Whole Life Carbon Addendum

This addendum has been prepared by Scotch Partners LLP in response to the following reviews of the Whole Life Carbon Assessment produced for the proposed development of Selkirk House, 166 High Holborn and 1 Museum Street, 10-12 Museum Street, 35-41 New Oxford Street and 16A-18 West Central Street, London, WC1A 1JR.

1. Hilson Moran Independent Third Party Review (On behalf of the London Borough of Camden)- 24th August 2023
2. Greater London Authority Review- 8th August 2023

In addition to the above two documents, this addendum is to be read in conjunction with the following documents:

1. Whole Life Carbon Assessment Report (r06c)
2. 1 Museum Street WLCA GLA Template (v6a)
3. High Holborn WLCA GLA Template (v5a)
4. West Central WLCA Street GLA Template (v5a)
5. Vine Lane GLA WLCA Template (v5a)
6. Site Wide GLA WLCA Template (V2a)
7. Hilson Moran Independent Third Party Review – applicant responses (v1)
8. GLA Memo Responses (v1)

1.1 Clarifications

This section outlines any clarifications required from the respective reviews.

1.1.1 Hilson Moran Third Party Review

This section outlines all clarifications following the independent review by Hilson Moran on behalf of the London Borough of Camden. Each clarification is referenced against the relevant ID code from the Hilson Moran report and should be read in conjunction.

ID	Clarification
NC1	The total GIA for the purpose of accurately assessing WLC per m2 is 30,989sqm. The two GIA figures address two methodologies of calculating GIA for planning and technical studies respectively. The 28,309sqm GIA represents the planning reportable GIA. This excludes significant elements of built area as required by LBC policy. The 30,989sqm GIA represents the total built area measured in accordance with IPMS with certain exclusions. The additional GIA in this calculation is largely accounted for by the plant and BOH in 1MS. A note on the methodology and scope of the two measurements can be found in appendix 1.

NC2	The pre-construction demolition and major demolition under building element 0.2 has been included for, however the facilitating works under building categories 0.3-0.5 are not included in the report due to lack of information and lack of industry accepted benchmarks to estimate at this stage, as agreed with HM. Note: WLC coverage is over 96% of the cost plan as per RICS guidance as these items are minimal.
NC3	Material lifespans and future replacements (B4) have been reviewed and updated within the spreadsheets to address the error.
NC4	Error in report displaying substructure for 1MS at 50% GGBS in table 26, item 10. Clarification that this should display 70%. Error in calculations in the 1 Museum Street spreadsheet to display a saving of 138kgCO2e/m2GIA for 70% GGBS in substructure compared to 20% GGBS in concrete. This has been corrected within the spreadsheet to display the correct figure of 36kgCO2e/m2GIA
RFI1	Clarification- Action for 60 year life cycle of internal partitions in table 26 (item 9) to be disregarded as an action and has been removed from the relevant spreadsheet.
RFI2	External works have been included in updated results as per section 1.1.2 of this addendum. Site Wide GLA spreadsheet has been updated to include summarised material quantities as per comment.
RFI3	Clarification- Approach to data selection- The methodology for selecting the appropriate data within one click follows the hierarchy below. OneClickLCA categorises its data depending on the locality, and if the data is manufacturer specific, or generic. Where possible, data selection has been approached with the following hierarchy. However, in some instances, data further down the hierarchy has been chosen where a more appropriate material type or associated carbon coefficient is found; 1. Where currently specified, manufacturer specific EPDs have been chosen, be this regional or local. 2. Local manufacturer specific data (where manufacturer is known) 3. Local Generic data 4. Regional Generic data 5. Worldwide Generic Data Structural materials- Structural materials have been selected using the structural information provided by the project engineer using the OneClickLCA templates to select the correct specifications and match carbon coefficients. Building services- MEP systems have been inputted using OneClickLCA templates using MEP schedules and input from the MEP team. Where possible, manufacturer specific EPD's were chosen to match MEP specifications, or closest match was chosen. In some instances, where specification are not present, in built OneClick benchmark spreadsheets based on the GIA of the building type

	have been used. For example, ductwork has been based upon a OneClickLCA template for the appropriate building type and GIA. Fittings, furnishings and equipment- FFE that has been included in the cost plan has been inputted in line with Shell & Core for the office and the fit out level of residential. OneClickLCA data has been used throughout.
RF14	QS Confirmation of cost coverage below RE: 1MS Cost Plan & WLC NF Nick Forester <N.Forester@Gardiner.com> To Seb Dimarco Cc Eleanor Wright; John McEvoy; Charles Thomas-Davies; Leandra Fages You forwarded this message on 29/06/2023 09:39. Museum Street Viability cost v2.xlsx 12 KB Seb, Based on your updated marked up cost plan, the items excluded (red) equate to 96.87% coverage of the cost plan. The items highlighted yellow you have clarified are included in your carbon assessment under an umbrella allowance calculation Regards, **Nick Forester** **GARDINER & THEOBALD LLP** m: 00447990001067 teams landline: 00442072093301
RF15	Clarification- Confirmation that a 60 year study period used, as per RICS and GLA Guidance.
RF15	Clarification- Carbon savings relating from the retention of the basement for 1 Museum Street to be included as an action for reducing carbon. This has resulted in a saving of 77kgCO2e/m2GIA.
R1	Please see below the carbon intensities of 5 key materials (expressed for Modules A1-A3): 1) Structural steel, 60% recycled content – 2.12kgCO2e/kg 3) Aluminium Frame Curtain Wall (50-75% Glazed)- 150kgCO2e/m2 3) Ready-Mix concrete, 32/40 MPa, 70% GGBS- 0.0634kgCO2e/kg (substructure only) 4) Ready-Mix concrete, C40/50, 50% GGBS- 231.29 kgCO2e/m3

	5) Rebar, 97% recycled content- 0.62kgCO2e/kg

1.1.2 GLA WLC Memo

This section outlines the clarifications following the GLA's review of the WLCAs and WLCA Report, provided in a memo dated 8th August 2023. Each clarification is referenced against the relevant ID code from the GLA Memo and should be read in conjunction.

Comment	Building	Clarification
N/A	West Central Street	All buildings have separate WLC templates as per previous comments for previous submission. The West Central Street element incorporates a blend of retention and refurbishment and new build. One Museum St (1MS), High Holborn (HH) and Vine Lane (VL) are all new build with retained basement; these three buildings site on the site of Selkirk House.
1	High Holborn	High Holborn GIA is 493m2 as per template and report
7	All	Marked up cost plan confirming elements included and excluded in the assessment provided to QS, who calculated and confirmed the 95% had been met for all building elements. See confirmation below from QS. RE: 1MS Cost Plan & WLC NF Nick Forester <N.Forester@Gardiner.com> To Seb Dimarco Cc Eleanor Wright; John McEvoy; Charles Thomas-Davies; Leandra Fages You forwarded this message on 29/06/2023 09:39. Museum Street Viability cost v2.xlsx 12 KB Seb, Based on your updated marked up cost plan, the items excluded (red) equate to 96.87% coverage of the cost plan. The items highlighted yellow you have clarified are included in your carbon assessment under an umbrella allowance calculation. Regards, **Nick Forester** GARDINER & THEOBALD LLP m: 00447990001067 teams landline: 00442072093301
11	Museum Street	Guidance has been followed with reporting, and the 1MS building results only relate to the GIA of the 1MS block as per the guidance. This has been followed for each building, and a summarised template with the combined GIA and carbon has been included to be as transparent as possible. Regarding the % of GGBS specified, the WLCA inputs are based upon specifications set out by the design team as per common practice and RICS guidance. The impact of reducing the level of GGBS used in the substructure from 70% to be in line with RICS guidance of 20% would result in an increase of

		36kgCO2e/m2GIA; thus representing an uplift however the development would remain within the benchmarks. See table in section 1.4 for more information. With regards to procurement of GGBS the applicant is confident that these materials can be procured in the quantities required. The applicant is using GGBS on other schemes (including Edge London Bridge) and have not encountered challenges to procurement. Our structural engineers HTS have confirmed (on 12.09.23) that in their experience "GGBS can be procured so we do not envisage that it will be a problem for this development". The applicant is also committed to exploring alternative low carbon concrete solutions. Further actions to reduce carbon, such as lean design have been incorporated into design at this stage. This work will continue through design development with facades as a particular target for further lean design, as identified in the WLCAs. 1 Museum Street results are within the GLA standard benchmarks, and we would expect the results to reduce further with the appropriate decarbonisation scenario for Modules B-C, as well as design development.
11	High Holborn	Guidance has been followed with reporting, and the High Holborn building results only relate to the GIA of High Holborn as per the guidance. This has been followed for each building, and a summarised template with the combined GIA and carbon has been included to be as transparent as possible. With regards to procurement of GGBS the applicant is confident that these materials can be procured in the quantities required. The applicant is using GGBS on other schemes (including Edge London Bridge) and have not encountered challenges to procurement. Our structural engineers HTS have confirmed (on 12.09.23) that in their experience "GGBS can be procured so we do not envisage that it will be a problem for this development". The applicant is also committed to exploring alternative low carbon concrete solutions. Regarding the % of GGBS specified, the WLCA inputs are based upon specifications set out by the design team as per common practice and RICS guidance. The impact of reducing the level of GGBS used in the substructure from 70% to be in line with RICS guidance of 20% would result in an increase of 19kgCO2e/m2 GIA. In the superstructure GGBS of 20% would result in an uplift of 21kgCO2e/m2 GIA thus representing an uplift however High Holborn would still be within the benchmarks for Module A and the site-wide development would remain within the benchmarks. See table in section 1.4 for more information. As noted, High Holborn performs outside the Module B-C WLC benchmark. This is largely due to high replacement of services products in line with RICS assumptions. This will be improved at the next work stage with MEP products prioritised for specification that have lower embodied carbon impact and higher life cycle where possible. It should be noted that module B3 has been based off the OneClickLCA outputs, and is performing much higher than the design stage benchmark suggested by the GLA guidance (34kgCO2e/m2GIA compared to

		1.75kgCO2e/m2GIA if GLA figures were used). Module A performs inside the benchmarks, but does not achieve the aspirational benchmarks largely due to the concrete substructure and frame, with elements of steel profiles. Please also note, due the decarbonisation of the grid, we would expect the B-C module to reduce. GLA Guidance is currently to not implement this within the assessment unless agreed with the GLA, which as a result has not been presented as part of the results.
11	West Central Street	Guidance has been followed with reporting, and the West Central Street building results only relate to the GIA of West Central Street as per the guidance. This has been followed for each building, and a summarised template with the combined GIA and carbon has been included to be as transparent as possible. Regarding the % of GGBS specified, the WLCA inputs are based upon specifications set out by the design team as per common practice and RICS guidance. The impact of reducing the level of GGBS used in the substructure from 70% to be in line with RICS guidance of 20% would result in an increase of 30kgCO2e/m2 GIA. In the superstructure GGBS of 20% would result in an uplift of 22kgCO2e/m2 GIA thus representing an uplift however Module A would remain within the benchmarks and the site wide development would remain within the benchmarks. See table in section 1.4 for more information. With regards to procurement of GGBS the applicant is confident that these materials can be procured in the quantities required. The applicant is using GGBS on other schemes (including Edge London Bridge) and have not encountered challenges to procurement. Our structural engineers HTS have confirmed (on 12.09.23) that in their experience "GGBS can be procured so we do not envisage that it will be a problem for this development". The applicant is also committed to exploring alternative low carbon concrete solutions. As noted, Module B-C perform outside the WLC benchmark. This is largely due to high replacement in Module B3 for services. The design team will work to reduce this to specify products with lower embodied carbon and longer life cycles during the next work stage. Module A performs within the benchmarks, however does not achieve the aspirational benchmarks largely due to the concrete substructure and frame, with elements of steel profiles. Please also note, due the decarbonisation of the grid, we would expect the B-C module to reduce. GLA Guidance is currently to not implement this within the assessment unless agreed with the GLA, which as a result has not been presented as part of the results.
11	Vine Lane	The results for Vine Lane are just outside the WLC benchmark guidance. This is largely due to amounts of concrete required for the substructure and high values for construction site impacts (accounting for 154kgCO2e/m2 for A5). Further actions to reduce carbon, such as lean design have been incorporated into design at this stage. This work will continue through design development with facades as a particular target for further lean design, as identified in the WLCAs.

		Further, reduced figures for construction site impacts are now available as part of the draft RICS PS Guidance (2nd Edition) which would bring the A module within the benchmarks if applied. Module B-C is also outside the benchmarks, resulting in A-C being outside. This will be reduced through design and material specification in the next work stage. It should be noted that Module B3 is much higher due to using the OneClickLCA output rather than the benchmarks suggested by the GLA guidance, which would result in a reduction of 21kgC20e/m2GIA and would result in Module B-C being within the benchmarks. Regarding the % of GGBS specified, the WLCA inputs are based upon specifications set out by the design team as per common practice and RICS guidance. The impact of reducing the level of GGBS used in the substructure from 70% to be in line with RICS guidance of 20% would result in an increase of 59kgCO2e/m2 GIA. In the superstructure GGBS of 20% would result in an uplift of 5kgCO2e/m2 GIA thus representing an uplift however the site wide development would remain within the benchmarks. See table in section 1.4 for more information. With regards to procurement of GGBS the applicant is confident that these materials can be procured in the quantities required. The applicant is using GGBS on other schemes (including Edge London Bridge) and have not encountered challenges to procurement. Our structural engineers HTS have confirmed (on 12.09.23) that in their experience "GGBS can be procured so we do not envisage that it will be a problem for this development". The applicant is also committed to exploring alternative low carbon concrete solutions. Please also note, due the decarbonisation of the grid, we would expect the B-C module to reduce. GLA Guidance is currently to not implement this within the assessment unless agreed with the GLA, which as a result has not been presented as part of the results.
12	Museum Street	An extensive review of the existing buildings, planning policy and alternative development options has been carried out for Selkirk House – which covers the site of the proposed Vine Lane and High Holborn buildings, in order to establish the design response. This is captured in the *Retention and Redevelopment Options and Whole Life Carbon Comparison report* which incorporates the scope of the pre-redevelopment audit. This concludes that the level of demolition is justified in order to achieve the aspirations for the site and wider sustainability aspirations. See also *Clarifications and Responses on Demolition Justification including Pre-redevelopment Audit and Retention options appraisal (September 2023).* Drawings identifying the extent of demolition for the planning scheme can be found on page 27 of the aforementioned retention options report and further detail has been provided in *Clarifications and Responses on Demolition Justification including Pre-redevelopment Audit and Retention options appraisal (September 2023).*

		All service life assumptions and replacement timelines for fit out have been outlined in the report and are in line with RICS PS Guidelines, any deviations for options have been outlined in the clarifications of the main report. It is clarified within the report for the resubmitted application that the differing assumptions applied to options 1-3 and 4-5 regarding replacement timelines for fit outs is based on a limited data set and therefore that while this assessment is deemed valid, it is included as an additional consideration only. All Building elements included from RICS PS Guidance have been included.
12	All	A pre-demolition audit for West Central Street and Selkirk House (the site of Vine Lane, High Holborn and One Museum Street) has been undertaken. An updated pre-demolition audit has been provided in parallel to this addendum. The DAS section 7.0 addresses pre-redevelopment audit objectives for 16a-18 West Central St with detail the existing building condition, implications of retention and options explored. This was the subject to pre-app during the design period. Massing drawings can be found on p.319 of the DAS. Further detail has been provided in *Clarifications and Responses on Demolition Justification including Pre-redevelopment Audit and Retention options appraisal (September 2023).* All other buildings on site - 10-12 Museum Street and 35-41 New Oxford Street are to be retained and refurbished to provide affordable and market homes (scheme provides 19 affordable homes in West Central Street).
14	Vine Lane, High Holborn, West Central Street	Drawings identifying the extent of demolition for Selkirk House (the site of the proposed Vine Lane, High Holborn and One Museum Street Buildings) for the planning scheme (option 4) can be found on page 27 of the *Retention and Redevelopment Options Appraisal* report. Massing drawings for the proposed extent of demolition for WCS can be found on p.319 of the DAS. Further detail has been provided in *Clarifications and Responses on Demolition Justification including Pre-redevelopment Audit and Retention options appraisal (September 2023).*
15	All	See response to question 11. Further actions to reduce carbon, such as lean design have been incorporated into design at this stage. This work will continue through design development with facades as a particular target for further lean design, as identified in the WLCAs.
16	All	Current calculations are based on assumptions and typical current benchmarks due to the early stage of design. A 20% reduction in refrigerant charge is targeted and considered to be feasible through specification of systems with lower refrigerant charges. Current calculations have been based on conservative estimates in the absence of detailed information
18	All	Material quantity and end of life scenarios table has been completed in full, with site wide completed.

19	Museum Street	• External works have been included in 1 Museum Street WLCA. • Concrete and rebar specifications confirmed in accompanying WLCA report and are in line with structural engineers specifications • Green roofs have been included in design and in assessment where present • Bike racks have been moved to FFE • Fire doors included • Renewable technology currently not part of design, to be reviewed at next work stage
19	High Holborn	• External works not present in High Holborn • Concrete and rebar specifications confirmed in accompanying WLCA report and are in line with structural engineer's specifications • Roof structure and insulation has been included in full • Mech ventilation systems included the MVHR units and everything associated such as ductwork • Renewable technology currently not part of design, to be reviewed at next work stage • Lifts are not included in design and are therefore not included in the WLCA
19	Vine Lane	• External works included in update • Concrete and rebar specifications confirmed in accompanying WLCA report and are in line with structural engineers specifications • Balconies have been included in the design and prefabricated steel balconies have been included as part of the WLCA • Floor finishes have been included as included in cost plan (Vinyl flooring) • Renewable technology currently not part of design, to be reviewed at next work stage
19	West Central Street	• External works included in update • Concrete and rebar specifications confirmed in accompanying WLCA report and are in line with structural engineers specifications • Hardwood floor is wrongly attributed, and should be attributed to the balconies for the deck. • MVHR systems and ductwork has been included for • Renewable technology currently not part of design, to be reviewed at next work stage
20	All	All service lives have been reviewed as part of update. These have been set to a default RICS PS within the tool and have reviewed by the third party review and corrected.
21	All	Site wide end of life scenarios aligns with the Circular Economy Statement

22	All	Cement/mortar changed in WLCA spreadsheets as per comments
23	1 Museum Street	End of life and leakage rate has been updated in line with CIBSE TM65 Guideline. Specification has been discussed with team and R410a has been removed from 1MS and changed to R32 as per suggestions.
23	High Holborn, Vine Lane, West Central Street	End of life has been updated in line with CIBSE TM65 Guidelines for heat pump systems.
w24	Museum Street	• Sequestration is from raised flooring panels • B2 estimate included as per GLA/RICS guidance and as per comments • Operational water has been calculated by a PHE.
24	High Holborn	• Sequestered carbon in substructure has been attributed in the tool asphalt binding layer in the foundations. • B2 estimate included as per GLA/RICS guidance and as per comments
24	Vine Lane, West Central Street	• B2 estimate included as per GLA/RICS guidance and as per comments

1.2 Changes to Whole Life Carbon Assessment since submission

This section outlines any changes that have taken place to the assessment that have resulted in changes to the results. Some of these changes are due to comments made in the respective reviews, others are due to design development. This has been clarified below.

Change since submission document	Reason for change
Where R410a refrigerant was specified, this has been changed to R32	Comments from GLA review to discuss with team. Design team are now confident this can be achieved.
Refrigerant leakage rate and end of life wastage changed to align with CIBSE TM65 Guidelines	In line with GLA comments and best practice
Construction site impacts scenario	Changed to align to latest RICS PS figures as per guidance. Please note, forthcoming RICS PS WLCA 2nd Edition will see reduced figures of 30kgCO2e/m2GIA attributed to this and will lead to reduced Module A figures across the development when this has been adopted (consultation has passed and awaiting release of final version).
External works added to Vine Lane and West Central Street	These had been incorrectly attributed previously and have now been included as per comments. Please note, High Holborn does not currently have any external works associated with the development.

1.3 Updated WLCA results

The WLCAs have been updated to reflect the above comments and clarifications. This has resulted in a change in the WLC for the buildings and site wide, as seen below.

1.3.1 1 Museum Street Results

	Module A	Module B-C exc B6 & B7	Modules A-C exc B6 & B7
1 Museum Street	734.581	436.720	1141.902
Min benchmark	<950	<450	<1400
Aspirational Benchmark	<600	<370	<970

1.3.2 High Holborn Results

	Module A	Module B-C exc B6 & B7	Modules A-C exc B6 & B7
High Holborn	792.763	426.426	1203.424
Min benchmark	<850	<350	<1200
Aspirational Benchmark	<500	<300	<800

1.3.3 Vine Lane Results

	Module A	Module B-C exc B6 & B7	Modules A-C exc B6 & B7
Vine Lane	881.555	365.374	1235.744
Min benchmark	<850	<350	<1200
Aspirational Benchmark	<500	<300	<800

1.3.4 West Central Steet Results

	Module A	Module B-C exc B6 & B7	Modules A-C exc B6 & B7
West Central Street	587.421	376.654	930.365
Min benchmark	<850	<350	<1200
Aspirational Benchmark	<500	<300	<800

1.3.5 Site Wide Results

	Module A	Module B-C exc B6 & B7	Modules A-C exc B6 & B7
Site Wide	732.220	413.275	1117.301
Min benchmark	<950	<450	<1400
Aspirational Benchmark	<600	<370	<970

1.4 Further clarifications:

- Further to a verbal comment raised by LBC sustainability team regarding the impact on the WLC should it not be possible to procure the specified % of GGBS for the superstructure and substructure – this would have the impact of increasing the WLC emissions by 39.95kgCO2e/m2GIA site wide (total of 1,237,776kgCO2e). This difference incorporates 20% GGBS over the substructure and superstructure across the site. This would result in the site remaining within the minimum benchmarks with a figure of 772 kgCO2e/m2 GIA for Module A.
- In anticipation of the upcoming updated RICS PS WLCA 2nd Edition Guidance, resulting in a reduced benchmark figure for construction site impacts for Module A5 (30kgCO2e/m2GIA), this would lead to the following results for Module A across the site;

	1MS	High Holborn	Vine Lane	West Central Street	Site Wide
Module A	700	715	790	587	688
Benchmark	950	850	850	850	950

- We would also note that this assessment has not taken into account the future decarbonisation scenario for the grid. This would lead to reduced B-C modules throughout the development and we would expect to take all buildings within the benchmarks.

Appendix 1:

Clarification response to Hilson Moran Third Party comment NC1 re scheme Gross Internal Area (GIA)

The total development's Gross Internal Area (GIA) used to determine the WLC emissions (kgCO2e/m2 GIA) is 30,980 m2. This does not match the total value of 28,309 m2 given in the project's Design and Access Statement. The applicant shall provide clarifications / resolve the discrepancy.

Clarification- GIA Calculation Methodology for Planning Policy Purposes

In accordance with Camden planning guidance Gross Internal Areas (GIA) for the purposes of policy assessment have been measured in accordance with IPMS (International Property Measurement Standards) with the below key exceptions. All GIAs within the planning statement/DAS have been measured and reported in line with this as the industry standard to include all internal areas with the following exceptions:

- Any area between a Notional Boundary and the external perimeter of External Walls;
- Sheltered Areas;
- External Floor Areas including covered terraces, external circulation and amenity roof terraces
- Plant spaces, loading bays and typically uninhabited BOH
- Enclosed walkways or passages connecting separate Buildings;
- Enclosed rooftop plant such as mechanical, electrical and lift motor rooms;
- External stairs that lead to upper levels, excluding open framework fire escapes, which are excluded; and
- Limited use area(s) not otherwise identified above.

GIA Calculation Methodology for Technical Purposes

In a number of the supporting technical reports it is necessary to calculate the GIA without the exceptions listed above and in accordance with RICS IMPS (International Property Measurement Standards), with the additional exclusion of shared outdoor amenity spaces or shared amenity roof terraces.