MBP Michael Barclay Partnership
consulting engineers
1 Lancaster Place WC2E 7ED
T 020 7240 1191
E london@mbp-uk.com
www.mbp-uk.com

ROOF EXTENSION OF
BLOCK A - SEARLE HOUSE NW8 7EB AND BLOCK B - BENJAMIN HOUSE NW8 7EF,
CECIL GROVE
LONDON

Structural Engineer's Feasibility Report, Structural Alterations and Extensions

August 2022

Status	Revision	Issued For	Date	Author
Preliminary	Issue 1	Issued for Comment	02.08.2022	AZ
Preliminary	Issue 2	Issued for Comment	14.09.2022	AZ

CONTENTS

1.0 INTRODUCTION

This report presents Michael Barclay Partnership LLP's proposals, as Structural Engineer, for the extension of the top floor of Block A – Searle House and Block B – Benjamin House, Cecil Grove, London as well as:

- records the design criteria and performance parameters to which the new structure will be designed;
- reports on investigations and studies that have been carried-out;
- details our proposals and specification for the structural works;
- forms the Structural Statement, required by the London Borough of Camden at planning stage.

1.1 THE BRIEF

Our proposal is based on the planning drawings prepared by the HUB Architects, dated August 2022, the Client's brief, and design discussions with the project team. It is proposed to create a roof extension on top of the Block A and Block B on Cecil Grove, London, with 6 separate apartments, 2 on top of the Block A and 4 on top of the Block B, with access to each apartment by stairs and extended lift shaft.

2.0 THE SITE

2.1 LOCATION

Cecil Grove is part of the Royal Borough of Camden at the postcode NW8, the site comprises two blocks of flats situated on the east side of Avenue Road (B525), with access via St Edmund's Terrace. The property is 2 separate buildings, Block A with 5 storeys above the ground floor and Block B with 3 storeys above the ground floor, both with one storey underground carpark built in late 2012. The blocks are located 300m north from The Regent's Park with a Regents Canal running east to west, and Primrose Hill is about 350m east from the site. St John & St Elizabeth Hospital is located less than a mile to the west of the site. The closest underground station, St John's Wood, is located 800m to the east. Barrow Hill Reservoir is the closest open space located to the west of the site which was an underground storage for 21,600 m^3 of water, and it's empty now.

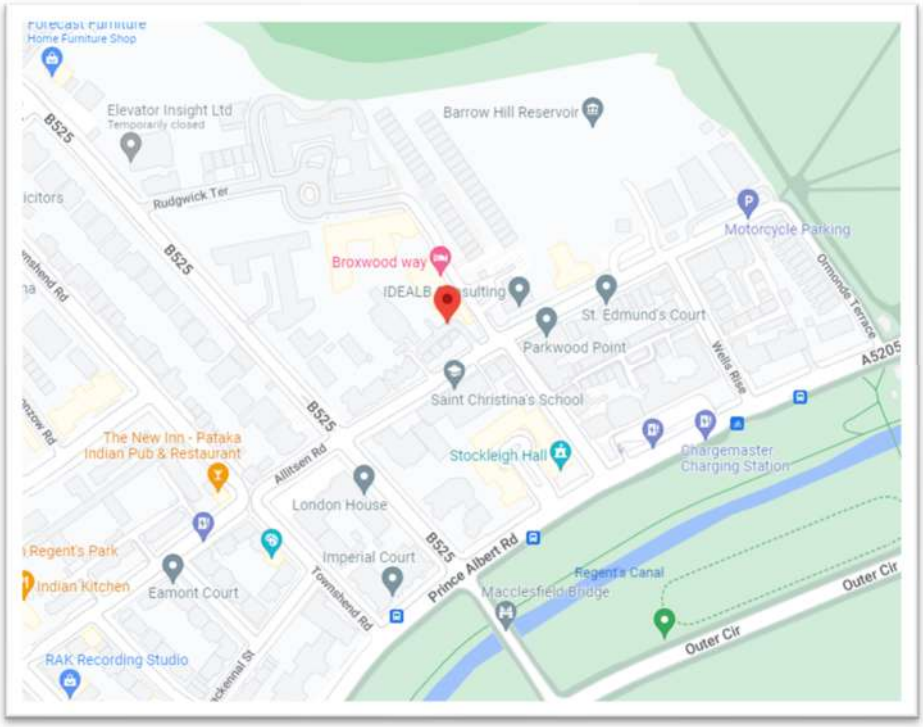

Figure 1: Site Location

2.2 SITE GEOLOGY

Although the proposed roof extension does not include any works to the foundations of the property, it should be confirmed there will be no more than 10% increase on the existing foundation loads of the apartment block. We have carried out a basic search on the geology of this area of London. The Geological Survey map of the area, Figure 2, indicates an area of London Clay Formation local to northern Regent's Park area. The top of the London Clay Formation is taken as the top of the Claygate Member, which is distinguished from the overlying Bagshot Formation by containing finer sand without crossbedding and in the relative abundance of clay and silt in the Claygate Member. Site Investigation will be carried out to confirm the existing ground condition, however there will be no change to the existing foundation.

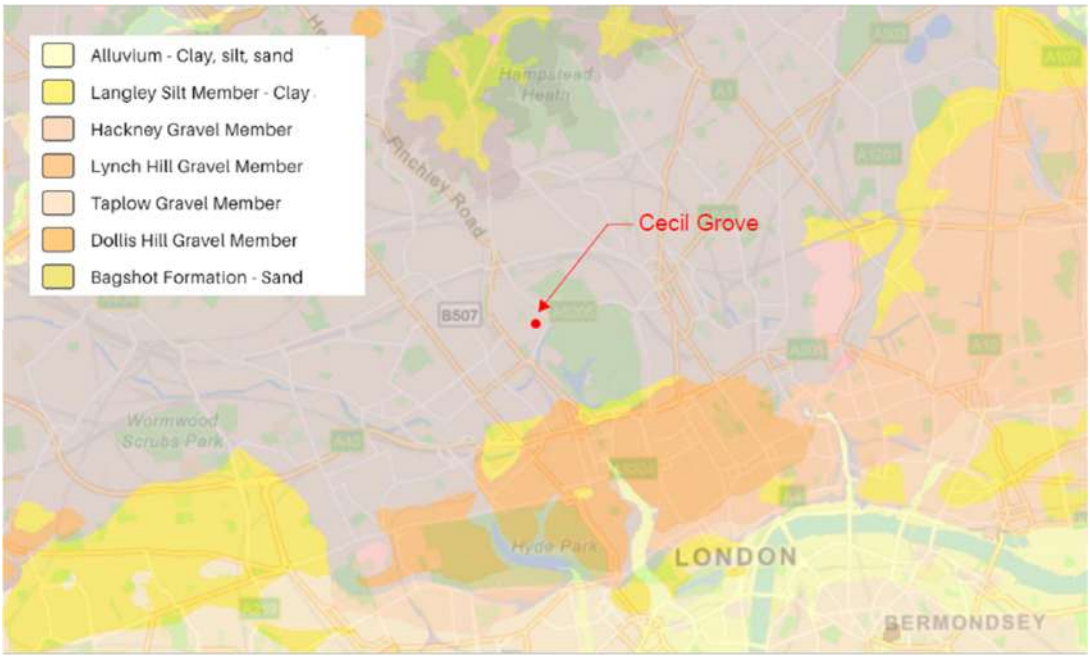

Figure 2: Extract from BGS maps

2.3 BOUNDARIES AND ADJOINING STRUCTURES

The apartment buildings, Block A and Block B sits separately on the site with the single story basement garage underneath. Blocks of flats are surrounded by different hight buildings from a single family terraced houses facing Avenue Road on the south – wester side with 4 storey residential houses built between Avenue Road and Broxwood Way on the north of the site and high residential 8 storeys block of flats on the eastern side of Broxwood Way. The closest buildings to the Block A and B is a row of 4 houses joint together to create terrace facing St. Edmond's Terrace on the south-eastern side of the plot. Although the buildings are different architecturally, they all are two storeys above the ground floor, not exceeding 8m above the ground.

Figure 3: Arial View *(Screenshot from Bing Map bird's eye view)*

3.0 OVERVIEW OF THE PROPOSED SCHEME

The proposed scheme for Block A - Searle House comprises single story extension on the part of the roof, with a two separate apartment wrapping around north/east/southern portion of the roof. The existing lift and common staircases will be extended to allow access to the new 6th floor.

A Single story roof extension on top of Block B – Benjamin House, comprises four separate apartments built over most of the roof's footprint. Both extensions to be constructed on top of the transfer deck built over the existing roof level and supported of the existing RC frame below. A new lightweight elevation will match the existing façade of the floor below. A green roof to be laid on top of both roof extensions. All lift shafts and staircases to be extended taking for consideration daylight envelope.

Figure 4: Area of proposed extension on Block A and Block B

3.1 EXTENSION CONSTRUCTION GENERALLY

The new extension perimeter walls, in most places to be set back from the face of perimeter upstand, and load would be transferred via steel deck down to the primary RC structure. In locations, where the new external wall line up with the wall below, the upstand will be reduced to desired hight. New green roof to match the existing will be supported on the steel frame structure with metsec SFS infill to create walls and floor. Existing PV panels will be replaced with new. Overall hight of the new extension will not exceed 4m.

As we are aiming to have a minimal impact on the existing structure below, the parameters considered in selecting a structural solution have included:
- ability to transfer all vertical loads from the new construction into the fabric of the existing building
- ability to transfer all horizontal loads from the new construction into the fabric of the existing building

The favoured method of constructing for the extension is to construct a transfer deck using hot-rolled steel beams fixed down to the existing RC frame structure and light-gauge steel (LGS) cold formed infill between. The walls and roof construction of the new extension will be predominately lightweight LGS metsec SFS framing (or similar approved) with hot rolled steel beams and columns to create robust frame. It is required for the new hot-rolled floor and wall structure to be braced to provide stability and resits lateral loads in temporary and permanent condition. Locations of the bracing to be discussed with Architect at the early stage of the design process.

Photo 1: Example of hot rolled frame structure with light weight metsec wall infill and floors.

Michael Barclay Partnership has considerable experience of the design and construction monitoring for roof extensions of the type suggested above. Recent projects have included the construction of a single level of penthouse accommodation on the top of similar blocks on the west side of Lowndes Square, Photo 2 and 5, and duplex penthouses on the east side of the same square. Both of these examples were carried out with neighbours in occupation below, the 5th floor having been vacated.

Photo 2: New penthouses above Lowndes Square

3.2 CO-ORDINATION OF EXTENSION AND EXISTING BUILDING

The lightweight roof extension will be supported on the new transfer deck structure, constructed of the steel beams positioned above the existing roof level. The transfer deck will be picked up on the existing load bearing RC frame and loads transfer down through the existing structure to the foundation level. There will be less than 10% of loading increase on the existing foundation however more detail calculation to be provided in the later stage of the design to confirm the estimated figure.

As a part of desk study, a large portion of the "as build" structural drawings produced by MLM Consulting in 2012, was reviewed to establish the details of the existing RC frame. As a first stage of the site investigation, an exploratory hole will be made to confirm the existing structure. A further site investigation by the structural engineer is required to confirm the condition and capacity of the existing structure. Any defects in the existing framing to be rectified before the new extension is installed. A study will be made of the existing original walls and flues before the main works commence, to ensure that there is no disruption to the service of the apartments below.

3.3 MANAGEMENT OF THE WORKS

Our experience suggests that a degree of prefabrication is often advantageous in these situations. By using prefabricated, light weight wall and floor system the amount of time to assembly the construction and to transport the elements from the street up to the roof level could be reduced. Using the large crane with special foundation may not be permitted due to the site constraints , therefore a temporary external goods lift, for lifting the building material up to the roof to be consider. Splicing the long members could be necessary.

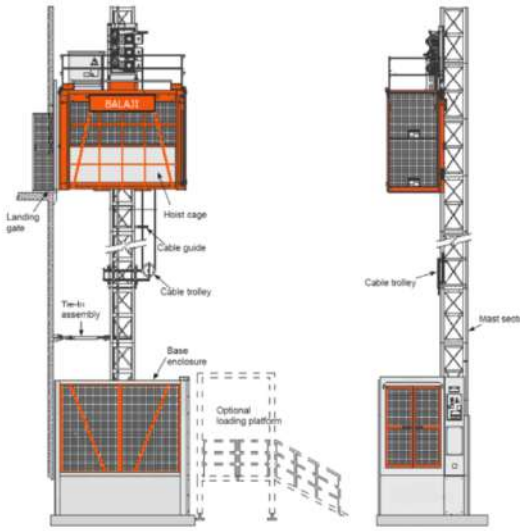

Photo 3 and 4: Example of external lift tower.

4.0 DESIGN AND PERFORMANCE PARAMETERS

4.1 OCCUPANCY LOADS

The new structure elements have been designed in accordance with current British Standards, Codes of Practice and Building Regulations. The general design imposed loads for the buildings are as follows:

Category	Use	Uniformly distributed load* (kN/m^2)	Concentrated load* (kN)
A	All usages within self-contained single Family dwelling	1.5	1.4

* defined by BS6399: PT 1

4.2 ENVIRONMENTAL LOADS

The buildings new walls and framing will be designed to support loads from the wind in combination with the occupancy loads scheduled above.

The wind net lateral load onto the structure was assumed as 1.0 kN/m^2 based on a worst case south-westerly wind direction.

4.3 PERMISSIBLE DEFLECTIONS

The design of new constructional steel elements will limit deflection and displacement in accordance to the following criteria:

Steel Elements	Limit – under full load
Simple Beams	Span / 360
Cantilever Beams	Span / 360

The above criteria must be read in conjunction with any performance specifications produced by MBP for individual works packages. Where brittle finishes are required, the allowable deformations will be reduced.

4.4 FIRE RATING

The new structure is to be designed and detailed to achieve the minimum period of fire resistance required by Approved Document B, Table A2. Fire proofing details, period and process will be provided by the approved Inspector/Architect. A separate draft Fire Safety Strategy was prepared by TRI Fire Consultants.

4.5 DISPROPORTIONATE COLLAPSE

The new extension shall be constructed so that in the event of an accident, the existing building below will not suffer any damage and the performance of the main apartment block will not be affected by the extension. In line with good practice the new transfer deck installed above the existing roof will be capable of supporting the collapse load of the new floor walls and roof.

4.6 SITE CONSTRAINTS

There is an access to a site from St Edmund's Terrace, with restricted parking on both sides of the road. There is a small residential parking area available on site. Large vehicular access for site deliveries is limited due to the existing landscaping, however there could be area made available to locate site accommodation and materials storage. In order to overcome the above constraints, a strategy will be developed in conjunction with the contractor and local authority to minimise the disruption to both vehicular and pedestrian traffic during the duration of the works.

4.7 DESIGN CODES AND STANDARDS

The following documents are used:

- BS648 - Schedule Of Weights Of Building Materials
- BS6399 Pt 1 - Code of Practice for Dead and Imposed Loads
- BS6399 Pt 2 - Code of Practice for Wind Loads
- BS6399 Pt 3 - Code of Practice for Imposed Roof Loads
- BS5268:Pt 2 - Code of Practice for Structural use of Timber
- BS5628:Pt 1 - Code of Practice for Structural use of Masonry
- BS5950: Pt 1 - Design of Steel Structures
- The Building Regulations 1991 - Approved Documents A, B, C, E, H, K & N

5.0 STRUCTURAL PROPOSAL

5.1 EXISTING STRUCTURE

5.1.1 DISMANTLING

The existing roof plant/services green roof and photovoltaic panels (Photo 5), will be carefully removed, taking into consideration waterproofing of the exposed roof section. The exploratory works to be carried out to expose the existing structure of the parapet walls, and to confirm the support for the new steel transfer deck. Existing roof structure to be protected at all times during the construction till the new waterproofing system is installed. Existing lift overrun and staircase to be retained and extended where necessary, and new hatch access to the roof to be provided.

Photo 5: Existing green roof of Block A with services.

5.1.2 TRANSFER FRAMING

The existing roof structure will be retained and protected, however where the new external walls line up with the walls below the existing upstand will be carefully reduced in hight. The new steel transfer structure to be supported on the existing load bearing walls and columns just above the existing roof construction. Deflection limits to be determent to avoid any contact of the transfer deck with non loadbearing elements of the existing roof. The existing structure will be exposed in the location of transfer deck's support and inspected as part of an enabling works package.

5.1.3 BEARINGS OF THE TRANSFER FRAMING

The junctions between transfer deck steelwork and the perimeter RC structure, the bearings, will also be inspected at an early stage. Any required repairs and adjustments will be carried out prior to the construction of the new extension to help transfer the load onto the existing columns below. Parapet wall to be cut down in some location to allow for steel beams to be positioned at the right level. New waterproofing and ventilation to be considered to protect the void between existing and new structure.

5.2 NEW SUPERSTRUCTURE

5.2.1 FLOORS AND WALLING, NON-VOLUMETRIC OPTION

The floors and walls of the new extension will be formed in modern lightweight construction, clad with panels to match the existing elevation. The walls around the exterior perimeter will be clad in non-flammable cladding with a structural liner panel formed using cold formed steelwork to keep weight to a minimum but still achieving the required stiffness.
The new plant area with PV panels will be installed on top of the new extension.

5.2.2 STABILITY

Lateral stability for the extension is to be provided within the new structural framing, which is then fixed down to the transfer deck, and connected with the existing loadbearing structure mentioned in item section 5.1. All of this will be done above the roof floor level. Once complete the new stability frame will transfer all of the lateral forces safely back into the bearings of the original structure.

Photo 5: Primary structure erected above transfer deck on MBP's Lowndes Square penthouse.

5.2.2 STRUCTURAL PROPOSAL

A simple structural calculation for typical Frame, supporting new loads including green roof and resisting wind load, was analysed in Robot (RSA) to better understand the expected deflections of the proposed transfer beams. Loads from these beams to be transferred onto the RC frame of the existing building. The Figures 5 and 6 below is an extract from the RSA model for Block A.

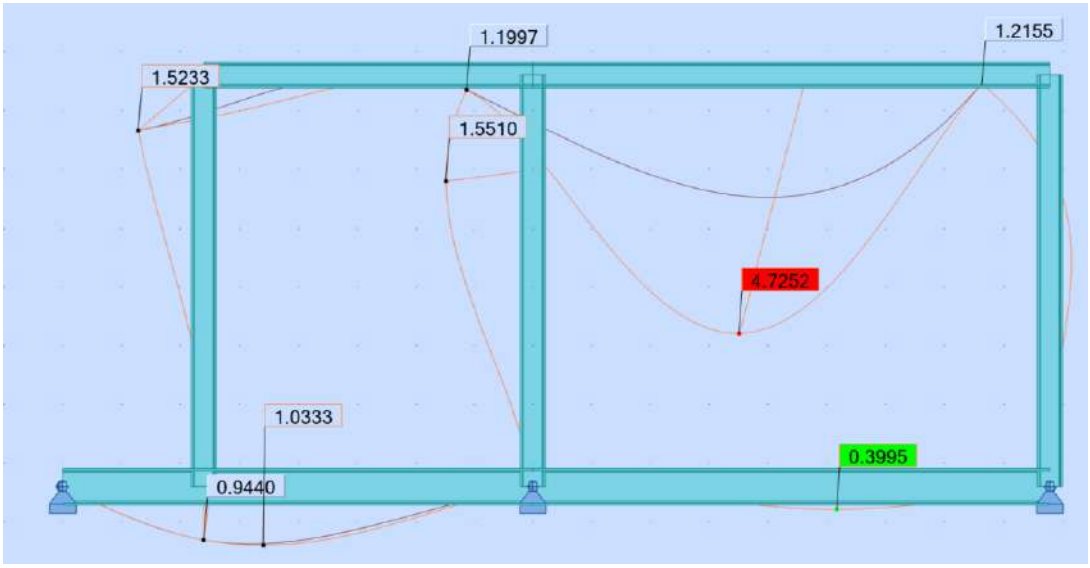

Figure 5: Extract from RSA model showing exaggerated deflection in [mm]

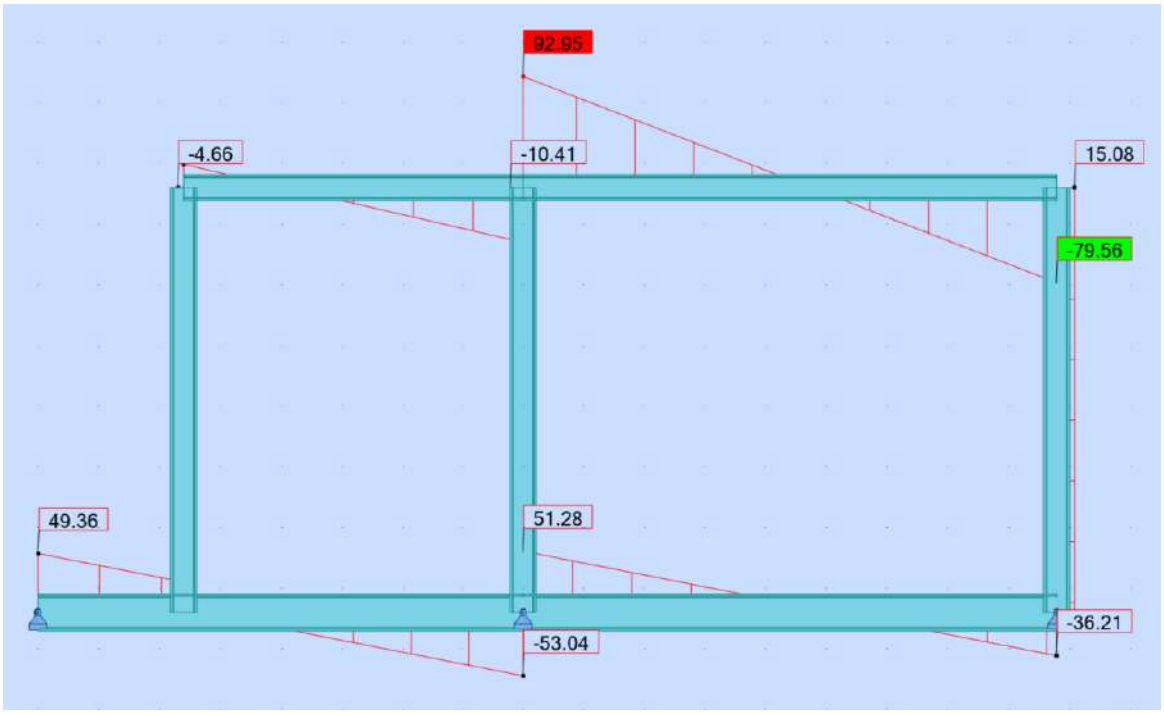

Figure 6: Extract from RSA model showing Shear Forces in [kN]

6.0 CONSTRUCTION HAZARDS

The proposed construction has standard materials and components and is of common form within the construction industry. Nevertheless MBP will produce a separate document that will be developed as the detailed design proceeds.

7.0 SPECIFICATION

The proposed construction materials, components, workmanship etc. will be specified using the National Building Specification documents and a separate performance specification. Those sections that MBP will schedule are:

Demolition	C20
Structural steel framing	G10
Carpentry/timber framing/first fixing	G20
Holes/chases/covers/supports for services	P31

It is Michael Barclay Partnership's practice to specify materials and construction-practices that do not cause undue harm to the environment. For example, timber used in temporary and permanent works must be obtained from a certified sustainable source, and be identified as such. The paint specification will avoid red lead, zinc chromate or coal-tar content and have a low solvent (VOC) content and offer manufacturers with an Environmental Policy in operation. The Contractor will be encouraged to use Portland cement replacement materials for the reinforced concrete elements.

8.0 DRAWINGS

A set of schematic scheme plans have been produced for the Block A – Searle House and Block B – Benjamin House that indicate the principals of the proposed development. These are appended to this report in Appendix A.

9.0 SUMMARY

The new rooftop extension to Block A and Block B on St Edmund's Terrace will be formed using modern lightweight methods of construction, successfully carried out by MBP on other projects in Central London and Camden. The weight of the increased volume of the rooftop extension will be reduced by removal of the existing roof plant/services enclosure with cavity brick walls and ceramic pot roof, supported on RC frame. The ventilation shafts, staircase and lift shafts will be extended to serve additional floors. The existing primary load paths will be used to support the new structure and all necessary repairs of the existing walls will be carried out to ensure the long term security of the building fabric. As the loading on the existing structure will not exceed allowable 10% and the top levels will represent a small portion of the building as a whole, the proposed development will not have an adverse impact on the apartments below or infrastructure at ground floor level and below.

Report Prepared by:

Name
Aga Zajac MEng CEng
For Michael Barclay Partnership LLP

Report Approved by:

Name (Principal)
Tony Hayes, BSc(Hons) CENG MIStructE
Date: 14th September 2022

ROOF EXTENSION OF BLOCK A – SEARLE HOUSE AND BLOCK B – BENJAMIN HOUSE, CECIL GROVE, LONDON NW8

Structural Engineer's Feasibility Report, Structural Alterations and Extensions

August 2022

Issue 2 - Pre - Planning Issue

Appendix A - Michael Barclay Partnership's schematic drawings

MBP - 8740 – 01 – Block A
MBP - 8740 – 02 – Block A
MBP - 8740 – 10 – Block B
MBP - 8740 – 11 – Block B