.7 Housing Offer

Camden Local Plan Policy H1 seeks to maximise housing supply in the Borough and aims to exceed a target of 16,8000 additional homes from 2016/17 – 2030/31 including 11,130 additional self-contained homes. Camden has a need for more housing across all tenures and all developments generating an uplift of over 200 sqm are required in planning policy to provide 50% of all additional floorspace as self-contained housing (Camden Local Plan Policy H2). The need for affordable housing – both low-cost (social) rent and intermediate (intermediate rent) is particularly acute in Camden.

Local Plan Policy H4 sets an affordable housing target of 50% for all developments with the capacity for 25 or more additional dwellings. The guidelines mix of affordable housing types is 60% social-affordable rented housing and 40% intermediate housing.

Camden's policy H4 for Affordable Housing (low-cost rent and intermediate) requirement is calculated using a sliding scale based on an assessment of development capacity whereby an additional residential floorspace of 100 sqm (GIA) is generally considered to create capacity for one additional home. Where there is an uplift of more than 100 sqm (GIA) of residential Camden will round the uplift in housing floorspace to the nearest 100 sqm (GIA) to give capacity in terms of the nearest whole number, which will be upwards in some instances and downwards in others. This does not apply to existing residential floorspace which is being retained or replaced as part of the development, and existing residential floorspace will not influence the assessment of development capacity.

Camden use the assessment of capacity and the sliding scale to determine the affordable housing percentage target. The sliding scale is a simple straight line scale starting with a 2% affordable housing target for each additional home.

Selkirk Housing includes 1,322 sqm GIA of existing residential space in floors 14-15 which must be reprovided. The target of affordable housing level is in addition to this market reprovision.

The below assessment includes an indication of the target for Affordable Housing delivery associated with each option. The actual amount the scheme would be able to provide would be subject to a viability assessment and it can be reasonably assumed that given rental values associated with options 1-3, the viability of meeting the expected affordable housing provision would be more challenging.
The proposed level of affordable housing takes into account the WCS block and baseline level of reprovision of existing residential accommodation on site.

To assess this criteria we have calculated:
– The amount of residential floor space the development could accommodate
– The associated policy requirement for affordable housing

Note: the level of affordable housing the development option could actually afford to provide would be subject to viability testing, this is beyond the scope of this report therefore the affordable housing figures are based solely on the policy target.

Floorspace range 1 or more additional homes with an additional residential floorspace of...	**Capacity** (rounded floorspace addition ÷ 100 sq m)	**Affordable housing percentage target** (capacity x 2%)
...100 sq m GIA and above, but less than 150 sq m GIA	1 additional home	2%
...150 sq m GIA and above, but less than 250 sq m GIA	2 additional homes	4%
... 450 sq m GIA and above but less than 550 sq m GIA	5 additional homes	10%
... 950 sq m GIA and above but less than 1,050 sq m GIA	10 additional homes	20%
... 1,450 sq m GIA and above but less than 1,550 sq m GIA	15 additional homes	30%
... 1,950 sq m GIA and above but less than 2,050 sq m GIA	20 additional homes	40%
... 2,450 sq m GIA and above	25 additional homes or more	50%

Sliding scale for affordable housing percentage targets, extract from Camden's Housing CPG 2021

5.7. HOUSING OFFER	**Option 1** **Maximum retention and retrofit (no extension)**	**Option 2** **Maximum retention and extension**	**Option 3** **Partial Retention and extension**	**Option 4** **Basement retention and new build (planning submission)**	**Option 5** **New Basement and new build**
Housing area required by uplift	- approx. 943.50 sqm GIA	- approx. 1,928 sqm GIA	- approx. 2,644 sqm GIA	- approx. 3,573 sqm GIA	- approx. 3,573 sqm GIA
Target of Affordable housing	- 18% equivalent to 170 sqm GIA	- 38% equivalent to 733 sqm GIA)	- 50% equivalent to 1,322 sqm GIA	- 50% equivalent to 1,787sqm GIA	- 50% equivalent to 1,787sqm GIA

5.0 Development Options Sustainability Assessment

5.8 Circular Economy, future flexibility and adaptability and resilience to climate change

To evaluate future proofing the full life cycle of a building should be considered alongside the six circular economy principles. To consider this factor we have assessed:

- How the options would offer future flexibility in terms of adaptability and reuse
- How the options would improve health & wellbeing
- The ability of the development to deliver on the six circular design principles

Future Flexibility and Adaptability
To enable longevity of the built environment there is a need to allow for change, to meet the needs of the present, but with consideration of how those needs might change in the future, and to enable periodic remodelling. A 'loose fit' approach will more easily enable modifications and replacement of parts, with space for alternative technologies. Flexibility is required in order to balance the needs of the present with how those needs will develop over time and to enable change through easy reconfiguring, with minimum carbon emissions.

Given that the fundamental problems of Selkirk House remain after a retrofit and that the existing structure has a shorter lifespan due to its age, there is a concern that comprehensive refurbishments would be required every c.15 years.

For options 1-3 where the existing building structure is retained there is less scope for flexibility and adaptability. The existing structure has its own constraints as identified on section 4.0 of this report including a limited loading capacity, potentially reducing the options for future repurposing compared to options 4 and 5.

For both options 4 and 5 the new office accommodation above ground level has been designed with reusability, recoverability, longevity, adaptability and flexibility in mind.

The new build structure would have a higher loading capacity than options 1 to 3, increasing the optionality to repurpose to different uses without the need to strengthen the structure or foundations.

Also, the open plan floorplates allow easy reconfiguration of the space to suit different commercial tenants needs and how these could evolve over the coming years.

A new building approach for One Museum Street (Options 4 and 5) will deliver a commercial development asset fit for the next 60 years (minimum life span of the structure) with a predicted comprehensive refurbishment required in 30 years' time.

In addition, options 4 and 5 are targetting a BREEAM rating of Outstanding (Excellent as a minimum) and a Nabers score of 5* (operational energy). Carrying out a BREEAM and Nabers assessment on options 1-3 is outside of the scope of this report. However it can be reasonably expected that the constraints of the existing building, alongside viability considerations, would make these standards extremely challenging to meet.

Incorporating Wellbeing
Wellbeing in the built environment refers to the development of environments that positively support and or encourage improvements in building users' physical and mental health. For example, a building might:

- Support active modes of transport / active travel facilities (e.g. with cycle storage, showers).
- Optimise access to daylight and fresh air.
- Provide access to outdoor green space and support biophilia.
- Provide multi-purpose rooms supporting the wellbeing of users.
- Support healthy nutrition.

Many of these approaches connect to broader net zero strategies, and other significant human systems like transport and food production.

Options 1-3
With the removal of the existing car park all the considered options would be car free. In addition to the removal of the excessive car parking provided by the existing NCP park, this will have a positive impact on local air quality by reducing vehicles movements to and from the site. Additionally for all options cycle facilities would be provided to support active travel and aligned with current policies.

Access to outdoor amenity space could potentially be provided on options 1-2. however existing loading capacity may constrain the ability to do this. This could be provided on the new podium roof of option 3.

Options 4 - 5
Options 4 and 5 will promote sustainable modes of transport and will be completely car free.

Access to outdoor amenity spaces, namely terraces at different levels and landscaped public realm, can be provided throughout on options 4 and 5. The planning application for Option 4 incorporates a biodiverse planting palette to encourage local wildlife.

The ecological emergency:
The planning scheme (option 4) addresses the ecological emergency by creating a valuable local addition of biodiversity in an Area of Deficiency in public access to nature by providing significant biophilic benefits for occupiers, their guests and the public. The Urban Greening Factor (UGF) for Options 4 and 5 is addresses the policy target of 0.3. It is beyond the scope of this exercise to calculated the comparable UGF for a retention scheme due to the level of design work required to calculate. However the retention schemes offer fewer opportunities for public realm creation and incorporating green and blue roofs due to design constraints and structural limitations.

Circular Economy
In line with the principles of a circular economy, first the condition of the existing site must be considered for any opportunities for a refurbishment in order to prevent waste prior to a new building being developed. This approach has been fully considered through a holistic evaluation of potential retention options when compared to the new build option as set in this report. A circular economy statement has been developed for option 4 (submitted scheme) to inform to establish relevant targets, and inform the approach to reusing existing materials, and minimise waste in construction, operation and end of life. The Circular Economy principles are:

- Building in layers - Ensuring different parts of the Development are accessible and can be maintained and replaced where necessary. Maximise material recovery from the existing site in line with the waste hierarchy. Goal to recycle 95% of the material.
- Designing out waste: 95% reuse/recycling/recovery of construction and demolition waste
- Designing for longevity - Designing to avoid a premature end of life for all components through considering maintenance and durability - Durability of materials used to be considered at outline specification stage and built into the design
- Designing for adaptability or flexibility - Consider how the Development might be easily altered structurally to prolong its life. Consider how the Development might allow easy rearrangements of its internal fit-out and to suit the changing needs of occupants. Utilise soft spots to allow different floors to be connected to suit future needs.
- Designing for disassembly - Consider how the Development can be deconstructed and reconstructed to allow components and materials to be salvaged for reuse or recycling, whilst maintaining their economic and environmental value. Utilise modular and pre-fabricated components where possible.
- Using systems, elements or materials that can be reused and recycled - Aim for 20% recycled of recycled content by value, for the whole building and 50% of new construction materials to consist of recyclable materials

Options 1 - 3 would be expected to produce less waste compared to options 4 - 5. To address the circular economy priorites for Option 4 and 5 the below strategies have been proioritised:
- Backfilling on site with demolition material
- Working with contractors to recycle 95%+ of waste
- Prefabrication off site of component design
- Exploring reuse of existing building materials within design.

Please refer to the Circular Economy Statement (CES) submitted with this application for further information.

5.0 Development Options Sustainability Assessment

5.9 Long-term economic sustainability and planning benefits

The amount of space and quality of the space a development can provide is a key factor contributing to long-term economic sustainability. It also has a bearing on the ability of a scheme to deliver key planning benefits such as public realm enhancements and affordable housing offer, typically captured in a Section 106 agreement.

Higher quality, flexible space with a wide appeal to occupiers is considered more likely to achieve target rent levels, be let on longer leases and to occupiers with strong covenant strength. These factors in turn contribute to the long-term economic sustainability of the development which supports the continued investment in the building's fabric and performance, important factors to reduce the likelihood of major refurbishment and keep up with technological advances that can further improve operational energy performance. Chapter 5.10 provides some further commentary on these factors and how they interface with potential carbon emissions.

Near-term economic performance is captured in the development viability which informs the type and scale of planning benefits including affordable housing, that the scheme can be expected to deliver. These benefits are typically captured in a S106 agreement. The development's Financial Viability Assessment (FVA) outlines the target rents and expected yield that the planning application scheme is expected to achieve. (Note, the FVA submitted is for the One Museum Street scheme overall including West Central Street).

The criteria analysed previously in this chapter inform development value and viability to varying extents by contributing to the expected quality and sustainability and therefore value of the space created by the development, particularly the workspace and therefore expected ability to meet the target rents in the FVA.

A further factor considered a public benefit of development, is the value of Business Rates generated by the uses. The rent levels a site can achieve is also directly linked to the value of Business Rates associated with the scheme. The level of Business Rates are based on the 'rateable value' of that space.

Therefore lower value can be reasonably expected to generate a lower level of Business Rates. Business rates are paid directly to the Council for the council to use to fund local services.

To assess this criteria our analysis focuses on
– The expected development viability and ability to deliver additional planning benefit
– Additional direct and indirect public benefits associated with the options.

A full Financial Viability Assessment and Business rates assessment for options 1-3 is beyond the scope of this report, therefore our analysis of these options is a commentary on the anticipated scenario.

Options 1-3
It can be reasonably assumed that the expected rental values and tenant strength associated with poorer quality office space would create significant challenges for the viability of options 1-3 as development project, as well as the ability of these options to deliver the additional planning benefits expected. This would be the case where the cost of the development didn't generate enough of a return to either represent a viable investment decision to implement the project, or a level of surplus profit to fund the expected planning benefits.

We have not undertaken an assessment of potential business rates for option 1-3 as this is outside of the scope of this assessment, however, all three options deliver less floorspace than options 4-5 and lower quality and therefore lower value space. Overall it is therefore reasonable to expect that they would generate a considerably lower level of Business rates payable.

Options 4-5
The viability of Option 4 has been assessed as part of the planning application in the FVA. For the purpose of this report it is assumed that the viability of option 5 would be consistent with this.

These options are able to deliver a range of planning benefits across the site (including West Central Street) including 19 new affordable homes and S106 contributions for council priorities including Employment and Training.
The expected annual Business Rates for the One Museum Street scheme (predominantly generated by the workspace) are IRO £15m.

More information on the business rates associated with option 4 can be found in the Socio-Economic Assessment submitted with the planning application.

5.0 Development Options Sustainability Assessment

5.10 Carbon Assessment

5.10.1. Overview

The aim of the Carbon Comparison Assessment included in this sub-chapter is to compare the carbon emissions of five potential development options at 1 Museum Street. This assessment covers the operational carbon emissions for the proposed development options from both regulated and unregulated energy and water use, as well as its embodied carbon emissions, i.e. those associated with raw material extraction, manufacture and transport of building materials, construction and the emissions associated with maintenance, repair and replacement as well as dismantling, demolition and eventual material disposal

This assessment also explores carbon associated with additional factors under consideration when comparing the development options. The objective is to understand the performance of the different options relative to each other and to the established benchmarks for carbon associated with development. This assessment forms part of a wider assessment of the carbon and sustainability impacts of the development proposals. The scope and methodology for the assessment is outlined below.

In addition to the RICS Methodology, further work has been carried out to understand the carbon impacts over the life of the different options. This acknowledges the extent to which each option could be successful in creating flexible space with broad and enduring appeal to occupiers. These qualities will have a direct impact on the occupational leases and need to re-let and repurpose the space through its life.

Summary of Results

	Option 1 Maximum Retention	Option 2 Medium Retention and Extension	Option 3 Maximum Retrofit and Extension	Option 4 New Build	Option 5 New Build & Basement
Upfront Embodied Carbon (Module A) (kgCO2e/m2 GIA)	420	431	455	716	788
Overall Embodied Carbon (Modules A-C exc. B6&B7) (kgCO2e/m2 GIA)	865	862	904	1,112	1,184
Operational Energy and Water (Modules B6 & B7) (kgCO2e/m2)	485	485	485	478	478
Whole Life Carbon (Modules A-C) (kgCO2e/m2 GIA)	1,351	1,347	1,389	1,590	1,662
WLC Including Refurbishment Scenarios (kgCO2e/m2 GIA)	1,657	1,688	1,696	1,622	1,695
WLC Including Cat-B Fit Out (kgCO2e/m2 GIA)	2,431	2,427	2,469	2,130	2,202

5.0 Development Options Sustainability Assessment

5.10 Carbon Assessment

5.10.2. Methodology

This study has followed the RICS professional statement: Whole Life Carbon Assessment (WLCA) for the Built Environment, released in 2017. This statement seeks to standardise WLCA assessment and enhance consistency in outputs by providing guidance on implementing the broad appraisal methodology set out in BS EN 15978: Sustainability of Construction Works. The Greater London Authority have adopted the RICS WLCA methodology in their guidance methodology for Whole Life Carbon Assessment of referable planning applications. Figure 2 below outlines the modules assessed in this report, in line with RICS guidance.

All figures are expressed in terms of tCO2e for total figures, or kgCO2e/m2 GIA when presenting results per m2 GIA of the option.

Embodied Carbon Assessment and End of Life Emissions

To assess the embodied carbon for the project a Life Cycle Assessment (LCA) tool – OneClickLCA – has been used to make allocations for the anticipated materials quantities in an inventory analysis. The materials are represented within the model by using materials with associated Environmental Product Declarations (EPDs). EPDs are produced by manufacturers and identify the carbon emissions of a product. By scheduling the materials proposed for the development, the overall carbon emissions can be approximated.

It should be noted here that the LCA tool has a limited database of materials. In the scenario where a specified material isn't included in the database, the most similar material in terms of composition is selected instead.

In line with standard UK practice, the LCA process and results included by this report have been assessed in line with BS 15978:2011 and the RICS Professional Statement: Whole Life Carbon assessment for the built environment. All EPDs used have been produced in line with the requirements of BS EN 15804:2012.

Operational Carbon Emissions

The regulated & unregulated operational energy use for each option has been estimated utilising the Part L Dynamic Simulation Model (DSM) methodology with IES Virtual Environment software, with the resulting energy consumption input into the OneClickLCA tool to calculate the associated carbon emissions accumulated over the 60-year study period.

The Part L compliance methodology has been utilised in favour of a detailed CIBSE TM54 operational energy assessment for simplicity and due to the very limited design information available for options 1-3. As a result the predicted operational energy consumption and carbon emissions stated herein are not considered to be the most accurate indicator for the performance of any option in operation. However the standardised assessment procedure does mean that the results in each case are directly comparable on a like-for-like basis. The DSM methodology contains a number of standardised templates and assumptions, meaning that factors such as occupancy density (which would vary in practice between the various schemes, affecting the operational energy consumption both in absolute and per-capita terms) are not adjustable and therefore input consistently across all options.

Options 1-3 utilise a simplified model geometry based on the drawings available for the existing building, with a parametrically generated envelope intended to replicate the glazing ratio of the submitted scheme (option 4), with the calculation results pro-rated for the proposed area of each option. Options 4 and 5 utilise the detailed model geometry for the submitted scheme (option 4).

The energy models for Options 4 & 5 utilise the building fabric & services performances set out in the energy statement for the submitted scheme (Option 4). The energy model for Options 1-3 utilise an adjusted set of assumptions for fabric and services on the assumption that this would likely be designed as a lighter touch refurbishment scheme with less stringent statutory obligations and a lower construction budget. These include some small relaxations to the building fabric performance (within the allowable parameters of Part L 2021) and alternative services strategies, most notably the inclusion of a VRF heating & cooling system in place of the centralised air to water heat pumps proposed for the submitted scheme.

Table 2.1 below summarises some of the key input values incorporated into each assessment.

Parameter	Value utilised in Option 1	Value utilised in Options 2-5
Wall U Value (W/m²K)	0.26	0.20
Roof U Value (W/m²K)	0.16	0.12
Glazing U Value (W/m²K)	1.6	1.6
Glazing g Value	0.4	0.35
Air Permeability (m³/hr.m² @50Pa)	5.0	3.0
Office Lighting Efficacy (lm/W)	110	140
Heating & Cooling Strategy	Air cooled VRF	Ambient loop with fan coil units
Heating SCOP	4.1	3.5
Cooling SEER	6.1	4.0
AHU Specific Fan Power (W/l/s)	2.2	2.0

Table 2.1 - Selected Operational Energy Input Summary

Operational Water Emissions

The operational water emissions have been based upon calculations undertaken by the Public Health Engineer for the project. Using freshwater and wastewater figures provided, these were inputted into the relevant OneClickLCA template. The carbon coefficient for the applicable water use is outlined below;

- Clean tap water, Thames Water - 0.01926kgCO2e/m3
- Wastewater- 0.39kgCO2e/m3

5.10 Carbon Assessment

5.10.2. Methodology

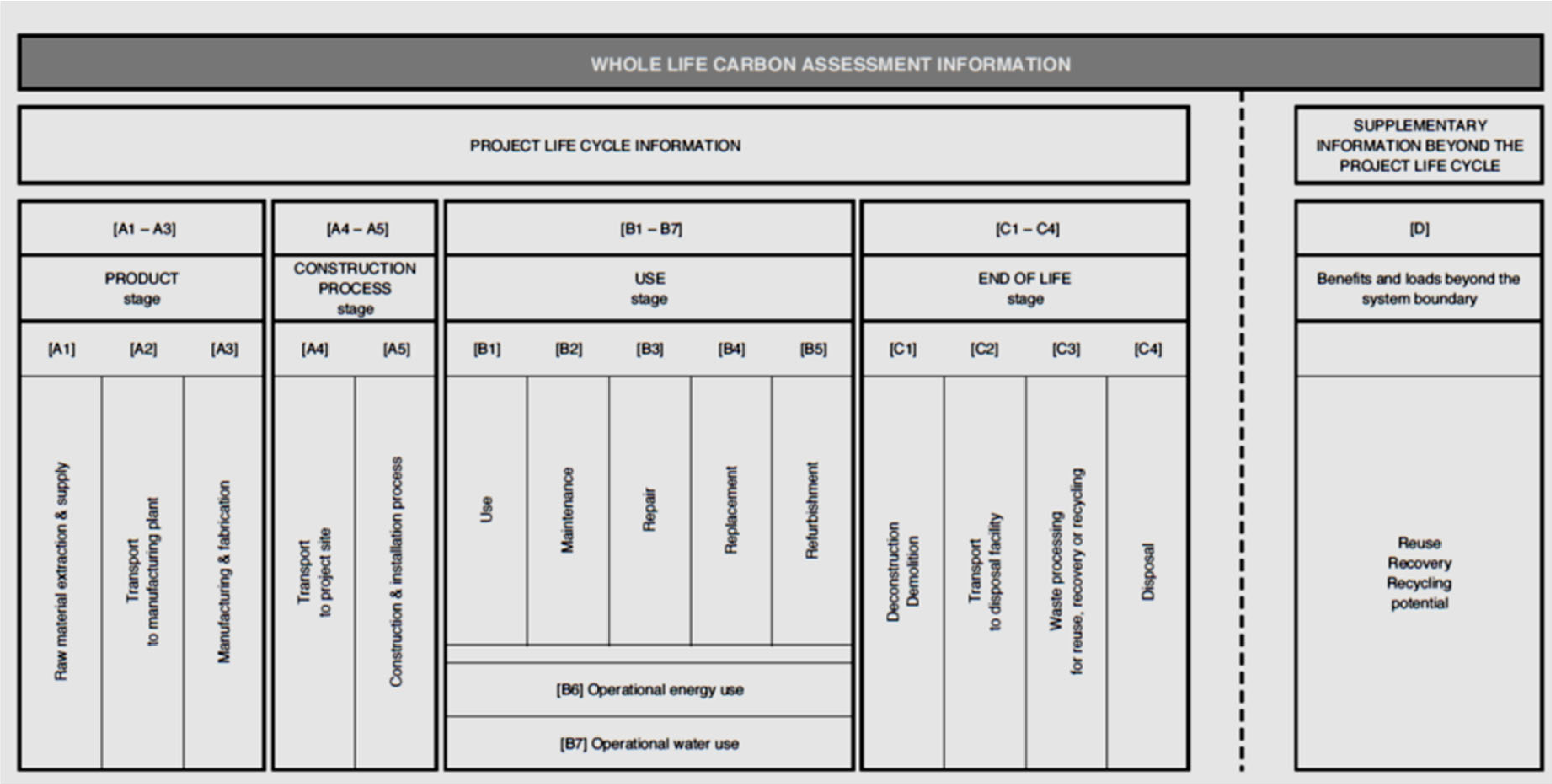


Figure 2 - Life Cycle Modules (GLA)

5.0 Development Options Sustainability Assessment

5.10 Carbon Assessment

1. Life Cycle Assessment Impacts

A building Life Cycle Assessment considers a range of environmental indicators that assess the relevant overall impact of the materials selections.

Standard ratios are used to convert the various greenhouse gases into equivalent amounts of CO2. These ratios are based on the global warming potential (GWP) of each gas. GWP is a relative measure of how much a given mass of greenhouse gas is estimated to contribute to global warming over a given time period – usually 60 years. It is expressed relative to carbon dioxide which is set as the baseline which other emitters are compared against, and which therefore has a GWP of 1.

This assessment reports on the embodied carbon of the development as 'global warming potential' with the annotation 'CO2 equivalent (CO2e)'.

2. Data Sources

There are a number of approaches to complete a building-specific life cycle assessment. In particular, a flexible approach is needed when utilising a dataset of product-specific environmental product declarations and more generic data calculated within the LCA tool.

A detailed report on development option 4 forms part of the planning application. This includes information provided by the design team from the following sources:

- Cost Plan
- Whole Life Carbon Schedule - completed by the design team with input from the cost plan. This document outlined all quantities and material types.
- Material specifications
- MEP Schedule

For the development options 1-3, the project team established a series of assumptions and associated performance specifications, and established the design approach. These options are based on a reduced intervention approach, and an alternative operational performance specification was as described in section 5.10.2. The design team completed an exercise outlining the areas of new materials needed. The specification followed the same as the new build scheme. In some instances, where areas were not known, a proportionate figure based on the GIA (gross internal area) compared to the new build scheme was used. The specification for development option 5 is the same as development option 4, with the addition of a new build basement. The following section summarises the input clarifications.

3. Clarifications

Please see below a list of clarifications and assumptions made as part of the methodology. A full list of clarifications for development option 4 can be found as part of the full Whole Life Carbon Assessment report submitted.

- Structural assumptions have been provided by the project Structural Engineer.
- Architectural assumptions have been made in collaboration with the lead architectural consultants on the project. In the absence of detailed design for development options 1-3, this has consisted of
- architectural assumptions following the specification of development option 4 for all newly specified elements. The areas/volumes have been calculated on a pro-rata based on GIA.
- Carbon emissions associated with operational energy consumption have been calculated by OneClickLCA utilising the carbon emission factors for each fuel type built into the software. These factors differ
- from those used within the Energy Statement, where emissions factors for each fuel type are defined by the GLA. For comparison, the Part L carbon coefficient used in the energy statement is 0.136kgCO2/kwh, compared to 0.14kgCO2/kwh in the OneClickLCA software. This results in minimal difference to the carbon emissions.
- Quantities and materials have been provided by the design team and the cost plan.
- Reasonable assumptions were made by the design team and the OneClick software when required.
- Development options 1, 2 & 3 include only new aspects of the refurbishment. Module B figures for any retained structure have not been included as the quantities are not available.
- This report focuses on the redevelopment options for the Selkirk House site only and excludes the proposals for the West Central Street (WCS) site. The WLCA and WLC report for planning incorporates analysis of the WCS site block.
- Specialist temporary works have been included for development option 1-3 based on figures provided by the Structural Engineer. This is based on 20kgCO/m2 for development options 1-2 and 30kgCO2e/m2 for development option 3.
- Development option 5 basement is based on an overall figure of 2,000tCO2e provided by the Structural Engineer. This has been proportionately distributed over Modules A-C (exc. B6&B7).
- OneCLickLCA does not include figures for Modules B2 Maintenance with the impacts included for within the B3 Repair module.
- OneClickLCA does not include figures for
- Module B5 Material Refurbishment, with the impacts included for within the B4 Replacement module.
- This module typically looks at significant refurbishment for a predetermined change of use.
- Preconstruction demolition has not been included as part of this assessment, as per RICS Guidelines.
- In line with comparable projects, the following material assumptions have been applied:
  - 60% recycled rate assumed for steel profiles.
  - 97% recycled rate assumed for steel reinforcement (rebar).
  - 70% GGBS assumed for concrete substructure and 30% for superstructure.

Key Variations from the planning submission WLCA and energy statement

As noted above, in order to enable comparison across options, in a few instances the methodology within this analysis for assessing WLC differs from that within the planning submission documents namely the WLCA assessments and Energy Statements. The core differences are:

- The planning application WLCA incorporates a 10% contingency for all modules to allow for design development and to be more accurately compared against benchmarks. This contingency has not been incorporated in the WLC analysis within this report therefore the figures will differ.
- Operational energy estimates utilised in this report utilised the Part L compliance methodology rather than CIBSE TM54 which is utilised in the planning application WLCA. This is due to the very limited design information available for options 1-3, and to ensure comparable results utilising a consistent standardised assessment procedure for all options presented.
- The figures presented in this report cover the Selkirk House development site only and therefore exclude the West Central Street proposals in all options.

Key Variations between report versions 1 (Feb 2023) and version 2 (this version)

- Templates and specifications updated in line with the planning application WLCA where relevant. In order to keep the comparison consistent, this has resulted in changes across the specifications of all options in some cases. This has resulted in changes in the results across all modules.
- Operational energy estimates for all options updated utilising latest Part L calculation engine, and estimates for Options 4 & 5 updated to align with latest proposals set out in the Energy Statement
- Operational water emissions have been refined in line with public health engineers calculations, consistent with the planning application WLCA. This has included updated templates.

5.10 Carbon Assessment

5.10.3. Results

Full Results

	Option 1 Maximum Retention	**Option 2** Medium Retention & Extension	**Option 3** Maximum Retrofit & Extension	**Option 4** New Build	**Option 5** New Build & Extension
Development option GIA (m2) (includes proposed residential block on Selkirk site and basement)	19,939	21,907	23,339	27,773	27,777
Upfront Embodied Carbon (Module A) (kgCO2e/m2 GIA)	420	431	455	716	788
Total (tCO2e)	8,370	9,438	10,630	19,863	21,863
Overall Embodied Carbon (Modules A-C exc. B6&B7) (kgCO2e/m2 GIA)	865	862	904	1,112	1,184
Total (tCO2e)	17,254	18,880	21,097	30,837	32,837
Operational Energy and Water (Modules B6 & B7) (kgCO2e/m2)	485	485	485	478	478
Total (tCO2e)	9,676	10,633	11,329	13,260	13,260
Whole Life Carbon (Modules A-C) (kgCO2e/m2 GIA)	1,351	1,347	1,389	1,590	1,662
Total (tCO2e)	26,930	29,512	32,426	44,097	46,097

Table 3.1 - Full Results

Upfront (Construction) Embodied Carbon

Figure 3 below displays the comparison of the upfront embodied carbon, sometimes referred to as construction embodied carbon, for the five options. This includes the product stages (Module A) as outlined in Figure 2.

Development options 1-3 result in 420, 431 and 455 kgCO2e/m2 GIA respectively, with development option 4 resulting in 716kgCO2e/m2 GIA and development option 5 at 788kgCO2e/m2 GIA. This shows development option 1 produces 47% less upfront embodied carbon per m2 of GIA when compared to development option 5, and 41% less than Option 4. In terms of total upfront embodied carbon produced, development option 1 produces 8,370 tCO2e, with options 2 and 3 producing 9,438 and 10,630 tCO2e respectively. Development option 4 produces 19,863 tCO2e and option 5 produces 21,863 tCO2e.

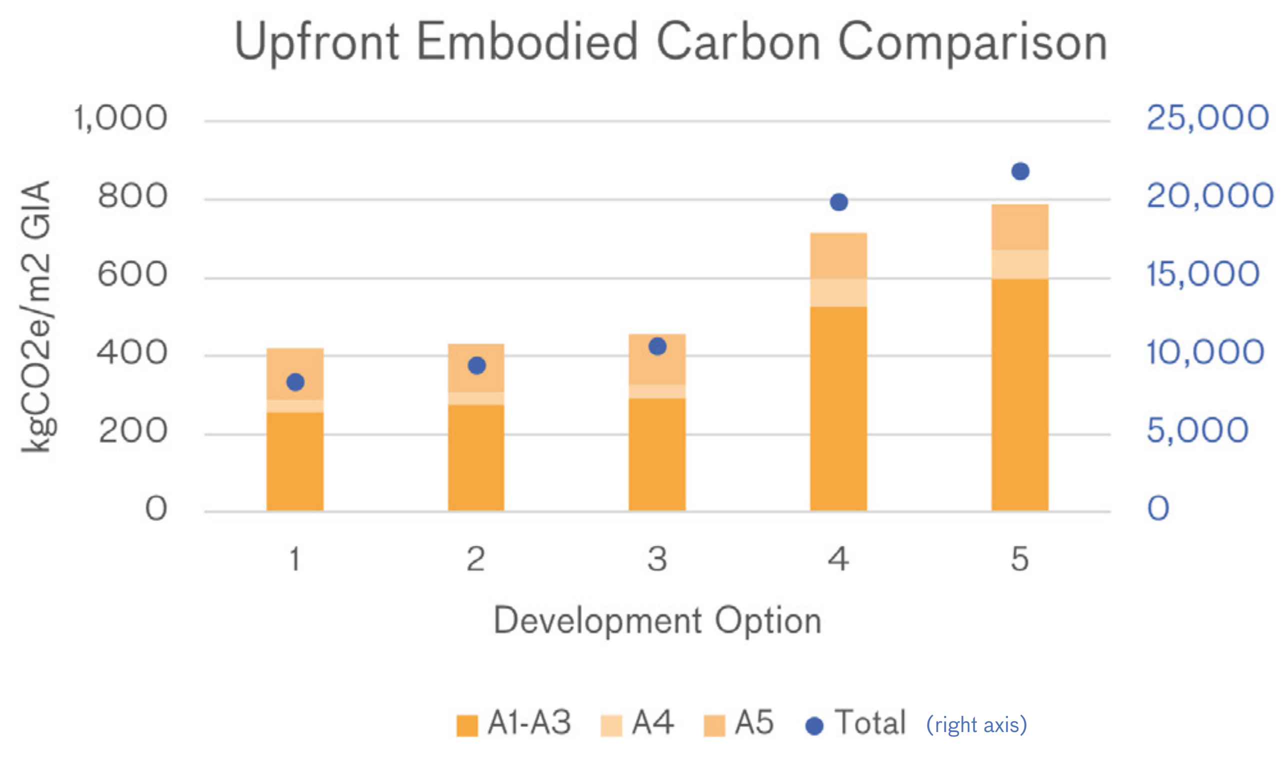


Figure 3 - Upfront Embodied Carbon Comparison

5.10 Carbon Assessment

Embodied Carbon

Figure 4 compares embodied carbon for each development option, this displays both the total carbon produced and per m2 GIA. This includes Modules A-C excluding Modules B6&B7 over a 60 year study period.

Development option 4 performs at 1,112kgCO2e/m2 GIA, which results in between 208-250kgCO2e/m2 GIA more than development options 1-3 and 72 kgCO2e/m2 less than Option 5. When compared on a per m2 of GIA basis, the figures are 865 kgCO2e/m2 for option 1 and 1,184 kgCO2e/m2 for option 5, with options 2, 3 and 4 producing 862, 904 and 1,112 kgCO2e/m2 GIA respectively.

This shows that when taking in account the overall embodied carbon associated with a building across a standard 60 year lifespan, the gap between the level emissions of retained and new build options per m2 of space narrows considerably. Option 4 generates a moderately higher level of overall embodied carbon per m2 than options 1-3 by between 19-22%. The results demonstrate that the retention of the existing basement in option 4 generates a 7% carbon saving per m2 when compared to option 5.

Operational Carbon

This section summarises the results of the Operational Carbon. This includes Modules B6 (Operational Energy) and Module B7 (Operational Water) over a 60 year period.

The results show that development option 4 and 5 generate 13,260 tCO2e compared to 9,676, 10,633 and 11,329 tCO2e for development options 1, 2 and 3 respectively. When compared by m2 GIA, option 4 and 5 perform at 478kgCO2e/m2 GIA compared to 485 for options 1, 2 and 3. Development option 1 therefore produces 2% more operational carbon when compared to development options 4 and 5 in terms of kgCO2e/m2 GIA.

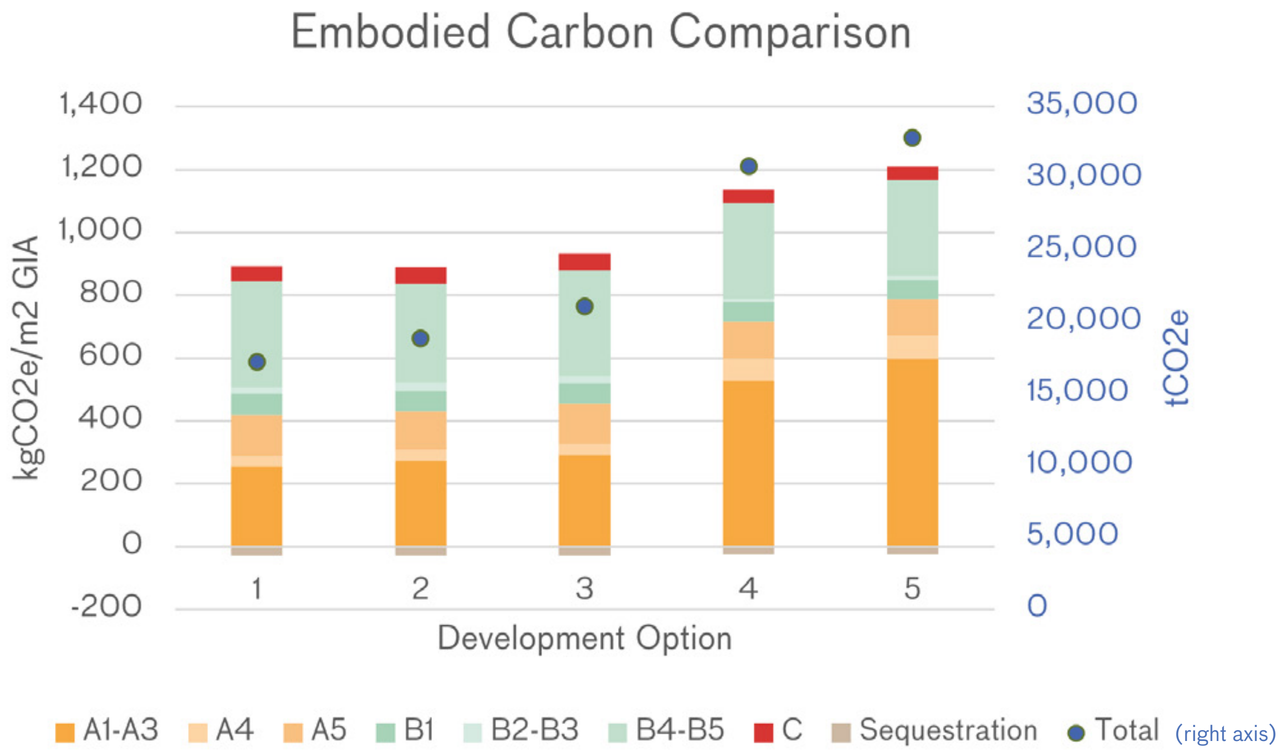


Figure 4 - Embodied Carbon Comparison

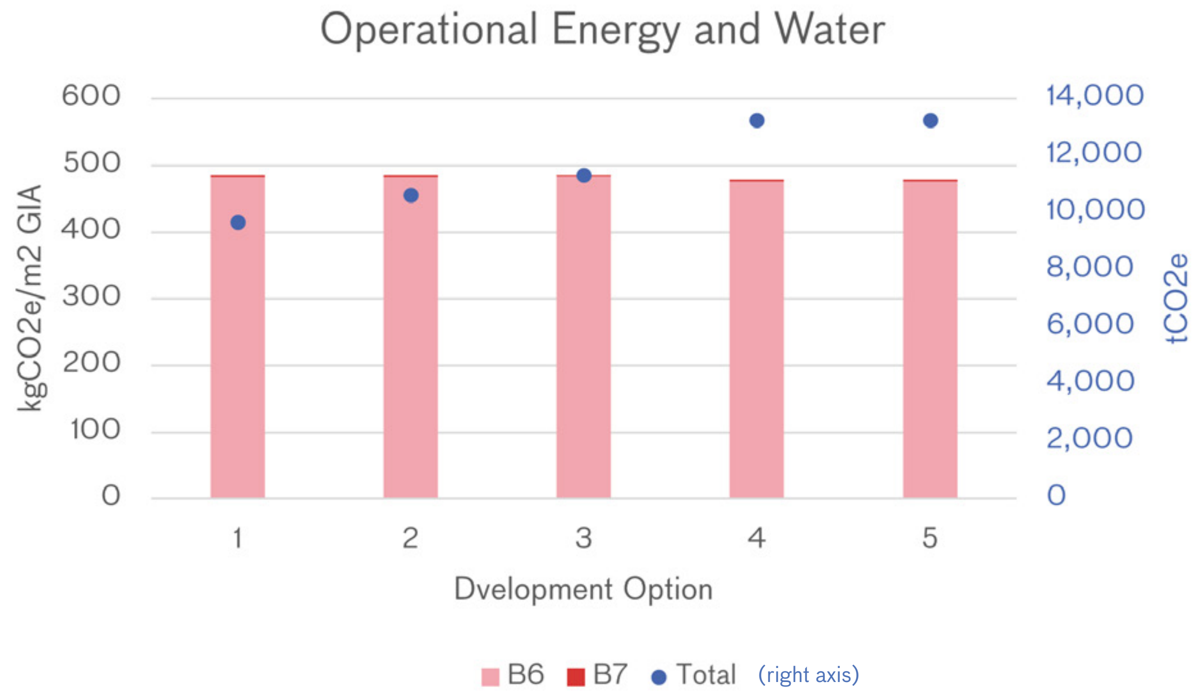


Figure 5 - Operational Carbon Comparison

5.0 Development Options Sustainability Assessment

5.10 Carbon Assessment

Whole Life Carbon

This section summarises the total Whole Life Carbon for all four options. This includes modules A-C including Modules B6&B7 over a 60 year study period.

The results for the five options can be seen in figure 6. The results show a total carbon of 26,930 tCO2e for development option 1, with options 2 and 3 producing 29,512 and 32,426 tCO2e. Development Option 4 produces 44,097 tCO2e and option 5 46,097 tCO2e.

When expressed in terms of per m2 GIA, development options 1, 2 and 3 produce 1,351, 1,347 and 1,389 kgCO2e/m2 GIA respectively, with development options 4 and 5 producing 1,590 and 1,662 kgCO2e/m2. This shows that the gap between the performance of the options narrows further, with option 1 producing 15% less kgCO2e/m2 GIA than option 4.

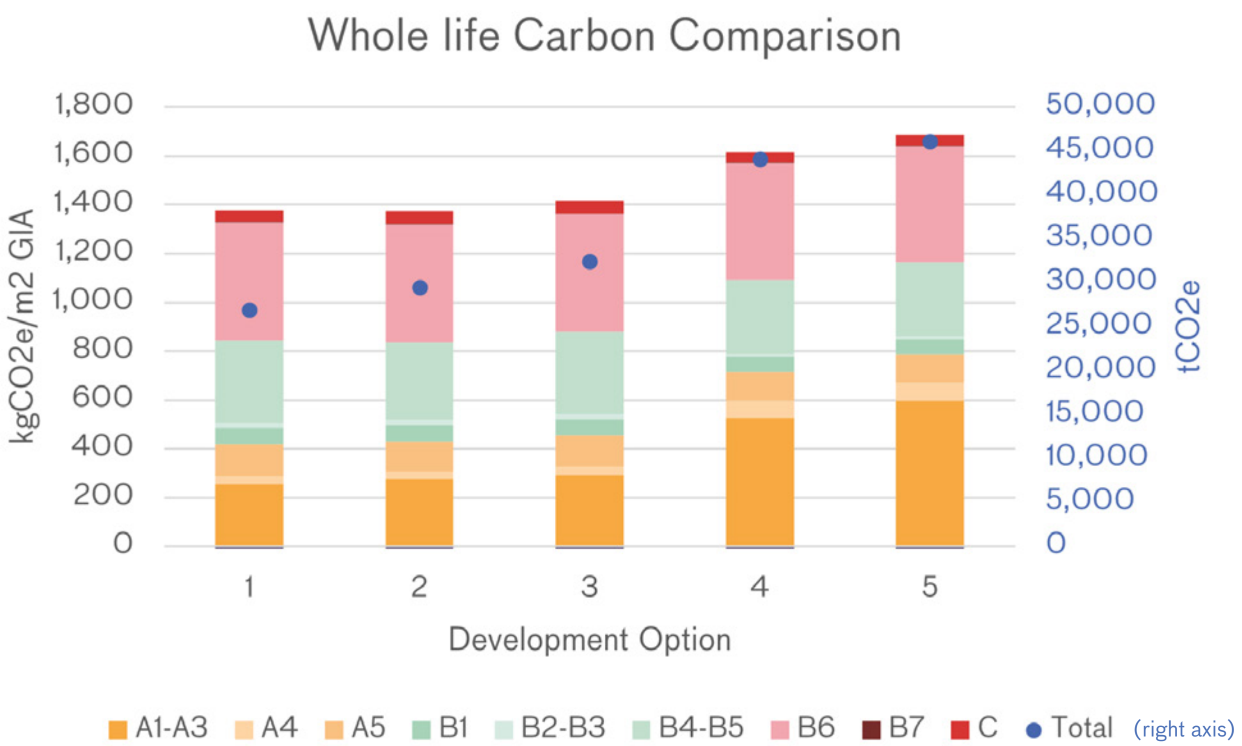


Figure 6 - Whole Life Carbon Comparison

Performance vs Industry Benchmarks

This section outlines the performance of the options in this assessment against industry benchmarks. The most relevant benchmarks for the project are as follow:

1. London Energy Transformation Initiative (LETI) Embodied Carbon Primer (January, 2020)
2. Greater London Authority (GLA) Whole Life-Cycle Carbon Assessments (March, 2022)
3. RIBA 2030 Climate Challenge (Version 2, 2021)

		Upfront Embodied Carbon (Module A) (kgCO2e/m2 GIA)	Embodied Carbon (Modules A-C exc. B6&B7) (kgCO2e/m2 GIA)
Development Options	Option 1	420	865
	Option 2	431	862
	Option 3	455	857
	Option 4	716	1,112
	Option 5	788	1,184
1)	LETI 'Business as usual'*	1,000	N/A
	LETI 2020*	600	N/A
	LETI 2030*	350	N/A
2)	GLA Benchmark	950	1400
	GLA Aspirational	600	970
3)	RIBA 'Business as usual'	N/A	1400
	RIBA 2025	N/A	970
4)	RIBA 2030	N/A	750

*LETI scope is different from RICS/GLA

Figure 3.6 - Comparison against benchmarks

5.10 Carbon Assessment

Additional Scenarios

This section includes scenarios that are not accounted for in the scope of a RICS Whole Life Carbon assessment, but are considered relevant when comparing the development options. This includes future major refurbishment cycles and works related to a Cat B Fit Out. These are presented as potential scenarios based on industry insight and available data. We believe these represent valid additional considerations when assessing the approach to development of this site. However it is acknowledged that data sources to inform such analysis and existing guidance for assessment are limited. Therefore this analysis is provided as supplementary to that following the RICS methodology.

1. Future Refurbishment Scenarios
Future extensive refurbishment scenarios are not accounted for as part of the RICS methodology. The options provide different quality of space with associated occupancy profiles. This section explores the scenario of future refurbishments to outline the potential impact on embodied carbon associated with the different development options.

While there is limited published research on the refurbishment cycle impacts of new-build vs retrofitted space, market research from letting agents on comparable schemes provides useful insight. Analysis shows a comprehensive refurbishment of compromised offices will be let on shorter term leases for lower rents to less financially stable tenants. These will date more quickly and see greater tenant turnover than the new- build equivalent and typically need to be upgraded more regularly than new-build stock. As an example, The Met Building, with roughly the same characteristics (although considered materially superior) was originally comprehensively refurbished in 2005 and again in 2022. Some further examples are provided below:

- 72 Welbeck Street – 1976 Built – 2003 refurb – 2021/2022 comprehensive refurb
- Dashwood House – 1978 Built – 2006 refurb – 2021 comprehensive refurb
- 50 George Street -1800s built – 1998 refurb – 2011 refurb – 2022 comprehensive refurb
- Almack House – 1931 Built – 2009 comprehensive refurb – 2022 comprehensive refurb
- 25 Soho Square – 1956 built - 1997 comprehensive refurb (back to frame) – 2012 comprehensive refurb

By comparison, buildings constructed in later periods typically present a longer period in between substantial refurbishments. A few examples of buildings from the 1980s and 1990s are provided below:

- 100 Liverpool Street – 1980s built and comprehensive refurbishment completed in 2022
- 1 Triton Square – Built in 1990s and comprehensive refurbishment and extension completed in 2021
- Cargo, Canary Wharf – built in the 1990s and comprehensive refurbishment and extension completed in 2021

Therefore, a refurbishment scenario of every 15 years for Options 1-3 and every 30 years for Option 4-5 is reasonable to assume.

Using OneClickLCA, the life expectancy of applicable materials can be altered within the assessment to reflect the refurbishment cycles for the development option. In order to do this, any applicable materials to a speculative refurbishment that has a life expectancy
longer than the refurbishment scenario has been altered to reflect this. For development options 1-3, this has meant any applicable material with an assumed life cycle of over 15 years has been reduced to 15 years to reflect the replacement within the refurbishment cycle. For Options 4 and 5, this has been done for applicable materials with assumed life cycles higher than 30 years. For this exercise, the assumed materials as part of the refurbishments include the following scope:

- Internal Walls
- Façade
- Roof
- Windows and External Doors
- Internal Doors
- Internal Finishes
- External Areas
- Sanitaryware
- Services

Figure 7 displays the results of this study this, broken down in terms of per m2 GIA and the total figure.

The results show an increase in 8 kg CO2e/m2 GIA for development options 4 & 5, with a change 278, 313 and 279 for development options 1,2 and 3 respectively. These changes are when compared to the Whole Life Carbon figures for the RICS and GLA scope as displayed in the previous Whole Life Carbon section.

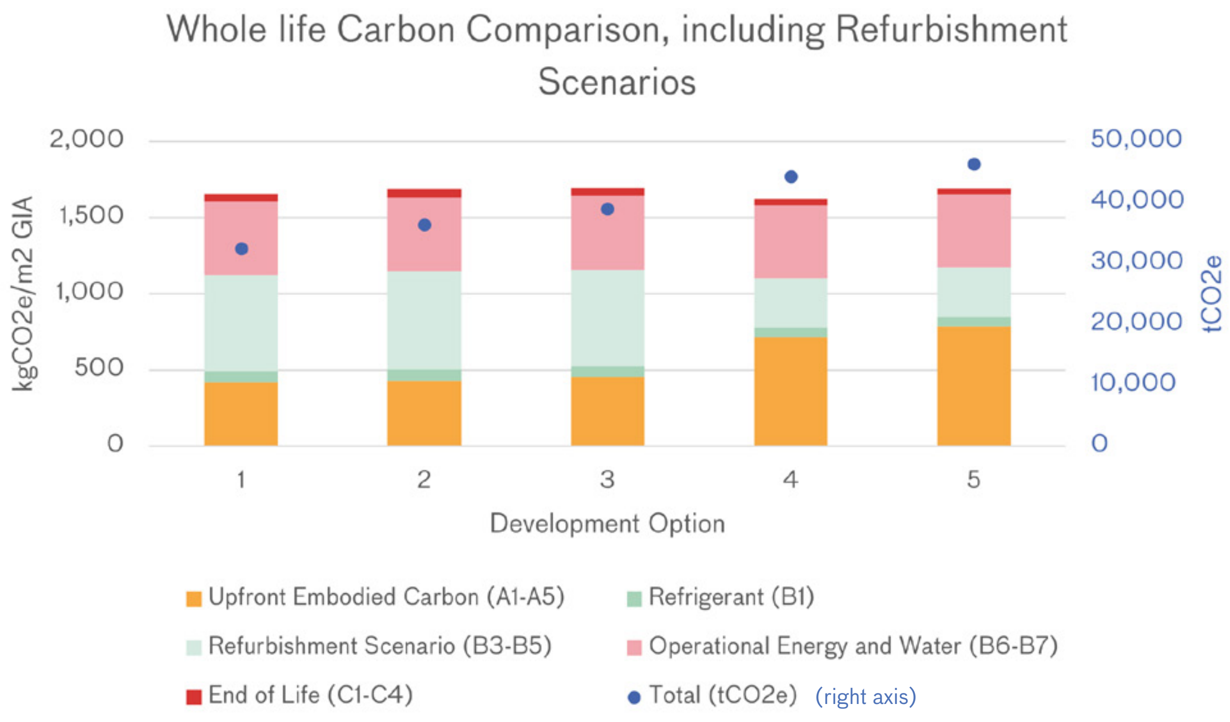


Figure 7 - Whole life Carbon, total, including refurbishment scenarios

5.10 Carbon Assessment

Additional Scenarios

2. Tenancy Scenarios
Cat B fit out is not included as part of the scope of Whole Life Carbon Assessments under the standard RICS Guidance. This section introduces the potential Cat B fit-out scenarios and associated carbon between the development options.

The Carbon Leadership Forum provides a medium benchmark of 90kgCO2e/m2 for tenant improvements as part of thee 'Estimates of Embodied Carbon for Mechanical, Electrical, Plumbing and Tenant Improvements' report (April, 2019). The scope for these Tenant Improvements includes the following:

- Finishes: Ceiling, flooring, painting, and interior glazing
- Furniture: Chairs, cubicles, tables, private offices, sofas, and shelving
- Fixtures: Cabinets, counters, doors, and partition walls (both fixed and operable)

Due to the constraints of the existing building set out in chapter 2, options 1-3 would result in a lower-quality office product. Market research from letting agents has provided insights into the potential attractiveness of lower-quality office buildings, which correlates with tenancy length. In all markets there is a place for a lower quality product, but that market segment is materially less attractive to a central London offices audience than ever before. As a generalisation, unless occupiers are seeking specific low-cost project space, site offices or are pre- seed tech businesses, they seek the highest quality space. Research suggests there is a finite and diminishing audience for low cost/low quality office space. There is a direct correlation between quality of space and tenant commitment, with poorer, compromised stock only being attractive to occupiers for 3-5 years, either for strategic reasons (such as ambitious growth plans) and/or the economic life of the building (actual or perceived).

Lease lengths have progressively reduced over the last 20 years. Most space-takes of scale will be for a term of 10 years, and up to 15. A floorplate of the typical size at Selkirk House, with the proposed specification and arrival sequence proposed in Options 1-3 is expected to attract a maximum 5 year lease term, most probably with 3 year breaks on the smaller mid-stack floors.

Therefore, we have calculated the potential carbon associated with a predicted tenancy of 5 years for options 1-3 compared to a predicted 10 years for options 4 and 5. Figure 14 compares the Cat B carbon impacts over 60 years. This shows that over 60 years, there is a total of 21,534 tCO2e for development options 1 and 23,659 and 25,206 tCO2e for options 2 and 3 respectively. Development Option 4 and 5 both produce. 14,997 tCO2e. When displayed in terms of per m2 GIA, this results in 1,080 kgCO2e/m2 GIA for options 1-3 and 540 kgCO2/m2 GIA for options 4 and 5.

If Cat B figures were to be included within the scope of the full study this would result in development option 1 having a total whole life carbon (Modules A-C) of 48,465 tCO2e, option 2 with 53,171 tCO2e, option 3 with 57,631 tCO2e, option 4 with 59,073 tCO2e and option 5 producing 61,073 tCO2e.

When expressed in terms of per m2 GIA, this results in 2,431, 2,427 and 2,469 kgCO2e/m2 GIA for development options 1, 2 and 3. Development option 4 produces 2,130 kgCO2e/m2 and option 5 with 2,202 kgCO2e/m2. This displays an increase of 14% kgCO2e/m2 GIA between option 1 and option 4.

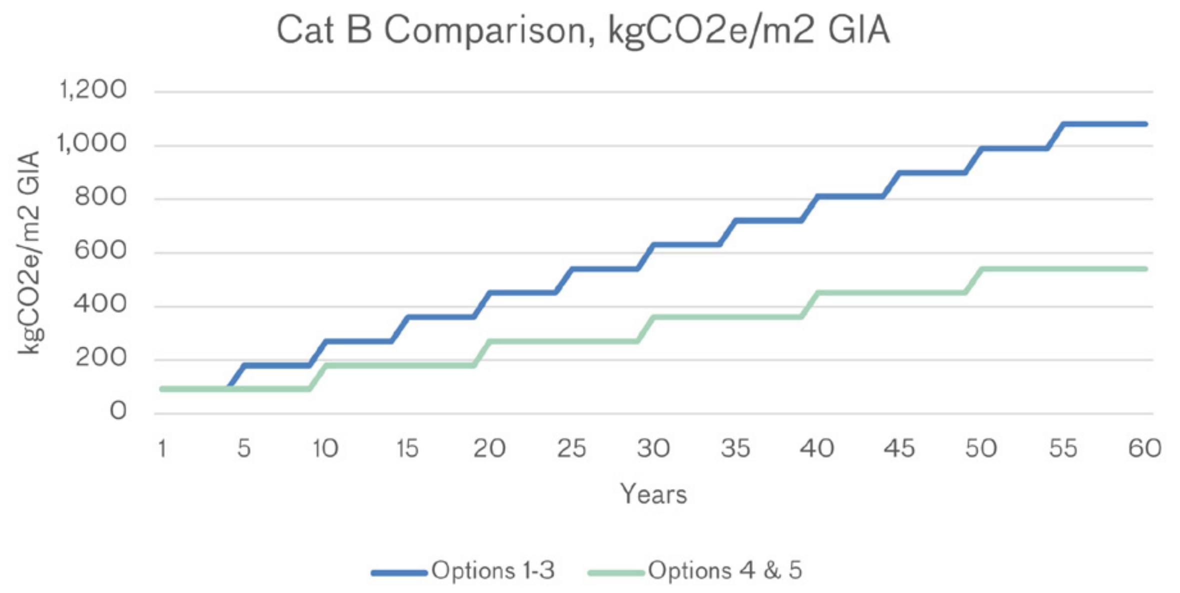


Figure 8- Figure 10- Cat B Comparison, kgCO2e/m2 GIA

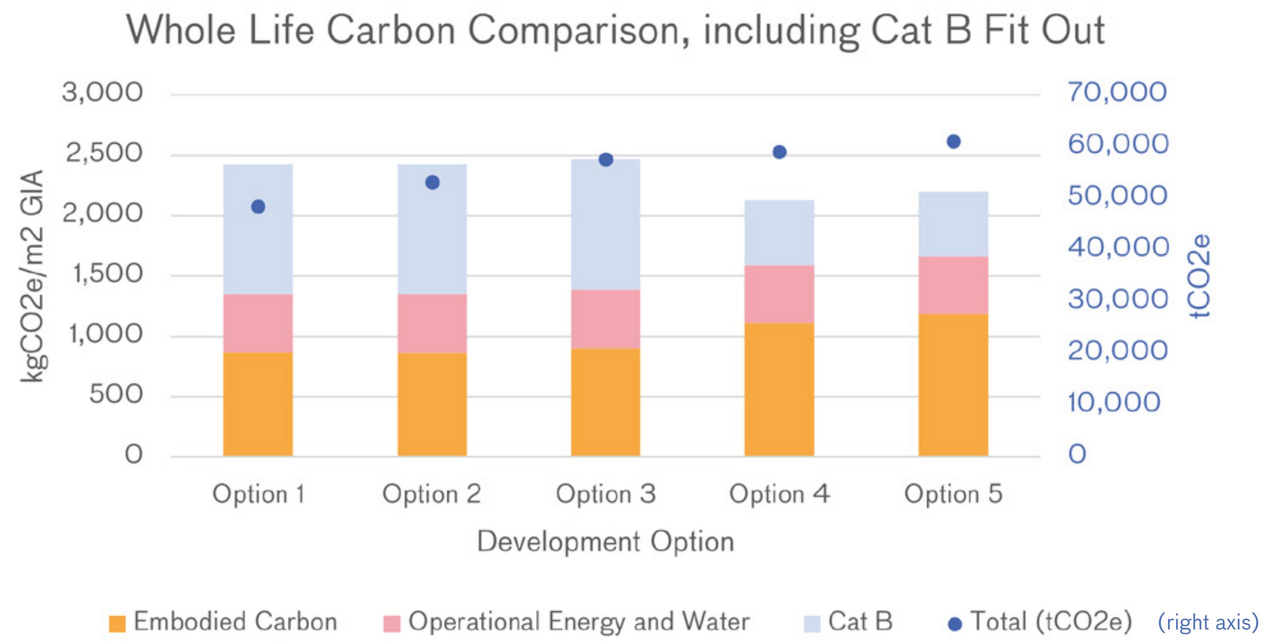


Figure 9- Whole Life Carbon Comparison, including Cat B Fit Out, kgCO2e/m2 GIA

5.0 Development Options Sustainability Assessment

5.10 Carbon Assessment

Estimated Carbon Emissions per Employee

The below table provides an analysis of the estimated kgCO2 emissions per employee accommodated within each of the options using the data and findings established earlier in this analysis. It should be noted that this isn't typically measured as standard within the construction industry and no standard methodology or benchmarks have yet been developed. Per capita measures are however widely used by governments, NGOs and companies, and this is the measure that any occupier will be primarily interested in.

The analysis shows that taken on a per employee basis, for upfront embodied carbon options 2 and 3 perform best. This is due to the increased occupational capacity provided by design interventions compared to option 1, and the lower total embodied carbon emissions due to the retention of much of the existing structure. However, the comparable figure for option 4 is only 24% higher.

Options 4 and 5 perform best on operational energy with 27% less kgCO2 per annum per employee when compared with option 2.

On a WLC basis, including both embodied and operational over the 60 years, option 4 is 3% better than the worst option 2. This is before additional scenarios as set out above are taken into account.

	Option 1 **Maximum retention and retrofit (no extension)**	**Option 2** **Maximum retention and extension**	**Option 3** **Partial Retention and extension**	**Option 4** **Basement retention and new build (planning submission)**	**Option 5** **New Basement and new build**	**Methodology notes**
Estimated development option employment capacity	592	925	1,037	1,571	1,571	
Upfront Embodied Carbon (Module A) (tCO2e)	8,370	9,438	10,630	19,863	21,863	
Annualised upfront embodied carbon (kgCO2e per employee)	236	170	171	211	232	Total upfront carbon divided by 60 (years) divided by estimated employment capacity (tonnes converted to KG)
Operational Energy and Water (Modules B6 & B7) (tCO2e)	9,676	10,633	11,329	13,260	13,260	
Annual operational carbon (kgCO2e per employee)	272	192	182	141	141	Total operational carbon divided by 60 (years) divided by estimated employment capacity (tonnes converted to KG).
Total annualised kgCO2 per employee	501	356	348	350	371	

5.0 Development Options Sustainability Assessment

5.10 Carbon Assessment

5.10.4 Conclusion

In conclusion, this chapter aims to give robust quantifiable data to compare the carbon impact of options 1-3 when compared to the new build scheme options 4 and 5. The report has followed RICS Guidance with some additional factors considered and analysed, and has been undertaken collaboratively with the design team.

Comparison of Options

The results in section 5.10.3 display the comparisons between the options in relation to the Upfront Embodied Carbon, Embodied Carbon, Operational Carbon and Whole Life Carbon. These results show that development options 1, 2 and 3, create less carbon than development options 4 and 5 in terms of Upfront Embodied Carbon and create less with regards to overall Embodied Carbon.

When looking at the Whole Life Carbon using the RICS methodology, development option 2 creates the least carbon per m2 GIA with 1,347kgCO2e/m2, and development option 5 creating the most carbon with 1,662 kgCO2e/m2 GIA. The difference between the lowest and the highest carbon options (by GIA) then is 23%.

Option 2, the best performing feasible option, produces 15% less kgCO2e/m2 over its lifetime than option 4 (the planning application scheme). In total WLC terms over a 60 year lifespan this equates to the carbon displaced in around 2.5 weeks by Whitelee Windfarm in Eaglesham Moor[1].

As expected the WLC carbon emissions for the retention options (1-3) are lower than the new build options (4 and 5). However when incorporating the additional factors the results indicate that redevelopment options perform better. For example the additional impacts of Cat B fit-outs result in options 1-3 generating higher carbon emissions per m2 over 60 years than the planning application scheme (option 4).

[1] Whitelee Windfarm holds 215 turbines (source: https://www.whiteleewindfarm.co.uk/). With 2-3MW capacity these turbines produce an estimated 6 million kwh electricity per annum, equivalent to about 1,398tCO2e carbon displaced per turbine.

Performance vs Industry Benchmarks

This report has also highlighted the performance of the options when compared to industry accepted benchmarks. It should be noted that the benchmarks are for new build office schemes, as there are no currently benchmarks available for refurbishment projects due to the complexities in the different scopes.

When comparing the Upfront Embodied Carbon (Module A) compared to the relevant benchmarks, all development options perform better than the LETI 'business as usual' and GLA benchmark. Development options 1-4 all perform well within the Benchmark/Business as Usual targets set out by the GLA and RIBA. Development option 4 is close to the GLA Aspirational and RIBA 2025 targets of 970 kgCO2e/m2, with development options 1-3 creating less carbon than the benchmarks.