

# GRENFELL TOWER REGENERATION PROJECT

## STAGE D REPORT

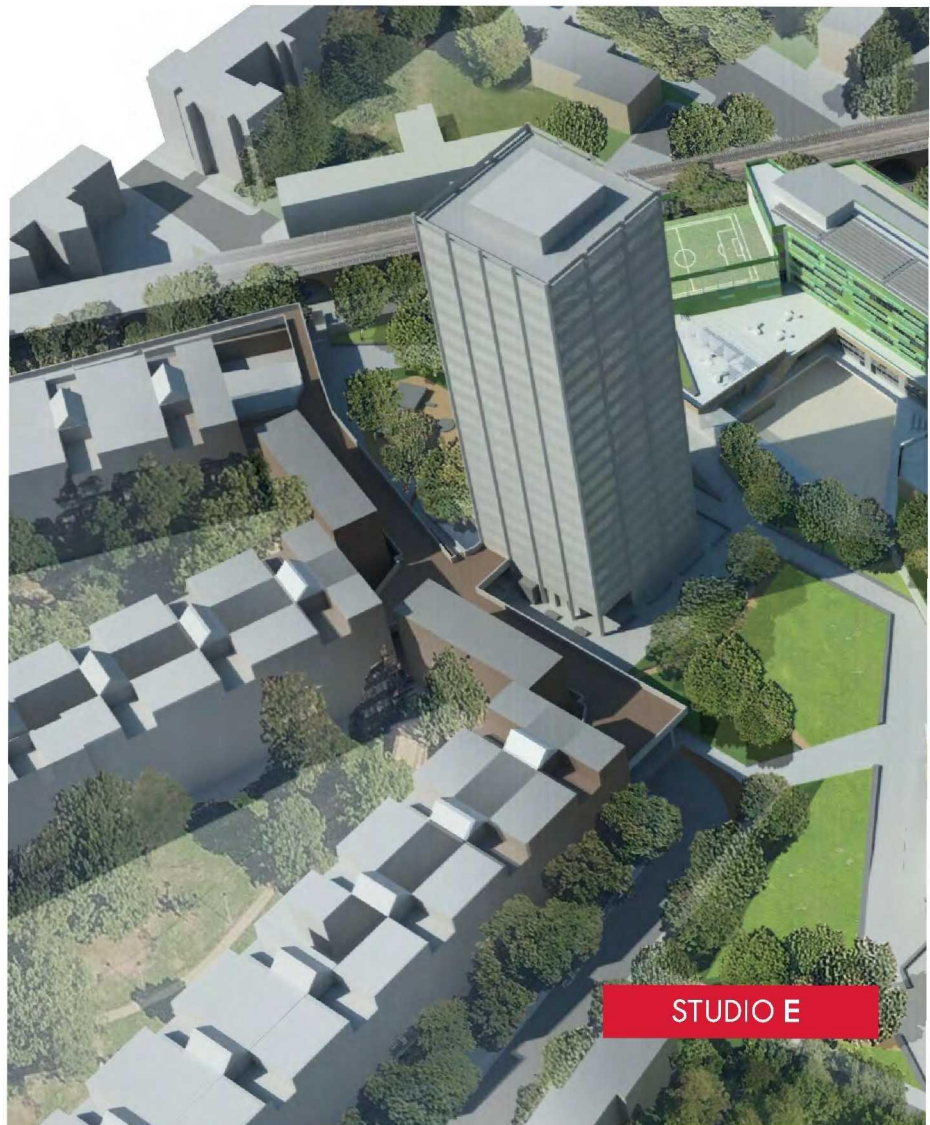
AUGUST 2013



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# 1 EXECUTIVE SUMMARY

Stage D Report  
Grenfell Tower Regeneration Project

The following report is intended to provide information in support of the development of detailed design proposals for the refurbishment of Grenfell Tower and completion of the project design brief as per RIBA work stage D.

The project was delayed between January and July due to concerns about cost and the appropriate form of procurement. At the same time the design development had stalled after input from the Architects' Appraisal Panel late last year which led us to explore colourful elevations. This approach was ultimately rejected although a number of points raised by the AAP – such as the removal of the perimeter low level canopy – are reflected in the current designs.

The scheme is awaiting Conditional Planning Approval and it is hoped that this will be received this September, twelve months after the original submission. During this period we have substituted three sets of Planning drawings but the overall scope and design is still quite close to what we originally drew. The changes however mean that the Services and Structural engineer's packages are out of date and therefore not included in this report.





## 2 INTRODUCTION

Stage D Report  
Grenfell Tower Regeneration Project

The detailed design proposals contained within the report are an ongoing record of the work undertaken post Stage C towards a coordinated design and further risk and cost analysis of the design objectives in response to K&C Tenant Management Organisation (TMO) stated aims of:

- Respond to the Supplementary Planning Guidance for the site.
- Find a long term solution which is both efficient and economically viable for the Communal heating to the tower.
- Extend the life of the building and bring the standard of the external envelope in line with current standards.
- Optimise the use of space in the tower.
- Exploit any "hidden homes" opportunities to deliver additional affordably housing for the Borough.
- Improve the entrance and appearance of the block and the Lancaster West Estate generally.

The regeneration project on Grenfell Tower is an extension of the Kensington Academy and Leisure Centre project (KALC) and integral to the upgraded public realm. (Planning Application Reference PP/12/01833); The public realm works include new play areas, a shared surface connecting Grenfell Road and Silchester Road, new pedestrian routes and a planting scheme. The three projects (Fig.1) represent a significant investment and make-over for the area.

The close integration between the associated KALC projects is reflected in the design team for Grenfell Tower by the involvement of the same consultant organisations as Kensington Academy.

The project team (see section 2.0) through participation in project meetings, design workshops, public consultations and site investigations along with supplementary design guidance has been able to determine and refine a number of design objectives related to the refurbishment of Grenfell Tower:

- Improve access
- Enhance security
- Boost the external envelope performance & appearance
- Increase services performance and control
- Increasing building occupancy and efficiency of use (Podium levels)





## 3 PROJECT DEVELOPMENT

Stage D Report  
Grenfell Tower Regeneration Project

The development of the project brief while primarily based on the stated aims of the TMO and Client aspirations and RBKC 'Hidden Homes' housing policy. Further definition is given to those aims through the requirement to comply with approved standards and consultation approvals.

The following report sections contains the results of ongoing and planned investigation works on the existing building to help define the scope and sequencing of works.

As part of the statutory approvals process for planning & building control consent in combination with best practice guidance a number of working standards can be defined. The standards define requirements for the provision of accommodation, the quality of internal and external spaces along with the quality of the environment contained within.

- The London Plan 2012 (planning)
- RBKC Core Strategy Documents inc.
  - CR2 3D street form
  - CL1 Context and Character
  - CL2 Architectural Design
  - CR7 Servicing
  - CL5 Amenity
  - CE6 Planning and Noise
- Lifetime Homes 21st Century Living - Habinteg
- BREEAM for Domestic refurbishment 2012 (target: v.good)
  - Current (2012) Building Regulations Approved Documents in particular:
    - Part B Fire Safety
    - Part E Resistance to Sound
    - Part F Ventilation
    - Part L Conservation of Fuel and Power (L2:2010)
    - Part M Access
- BS9999:2008 Code of Practice for means of escape for disabled people
- BS 8300:2009 Design of buildings and their approaches to meet the needs of disabled people - Code of Practice
- BS 8206 part 2 code of practice for day lighting
- Department of Transport – Inclusive Mobility

- Dulux – Colour and Contrast: A design guide for the use of colour and contrast to improve the built environment for visually impaired people
- Accessible London: achieving an inclusive environment, Lifetime Homes
- LDF Access Design Guide: Supplementary Planning Document – Adopted December 2010
- RBKC Supplementary Planning Document: Lancaster West Estate
- Fire Safety Risk Assessment – sleeping accommodation, Department for Communities and Local Government 2006
- London District Surveyors Association Fire Safety Guide No. 1, Fire Safety in Section 20 Buildings – LDSA Publications 1998

### Surveys / Investigations & Inspection

As part of the design process a number of surveys and invasive investigations have been carried out on the existing building, to determine the extent of risks from the proposed refurbishment works for both the residents and contractors during the works.

The tests are also designed to assess the viability of proposed materials and construction techniques in terms of the existing building structure and the fact that the building is to remain occupied in large part throughout the project.

The following is a summary of the current position with regard to investigations. Further detailed analysis of identified risks can be found in the CDM risk register or in the individual survey reports:

### Asbestos

The TMO have previously issued an Asbestos report in spreadsheet format detailing previously recorded locations of Asbestos within Grenfell Tower. At the next stage specialist contractors will need to be approached on the likely cost and safe methods for asbestos removal, given that the debris will need to be taken through common areas that will be continuously in tenant and public use.

### Concrete Health (Curtins Consulting)

Inspections and concrete analysis of dust samples was carried out by specialist subcontractors to determine the health of the existing concrete within Grenfell Tower due to the age and period of construction of the existing building (1970's). The findings did not highlight any areas of concern

### Intrusive Structural Investigations (Curtins Consulting)

The location for further investigations into floor slab thickness and construction will be based on the Structural and M&E builders work drawings contained within this report. The investigations are required to determine the viability of the existing structure in areas requiring proposed penetrations for structural setting out and M&E coordination.

Some pull out testing of fixings for the proposed over-cladding have been carried out which did not highlight any areas of concern in terms of the fixing strength of the existing structure. The tests did however raise concerns on the type of drilling technique and the possible disruption to existing residents caused by noise and vibration. Non-percussive drilling may be required to minimise the impact on residents.

### Existing MTHW Pipe work Survey (Max Fordham)

Max Fordham's commissioned a condition survey of the existing heating system pipe work by specialist sub contractors, to determine the viability of services design options making use of the existing system. The survey was also necessary to determine if the existing system could be modified for use in minimizing work sequences and / or disruption during switch over and removal of the existing heating system.

The survey findings concluded that the existing heating pipe work was beyond its useful design life and in a serious state of disrepair that increased the risk of proposed works on or close to leading to leakage and disruption to the existing heating / hot water service which is to maintained throughout the works.



### Existing Electric Cable condition survey

With the introduction of proposed mechanical ventilation for kitchen extract fans into the scope Max Fordhams are awaiting a copy of the Grenfell Tower TMO periodic electrical testing as a preliminary step to assess the need for additional testing.

The testing is necessary to assess the condition of the existing electrical cables in particular the lighting circuits within the flats as a possible point for connecting the new mechanical extract fans into existing electrical circuits.

Until the condition of the existing wiring can be assessed the costs will include for a new dedicated circuit to power the kitchen extract fans

### Condition Survey of existing residential flats & common spaces

Leadbitter noted that the scope of making good works within the existing flats lacks definition as the condition of décor in the individual flats is unknown. Leadbitter requested support from the TMO in gaining access to the properties to record the type and condition of décor in areas where work is to be carried out including the areas where materials and contractors pass through.

The condition survey should also help define the scope of works in relation to kitchen extractor fans as some existing flats may already contain vents that satisfy BREEAM requirements.



### Area Schedule

|                                    | <b>EXISTING</b>        |                       | <b>PROPOSED</b>        |                            |
|------------------------------------|------------------------|-----------------------|------------------------|----------------------------|
|                                    | m <sup>2</sup><br>Nett | m <sup>2</sup><br>GIA | m <sup>2</sup><br>Nett | m <sup>2</sup><br>GIA      |
| <b>Basement</b>                    |                        | 696.5                 |                        | 696.5                      |
| <b>Ground Floor</b>                |                        |                       |                        |                            |
| Boxing                             | 181.1                  |                       | Nursery                | 209.4                      |
| Office                             | 74.1                   |                       | Concierge/Office       | 87.6                       |
| <b>Subtotal</b>                    | <b>255.2</b>           | <b>425.2</b>          | <b>Subtotal</b>        | <b>297      468.9</b>      |
| <b>Mezzanine Level</b>             |                        |                       |                        |                            |
| Nursery                            | 244.4                  |                       | 2b4p unit              | 74.4                       |
| Boxing Gallery                     | 17                     |                       | 2b4p unit              | 74.4                       |
|                                    |                        |                       | 1b2p unit              | 50.9                       |
|                                    |                        |                       | Office                 | 61                         |
|                                    |                        |                       | Community / Meeting    | 61.2                       |
| <b>Subtotal</b>                    | <b>261.4</b>           | <b>272.8</b>          | <b>Subtotal</b>        | <b>321.9      444.7</b>    |
| <b>Walkway Level</b>               |                        |                       |                        |                            |
| Office                             | 75.5                   |                       | Office                 | 75.5                       |
|                                    |                        |                       | Community Use (Boxing) | 255.2                      |
| <b>Subtotal</b>                    | <b>75.5</b>            | <b>198.7</b>          |                        | <b>330.7      441.5</b>    |
| <b>Walkway +1</b>                  |                        |                       |                        |                            |
| Office                             | 378                    |                       | 3b4p unit              | 101.4                      |
|                                    |                        |                       | 4b6p unit              | 101.4                      |
|                                    |                        |                       | 4b6p unit              | 101.4                      |
|                                    |                        |                       | 4b6p unit              | 101.4                      |
| <b>Subtotal</b>                    | <b>378</b>             | <b>394.4</b>          | <b>Subtotal</b>        | <b>405.6      473.9</b>    |
| <b>Existing Residential Floors</b> |                        |                       | x (20)                 |                            |
| 1b2p unit                          | 50.9                   |                       | 1b2p unit              | 50.9                       |
| 1b2p unit                          | 50.9                   |                       | 1b2p unit              | 50.9                       |
| 2b4p unit                          | 73.3                   |                       | 2b4p unit              | 73.3                       |
| 2b4p unit                          | 73.3                   |                       | 2b4p unit              | 73.3                       |
| 2b4p unit                          | 73.3                   |                       | 2b4p unit              | 73.3                       |
| 2b4p unit                          | 73.3                   |                       | 2b4p unit              | 73.3                       |
| Total Second Floor                 | 395                    | 473.9                 | Total Second Floor     | 395      473.9             |
| x Total Floors                     | 20                     | 20                    | x Total Floors         | 20      20                 |
| <b>Subtotal</b>                    | <b>7900</b>            | <b>9478</b>           | <b>Subtotal</b>        | <b>7900      9478</b>      |
| <b>Roof Plant</b>                  |                        | 250.6                 |                        | 250.6                      |
| <b>TOTAL</b>                       | <b>8870.1</b>          | <b>11716.2</b>        |                        | <b>9255.2      12254.1</b> |
|                                    |                        |                       |                        |                            |
|                                    | <b>Nett</b>            | <b>GIFA</b>           |                        |                            |
| Diff PROPOSED-EXISTING             | <b>385.1</b>           | <b>537.9</b>          |                        |                            |





## 4 ARCHITECTS REPORT

### 4.1 Context

Grenfell Tower sits at the Northern end of the Lancaster West 1 Estate, in the Notting Barns Ward of North Kensington. The Estate consists of the tower and three “finger blocks” – Testerton, Hurstway and Barandon Walks – 3 and 4 storey linear residential blocks which extend 150m south from the Tower enclosing two large green spaces.

The area to the immediate east of the tower is Lancaster Green and there are children's play areas to the immediate west. While these are retained and remodelled as part of the KALC project the open space to the north which is currently all-weather football pitches is the site of the proposed Kensington Academy. The London Underground viaduct is 70m to the west and Latimer Road Tube station is 200m walk from the entrance to the tower. The new Leisure Centre is situated beyond Lancaster Green.



Figure 1

#### Supplementary Planning Document

The Special Planning Guidance (SPD) for this site deals primarily with the siting of the proposed Academy and Leisure Centre and the Public Realm. It is this last aspect which is most important because of the fractured nature of the KALC site, a consequence of its historic piecemeal development. The SPD seeks to improve the pedestrian (and visual) links across the site, beginning with a new north-south

shared surface, leading from Grenfell Road on the southern end and connecting with Silchester Road on the north. The new north-south route is part of the KALC Planning Application and will be controlled by retractable bollards at both ends.

An improved east/west link is also indicated on the SPD on the south side of the tower because this is currently not a level direct pedestrian route. It is the shortest route from Station Walk and the tower entrance, and a natural desire line for anyone crossing the site by foot.

The area to the North & West of Grenfell Tower was originally a private walled garden for residents' use with no public thoroughfare. A youth club and Tenant's Association meeting areas at the base of the tower both opened directly onto the garden along with several means of access from Walkway level. One route down from the Walkway level is a stepped and curved ramp on the west side of the tower. This does not extend down to grade, perhaps because of the limited space available for the ramp. The ramp along with the intermediate ground level effectively block the direct east-west connection highlighted in the SPD by having to negotiate a flight of steps to the base of the ramp and a change of direction to pass.

Over the years the walled garden has been opened up to public access increasing routes through the site around the Tower. The Youth Club has been disbanded and the current tenants at the base of the tower include a nursery and amateur boxing club which both require better public access. The SPD sees the removal of the stepped ramp and a levelling of access around the Tower as key to re-establishing East – West movement through the site and improving public access generally.

#### East-West Connection

**5.4.5** The map in Appendix 2 shows there is a popular east-west connection at ground level to the South of Grenfell Tower under Grenfell Walk. At present this route is poorly defined, dominated by the servicing yard for Lancaster West and Grenfell Tower and includes steps, limiting disabled access. Whilst not included as part of the site, an improved pedestrian environment should be provided as an integral part of the project.

Fig. 5 SPD – Extract

#### Appendix 2: Walking Routes

The first image shown below is a photograph showing residents preferred walking routes. This information was obtained from the consultation event held by the Council on 20th November 2010. The second image is a graphical reproduction of this.

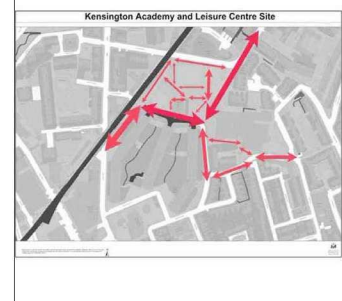
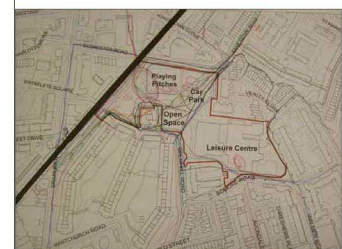
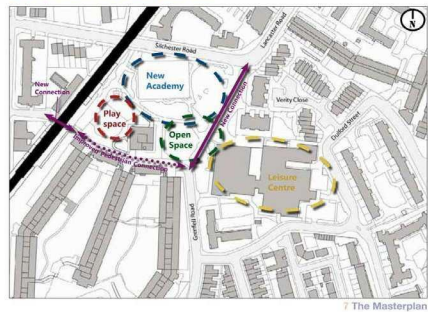


Figure 2- SPD

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4.0 Vision And Objectives



**4.1 VISION**  
4.1.1 The vision will guide the development of the project at every stage:  
4.1.2 The new Kensington Academy will provide a local school for local people that is of a high quality, cost effective design. The new leisure centre will provide a hub for healthy living for North Kensington as a whole. Located close to one another, the school and leisure centre will benefit from shared facilities by opening up school facilities for use by the community out of hours. Enhanced play facilities will be provided on the site, along with an area of public open space. Improved street and pedestrian routes will better connect the area and re-establish the grain of the historic street pattern. The amenity of residents will have been considered following close working with the community. The school and leisure centre will also provide an anchor for locally generated heat and power, which could be extended into the surrounding neighbourhood, significantly reducing carbon emissions.

Figure 1 SPD



Figure 3- Aerial view of complete development

4.2 Lancaster West

The original design concept for the Lancaster West Estate was to keep vehicle and pedestrian traffic separate by having pedestrian access into and through the site on a walkway level running above the ground level.

Security and anti-social issues associated with having public thoroughfares through the estate, open 24 hours a day, resulted in various changes being made during the early 1990's: the estate was divided into a series of independent blocks, each with its own secure entrance. The walkway connection to Grenfell was closed off by a new EMB office and all resident access to the tower is now via the southern entrance at ground level.

All vehicle access to the lower level for resident's parking and for service vehicles to the Estate is via Grenfell Road and this concentrates vehicle traffic down a narrow cul-de-sac which results in congestion at times which has to be managed by the Estate Inspectors. This service undercroft is directly opposite the entrance to Grenfell Tower.

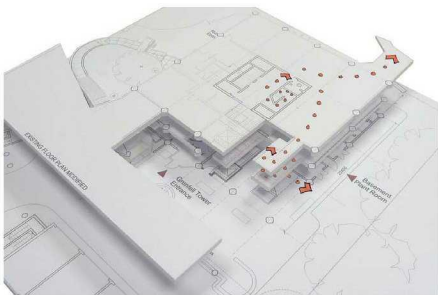


Figure 9 Model illustrating the existing escape route from the main stair which terminates at Walkway level.

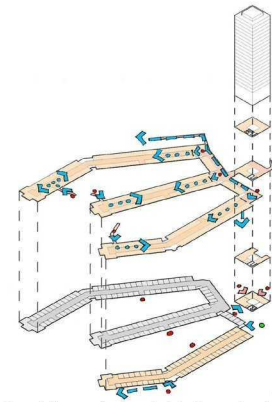


Figure 5 Diagram showing principle of separation of vehicles and pedestrians.

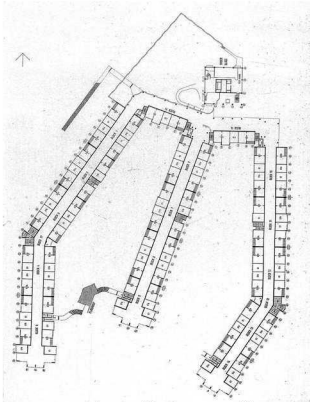


Figure 7 Original drawing of the lower ground floor showing garages and walled garden on north

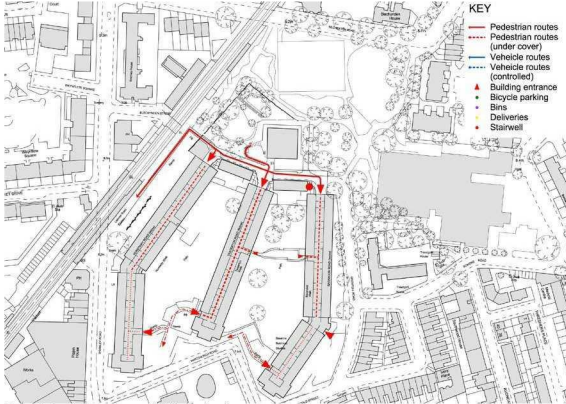


Figure 6 Pedestrian access at Walkway level

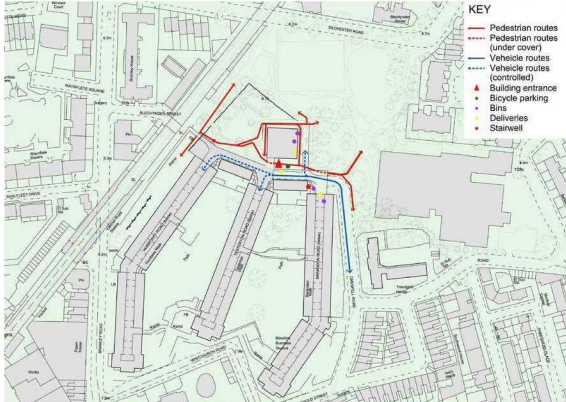


Figure 8 Existing access at ground level.





Figure 10 Existing Tower



Figure 11 Views showing vehicle access to the undercroft of Lancaster West and around the base of Grenfell Tower





Figure 12 Lift lobby – typical floor



Figure 13 Lift lobby – Fire escape door on right, refuse chute on left



Figure 14 Living Room – Existing 2 Bed



Figure 15 Living Room looking towards kitchen – Typical 2 Bed



Figure 16 Living Room – Typical 2 Bed flat



Figure 17 Bathroom



Figure 18 Kitchen – Existing 2 Bed



Figure 19 Dale Youth Boxing Club



Figure 20 Nursery on Mezzanine



Figure 21 Walkway offices



Walkway + 1 - Vacant offices



### 4.3 Design Approach: Podium

The following principles were in place at Stage C (October 2012),

- Relocation of the Boxing Club to walkway level
- Relocation of Nursery to ground floor, roughly where the boxing club is now.
- Creation of new floor space and new residential units at Mezzanine level.
- Creation of new floor space and new residential units at Walkway +1
- Creation of a new and more generous tenant entrance with good surveillance.

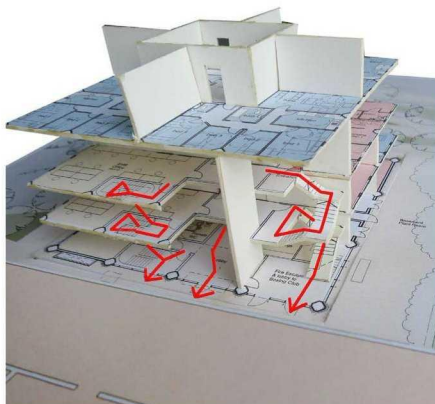


Figure 23 Illustration of revised escape and access arrangements

The major work involved is therefore:

- Removal of the external concrete stair and lift shaft on the south east corner to make way for new floor space at ground, mezzanine, walkway and Walkway+1.
- Creation of a new stair on the south west corner of the tower, connecting the lower three levels.
- Infill of voids and new floor space at Mezzanine and Walkway +1 to create the extra space.
- New facades; insulated cladding and windows.
- Upgrade to many of the existing building services:
  - Smoke ventilation to the lift lobbies
  - Door entry system
  - New CCTV
  - Remodelling of several of the basement vents

The following amendments have been made since Stage C:

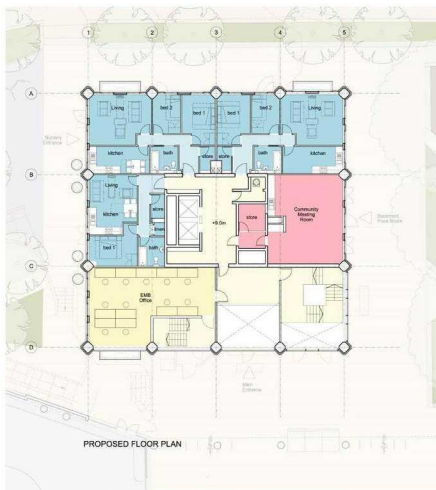
- The residents' entrance and new fire escape stair are separated. The new stair becomes the primary means of access for the boxing club. A second door at ground level will permit the boxing club to control this stair while it continues serve as a fire escape for the whole the tower.
- The boxing club occupies the majority of the Walkway level.
- The estate office now extends over three floors and has its own dedicated accommodation stair.
- The existing walkway bridge is removed. This will necessitate re-routing the primary heating pipes serving the finger blocks which run along the underside of the Walkway.

The location of the transformer Room, lifts and refuse chute are fixed and relocating them is beyond the scope of this project. Within the given footprint (roughly 22x22m square) and the concrete structure we are proposing the following at each level:



GROUND FLOOR

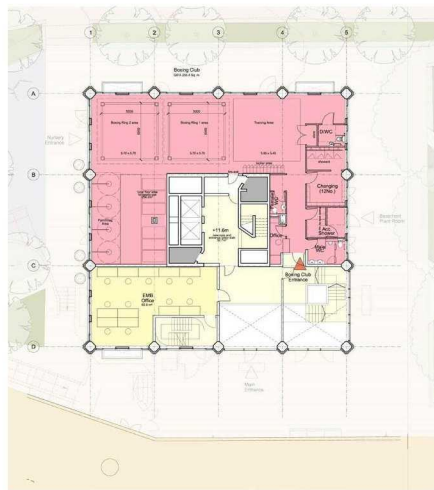
- Enlarged entrance foyer, new stair and Part M compliant lift
- Conierge / reception desk with view of main entrance, new lift and stair and the entrance to the main lift core.
- A new enlarged meeting room and facilities for the Estate Office. This suite of offices is accessed by a new stair
- New office for the EMB (Estates Management Board). This office is transferred from its existing location on the north-east corner of Barandon Walk.
- Relocated nursery in an L-shaped configuration with the new entrance in roughly the same position as the existing.
- A new fire escape stair



MEZZANINE

This level is not currently served by the two central lifts and it is proposed that a new lobby slab and lift openings be created at Mezzanine level. The existing floor to ceiling dimension is low – as little as 2050mm – and Planning felt that this was not suitable for large family dwellings so 1 and 2 bed units only are proposed.

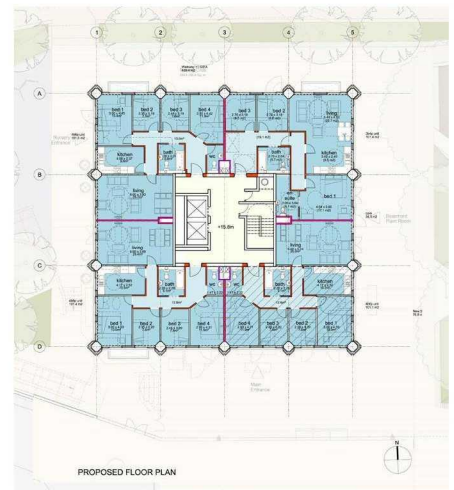
A community meeting room (pink above) is proposed above the existing bins and transformer room.



WALKWAY LEVEL

The boxing club occupies the majority of the available floor plate. Access is via the new escape stair with disabled access via the main lift core

The existing fire escape stair in the core discharges into the lift lobby and the route is continued down to ground via the new stair.



WALKWAY +1 LEVEL

A new “shell and core” arrangement similar to the 20 floors above is proposed with some structural changes: new floor slab, new lift door openings, new connection to the refuse chute and a new connection to the escape stair. Four new units are arranged in each quadrant: 3 no 4 Bed and 1 no 3 Bed Wheelchair accessible unit. The structural module has a strong influence on the layout: the bedrooms are situated on the north and south elevations and the living spaces face east and west where the structural module is wider. The kitchens are stacked directly below the kitchens to the two-bed units on the floor above, which is important to maintain a vertical continuity of services such as gas and water.

## 4.4 Design Approach: Façade

### Existing Building

Grenfell Tower is a concrete structure with mill finished (unfinished) aluminium windows. The external wall to the finger blocks are brick but there is relatively little used on Grenfell tower and only at the ground level. For the upper 20 storeys precast concrete cladding has been used: one panel type serves as a structural spandrel under the windows (horizontal) and the other is a decorative facing to the triangular pilasters, each a full storey height of 2.6m (vertical). This system sets up a simple visual language of modular elements: horizontal rough, washed aggregate for the spandrels, lighter and sharper detail on the vertical columns with cast-in vertical grooves, and aluminium framed “strip glazing” between. The infill panels between each window are a smooth white panel so that the assembly reads as a light weight infill in a concrete frame.

The original tower was divided compositionally into a base – the podium up to Walkway +1 level, a middle – the 20 residential floors, and a top – the plant room and pre-cast “crown” of tapered pilasters and ring of perforated freestanding beams. The perimeter columns have been rotated by 45° to read as diamonds in plan, and this generates the distinctive triangular pilasters running the full height of the building and grid across each elevation.

The existing windows are single glazed and sliding opening, each half sliding across the other so that it is in theory possible to clean the outside of outer half with the inner open and the outside of the inner half by moving it left and right of the outer window positioned mid-way in the opening. The low (980mm) internal sill height and need to reach up and out of an open window makes cleaning the windows potentially very dangerous. Retrofit restrictor devices have been fitted to all the windows which limit the opening to approximately 150mm. These can be disengaged but they do provide a measure of safety for residents, and in particular young children.

An Integrated Receiver System has recently been installed to Grenfell tower meaning all wall-mounted satellite dishes will be permanently removed as part of these proposals.

### Concept

Grenfell Tower was designed as a large rectilinear mass lifted high off the ground on stilt-like columns and nestled in an urban garden. We interpret the original intent behind this concept was to mitigate the density of the development by handing over of the lowest levels to outdoor and community use. The latter part of this vision has been completely lost. The lowest levels are now entirely defensive in character and the building is separated by a tarmac road from what little garden there is. The under-utilized outdoor deck and stairs to Grenfell Tower are prime locations for mischief rather than community use, and plagued by pigeons.

The original pre-cast concept is a simple and direct solution for the elevations, albeit very uniform and even monotonous. The tower offers only limited interest in the modelling and silhouette at roof level and the constraints of existing structure and plant mean there is no opportunity to add new habitable space at roof level.

Our response to the detail design of the over-cladding to the residential floors has been to respect the visual language of the original: light verticals, darker horizontals and “window strips” as used throughout Lancaster West, including the finger blocks. We have also sought to maintain the podium or lowest four levels as a distinct “base” zone with a more glassy appearance and different cladding material. The glazed screen is full height across the four levels on the two centre bays of the north and south elevations, and on the south-west corner where the new stair is situated. These proportions work for the size of the tower and the glassy openness responds to a desire to address the outdoor spaces: and expanded entrance forecourt on the south, and the scoop of the Academy to the north.

### Cladding Design Brief

The over-cladding works are an integral part of the upgrade to the heating of the building, while also being a complete overhaul to its appearance. New windows will deliver improved thermal performance and better functionality. The existing windows are 40 years old and at the end of their design life. More detail on the proposed energy efficiency of the complete building envelope and

the parameters use in identifying the preferred window option can be found in the Sustainability Statement.

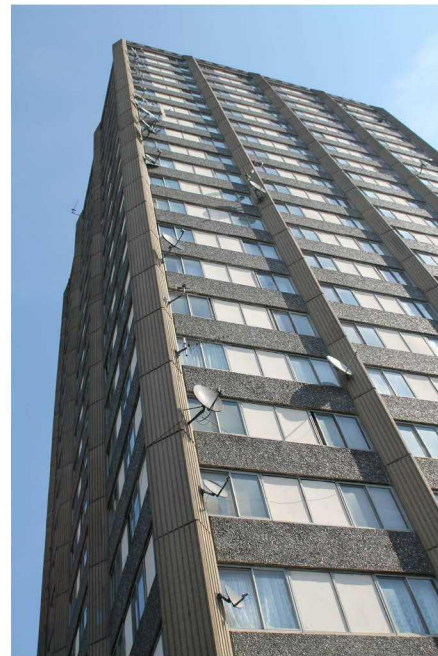


Fig. 2/1 Existing cladding



In consultation with the Design Team, the TMO and through several open workshops with residents we arrived at the following objectives for over-cladding:

- A dramatic improvement in heat loss with new insulation and air sealing which will generate significant energy savings.
- Windows which can be opened sufficiently to naturally vent the building throughout the year, without contributing to a risk of falling.
- Windows that can be safely cleaned from the inside.
- Windows that maintain the existing good levels of natural daylight internally.
- Improved acoustic performance which will bring the noise levels inside the flats to within Planning policy targets.
- To re-compose the tower with the reconfigured spaces at the lower floors into a coherent single entity and improve the overall appearance of the tower which is such a dominant presence in the public realm that will be upgraded as part of the KALC project.

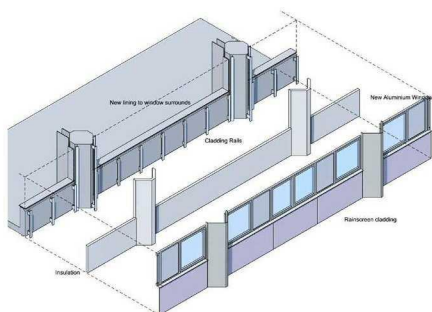


Figure 25 Principle of overcladding

## Windows

Powder coated aluminium windows are proposed as replacements for the existing. The proposed configuration is not dissimilar to that illustrated below (22): A narrow "purge panel" opens inward to allow rapid ventilation. It is screened by horizontal louvers to ensure large objects cannot fall out. The larger panel is a pivot window which is the default means of ventilation and it will be restricted to a narrow opening in normal use. Both window halves can be cleaned safely from inside: the pivot window can be disengaged from the safe position and rotated by 180 degrees. The casement is narrow enough not to disturb internal furniture arrangements when open 90 degrees inwards.

We feel the narrow module of the grille to the purge panel introduces a new and interesting rhythm to the otherwise very rigorous geometry of the original. The calculations prepared by Max Fordham demonstrate the need to for this amount of openable area to safeguard the thermal comfort of the occupants. The windows are slightly larger than existing to compensate for the heavier frames and to therefore to maintain the good levels of natural daylight.



Fig. 26 Grille to purge vent

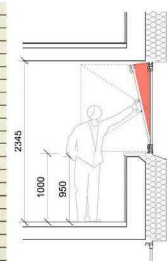


Fig. 27 Tilt and turn window

## Materials

A zinc composite rainscreen cladding is proposed to the upper levels. Zinc has the advantage of being a self-finished natural material that will not corrode or weather as a coated finish eventually would. It offers a clean appearance, crisp detailing at joints and an attractive dull lustre. It is not sufficiently robust to use at low level so a combination of dark brick and new high quality concrete facings for the columns is proposed for the podium level. The colour of the brick is selected to match the pallet of the tower rather than the red multi brick used on the rest of the estate. Our view is that the tower always had a different treatment; the precast panels complemented the raw and rough brick used on the finger blocks and the neutral grey zinc will do the same in the overclad condition, albeit a lightweight and more refined material. Colour is proposed in a controlled way to the solid infill panels to the new areas of curtain wall and windows. This is proposed as coloured glass.

These works in turn have a further impact on the existing TV and Satellite systems requiring the removal existing dishes in favour of a communal system located on the roof. The renewal of the heating, domestic hot water systems and windows will also require making good works within the existing flats and common areas.



RhineZink

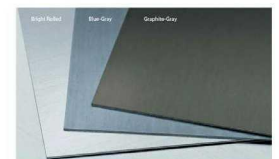


Figure 28 RhineZink Natural and pre-patinated colours:

4 ARCHITECTS REPORT

Architects Appraisal Panel

The proposals were presented to the RBKC AAP on the 15<sup>th</sup> November. By this time we had made a number of tweaks to the design:

- The re-provided escape stair and lift were moved to the south eastern corner, forming part of a triple height lobby.
- A new bridge connecting the tower and walkway was proposed.
- The boxing club was expanded to fill the majority of the Walkway level.
- The conversion of 5no. garages opposite for TMO offices was added.

*The AAP response was critical of a number of aspects (*

Figure 24). We were encouraged to be more bold in the elevation treatment and although not recorded, the comments on the night emphasised colour and the silhouette of the tower. We set about exploring options and had a number of meetings with RBKC Planners. A range of alternatives is illustrated in the Appendix. The following changes were made:

- The canopy was omitted
- A crown of perforate cladding was introduced at the top as an extension of the freestanding beams which are a distinctive feature of the existing building. The elevation is clearly articulated into bottom, middle and top sections.
- The zinc cladding was retained but shown in a lighter colour
- Coloured infill panels, proposed as a high pressure laminate were introduced, graduating in colour from deep green to a strong lime yellow at the top.

By December we felt we had arrived at a consensus with the Planning Officers and revised drawings were submitted. However in late January Planning came back to say they were rejecting the use of bold colour and had a strong preference for natural materials such as copper.



Figure 30 As presented to AAP

Figure 31 Amended Elevation in response to comments



Figure 32 Amended scheme with new bridge and coloured panels

Royal Borough of Kensington and Chelsea

Architects Appraisal Panel Report  
Grenfell Tower, Grenfell Road, W11

15<sup>th</sup> November 2012  
Studio E

Alterations to a residential tower  
Proposals for the re-cladding of the tower block and remodelling of its lower floors to provide improved accommodation for a nursery and boxing club, and 7 new family-sized flats.

The AAP notes that the planning application has been submitted, but hopes that the project timescale allows sufficient scope for addressing the following:

- the brief for re-cladding the tower and updating its energy performance is supported, but more could be done to improve the amenity of its residents, particularly in terms of improving the tower's appearance and raising their spirits.
- despite a good budget and the use of expensive materials the current choice of cladding finish is dull and lifeless, offering little visual improvement compared to the existing profiled and textured concrete finish. Alternative designs and materials or mix of materials should be explored that would be more visually stimulating and would foster a more heartening identity (e.g., copper or enamelled steel).
- the Panel has discussed whether the designs should continue to emphasise the horizontality rather than the verticality, but feels the right response will emerge from the design review.
- linked to the above, however, is the sense that the building's architecture would benefit from an expression of its base, middle and top.
- the proposed canopy structure(s) is not supported and should be removed, as it clutters the elevations and detracts from the amenity of the accommodation and public space below. The problem of items dropped from upper floor windows could be better addressed by other more management-based solutions (e.g., key-operated window restrictors).
- the relocated nursery seems sensible, though functionally it would benefit from a dedicated doorstep play space rather than using the communal gardens. A protected outdoor nursery space could bring character to the building's base and allow the architecture to break out of its existing rigid structure.
- the daylighting of the upper floor flats could be improved by reducing the extent of the wall panels covering the party wall and introducing larger windows or maybe coloured glass for visual interest, and
- the need to address how the building is terminated. It is a disappointing that the opportunity is not being taken to make more of the roof space and provide a community facility, such as a meeting room or winter garden.

Will Alsop  
Chairman AAP  
28<sup>th</sup> November 2012

Figure 29 AAP report

### Planning Re-invigoration – July 2013

The impasse on the colour, but more significantly doubts about the affordability of the entire scheme has resulted in a delay to the Planning process. The Planning Authority has not had to determine the application – ie reject it – because a Planning Performance Agreement (PPA) was signed at the outset.

Revised drawings were submitted on 29 July and a fresh period of public consultation has begun. In the intervening period the KCTMO have reviewed their priorities and the original premises of the project. Several radical departures were considered but the revised elevations and indeed the plans retain much of the original design, with the following exceptions:

- The colour is omitted although a monochrome gradation to the infill panels is retained.
- The height of the crown is reduced
- The link bridge is omitted.
- A steel pergola, providing protection from falling objects and a trellis for planting is proposed on the western elevation where the nursery entrance is located. We feel the nursery deserves the added protection given the connection to the play area, and a softer architectural treatment is called for here.

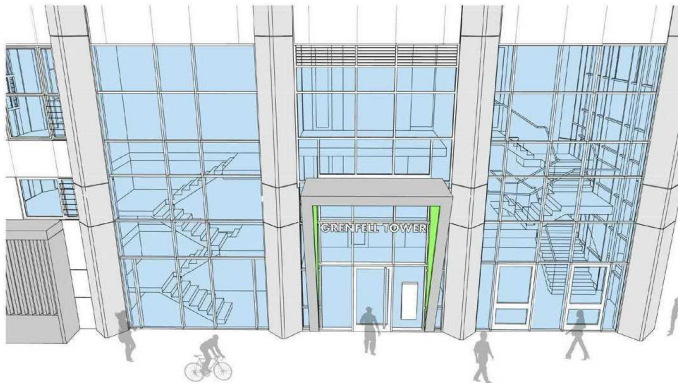


Figure 33 – New Entrance



Figure 34 Trellis/canopy to western facade, linking nursery to play area.



4 ARCHITECTS REPORT



Figure 35 Existing approach to tower entrance



Figure 36 Revised crown detail

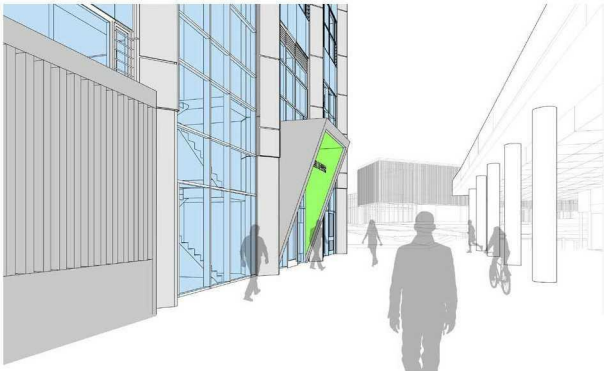


Figure 37 Proposed entrance approach



Figure 38 Proposed entrance approach



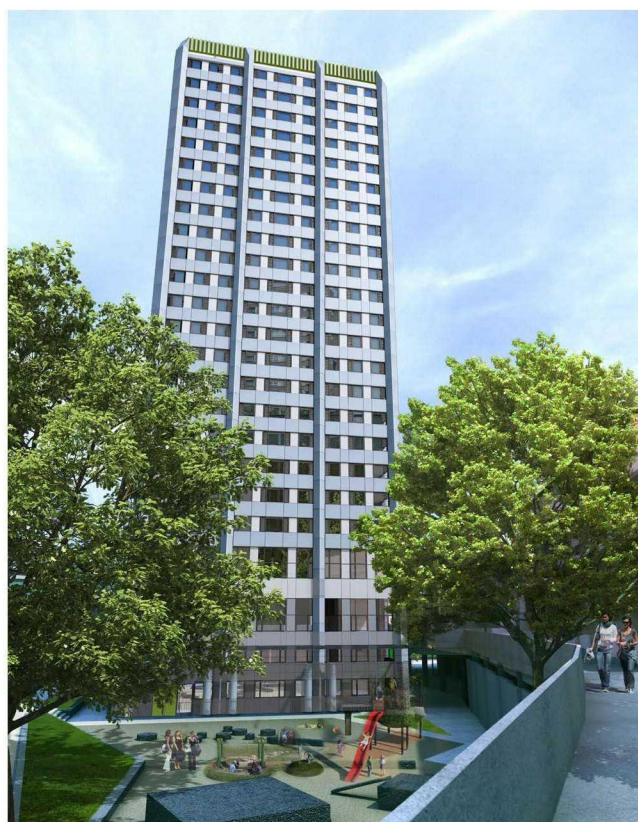
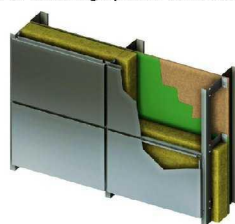


Figure 39 Overclad tower

#### Alternative cladding options which may be considered



LINEAR3 rainscreen cassette panel system  
by Euroclad

Figure 40 Aluminium Cassette rainscreen Powdercoated finish

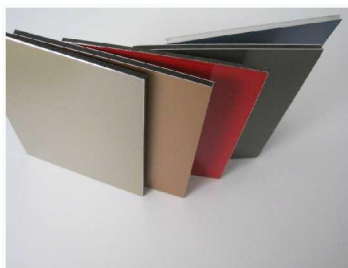


Figure 42 – Aluminium Composite Material (ACM)



Figure 41 – Coil coated aluminium: Euramax anodised aluminium



Figure 43 Coil coated Aluminium - Zinc colour



Figure 44 Rheinzink Blue Shingles

## 4.5 Issues for Stage E

Several design issues remain to be resolved as part of the next stage:

- Nursery internal layout, fixtures & fittings and level of finishes required
- Boxing Club internal layout, fixtures & fittings and level of finishes required
- Office layouts, fixtures & fittings and level of finishes required
- Traffic management across and through the site.

### RBKC Accessibility Appraisal

As part of an RBKC internal procedure the planning drawings were submitted to an Accessibility appraisal the recommendations and comments are listed below:

- Provision of wheelchair accessible accommodation to be considered (see SK60 section 6.4)
- Communal approach to dwelling front doors are below lifetime homes standards (1200mm for turn approach)
- Space arrangements in some dwellings do not allow for sufficient corridor movement / bathroom use for disabled persons
- There is no storage space for the dwellings
- Refuse arrangements must be considered. Refuse areas must be accessible.
- The following should be reviewed to comply with accessibility standards
  - Lift dimensions
  - Dwelling front door widths
  - Internal corridor widths
  - Storage
  - Refuse arrangements

### Architect's risk assessment schedule

| Project CDM co-ordinator: <b>Appleyards</b> |     |  |                  |              |   | Latest review: <b>26/10/2012</b> |  | Pages: <b>1</b> |  |
|---|-----|--|------------------|--------------|---|----------------------------------|--|-----------------|--|
| Element / Activity                          | No. | Potential hazard   | Persons at risk* | Risk factor* |   | Action taken at design stage     | Actioned   |                 | Possible control options (Contractor)  |
|   |     |  |                  | L            | S | R                                | By   | Date            |  |
| General                                     | 00a | Fire risk during works   | C/P/R            | 2            | 3 | 6                                |  |                 |  |
|   | 00b | Asbestos: removal or containment   | C/R              | 2            | 2 | 4                                | Asbestos report commissioned   |                 |  |
|   | 00c | Disruption of services: water, electricity, gas, etc.  | R                | 2            | 2 | 4                                |  |                 |  |
|   | 00d | TV dishes, etc. danger of falling while removing or, in future, erecting existing tenant installations | M/R              | 2            | 2 | 4                                | A central aerial system will be installed; tenants will not install private systems. |                 | Carry prohibition of tenant installation to O&M manuals                                  |
|   | 00e | Machinery – noise & vibration during the works   | R                | 3            | 1 | 3                                |  |                 |  |
|   | 00f | Public safety: construction site activities, wet & dirty streets and access                            | P/R              | 1            | 2 | 2                                |  |                 | Contractor to monitor during construction  |
|   | 00g | Emergency vehicle access, strategy during works  | P/R              | 1            | 2 | 2                                |  |                 | Contractor to monitor during construction  |
|   | 00h | Injury to persons resident during the works  | P/R              | 1            | 1 | 1                                |  |                 |  |
|   | 00i | Traffic disruption; access to parking and for services and statutory bodies                            | R                | 1            | 1 | 1                                |  |                 | Contractor to monitor during construction  |
|   | 00j | Unauthorized / unintentional access to site  | P/R/V            | 1            | 1 | 1                                | Hoarding and monitored security to suit local conditions                             |                 | Contractors method statement required  |
| Site clearance                              | 01a | Collapse of structure  | C/P/R            | 1            | 3 | 3                                |  |                 | Temp. works method statement required  |
| Access / egress                             | 02a | Machine movement / risk of collision due to lack of visibility, poor sightlines                        | C/P/R            | 1            | 2 | 2                                |  |                 |  |
|   | 02b | Temporary closures of Grenfell Road to services  | R                | 1            | 1 | 1                                |  |                 |  |
| Excavation, demolition                      | 03a | Machinery – noise & vibration  | C/P              | 3            | 1 | 3                                |  |                 | Working hours to be agreed, out of hours working to be limited / negotiated / prohibited |
|   | 03b | Machine collision / vehicle stability  | C                | 2            | 1 | 2                                |  |                 |  |
|   | 03c | Risk of collapse / falls   | C                | 1            | 2 | 2                                |  |                 |  |
| Scaffolding                                 | 04a | Falls from height  | C                | 1            | 3 | 3                                |  |                 | Contractors method statement required  |
|   | 04b | Falling objects  | C/P/R            | 1            | 3 | 3                                |  |                 | Contractors method statement required  |
|   | 04c | Projections  | C/R              | 1            | 1 | 1                                |  |                 |  |
|   | 04d | Tripping and slipping  | C                | 1            | 1 | 1                                |  |                 |  |
| Stripping out, demolition                   | 05a | Falls from openings  | C/R              | 1            | 3 | 3                                |  |                 | Contractors method statement required  |
|   | 05b | Falling objects  | C/P/R            | 1            | 2 | 2                                |  |                 |  |
|   | 05c | Moving objects / crushing  | C/P/R            | 1            | 1 | 1                                |  |                 |  |
| Craneage                                    | 06a | Falling objects  | C/P/R            | 1            | 2 | 2                                |  |                 |  |
|   | 06b | Moving objects / crushing  | C                | 1            | 1 | 1                                |  |                 |  |
| Structural steel                            | 07a | New lift shaft, SW corner: rises 5 levels  | C/R              | 1            | 2 | 2                                |  |                 |  |
|   | 07b | Infill floor, SE corner, mezz & office levels  | C/P/R            | 1            | 2 | 2                                |  |                 |  |
|   | 07c | New canopy 4m above pedestrian traffic   | P/R              | 1            | 2 | 2                                |  |                 |  |
|   | 07d | Handling   | C                | 1            | 2 | 2                                |  |                 |  |
|   | 07e | Cutting, welding, hot work   | C                | 1            | 1 | 1                                | Only unavoidable hot work permitted  |                 | Contractor to institute permit system  |

Continued over

### RBKC Building Control Consultation – Fire Safety

A preliminary meeting with RBKC building control was held to discuss the current layouts and the proposed changes to the existing fire strategy. No major changes to planning layouts required but the discussions on the existing dry riser location and smoke ventilation introduced several services issues to be considered as part of the attached M&E section by Max Fordhams.

One of the issues was a request to extend the existing smoke extract system down through Walkway level into the proposed mezzanine level without knowing if the existing system is fit for purpose under the current building regulations.

Other issues raised to be taken into consideration are:

- Fire fighting lift location and which floors serviced to be clearly indicated on application
- Existing fire safety strategy for each floor and proposed changes to be clearly explained.

### Health and Safety

Studio E's Risk Assessment is shown opposite. A full Tender Health and Safety File will need to be prepared for tender, including the phasing requirements for the building so that disruption to residents is kept to a minimum and they are not put in any danger by the building work.

### Contract Site Boundary

The exact line separating works paid for under KALC and works under this project has still to be agreed. For instance is understood that the removal of the stepped ramp will fall under Grenfell project but the re-provided play area which overlaps with this area will fall under KALC. The working space available on the north side of the tower is constricted and Bouygues/Leadbitter will need to be approached to understand if there is any opportunity to move their hoarding back.

| Continued...                 |     |   |                  |              |   |   | Latest review: 26/10/2012   |         | Pages: 2                                     |
|------------------------------|-----|---|------------------|--------------|---|---|---|---------|--|
| Element / Activity           | No. | Potential hazard  | Persons at risk* | Risk factor* |   |   | Action taken at design stage  |         | Possible control options (Contractor)        |
|                              |     |   |                  | L            | S | R | By  | Date    |  |
| Frame preparation            | 08a | Shot-firing or drilling injuries  | C                | 1            | 2 | 2 |   |         |  |
| Installation of new cladding | 09a | Falling / breaking glazed units   | C/P              | 1            | 3 | 3 |   |         | Contractors method statement required        |
|                              | 09b | Falls from height   | C                | 1            | 3 | 3 |   |         | Contractors method statement required        |
|                              | 09c | Handling  | C                | 1            | 2 | 2 |   |         |  |
| Brick- & blockwork           | 10a | Handling  | C                | 2            | 1 | 2 |   |         |  |
| Plastering                   | 11a | Working at height   | C                | 2            | 1 | 2 |   |         |  |
| Installation of new services | 12a | Making connections to existing live services  | C/R              | 1            | 3 | 3 |   |         | Contractor to carry forward to M&E installer |
| Decoration                   | 13a | Working at height   | C                | 2            | 1 | 2 |   |         |  |
| Maintenance (future)         | 14a | Cleaning of new external cladding windows   | R                | 2            | 2 | 4 | Horizontal 'tilt & turn' units with key-operated restrictor will now be fitted. | 10/2012 | Carry forward to O&M manuals                 |
|                              | 14b | Cleaning of new curtain wall elements   | M                | 2            | 2 | 4 |   |         | Carry forward to O&M manuals                 |
|                              | 14c | Cleaning of new canopy  | M                | 2            | 2 | 4 |   |         | Carry forward to O&M manuals                 |
|                              | 14d | Re-lamping in double- & triple-height volumes   | M                | 1            | 2 | 3 |   |         |  |
|                              | 14e | Lift maintenance  | M/R              | 1            | 1 | 2 |   |         |  |
| Fire                         | 15a | General means of escape: review   | R/P/V            | 1            | 3 | 3 |   |         |  |
|                              | 15b | Alarm system: review  | R/P              | 1            | 3 | 3 |   |         |  |
|                              | 15c | Fire-fighting strategy: review  | R/P/V            | 1            | 3 | 3 |   |         |  |
|                              | 15d | Escape strategy at mezz. ground & walkway levels - from lifts and commercial premises | R/P/V            | 1            | 3 | 3 |   |         |  |
| Rubbish removal              | 16a | Access for sanitary services: review  | M/R              | 2            | 1 | 3 |   |         |  |

**Key:** Persons at risk: C = Contractor personnel, M = Maintenance staff, P = Public, R = Residents, V = Visitors (E = Environment)

Risk factor rating: L = Likelihood (1 = Low, 2 = Medium, 3 = High), S = Severity (1 = Low, 2 = Medium, 3 = High), R = Risk (Likelihood x Severity)

- Hazards scoring a Risk factor 3 attracts special notice, Risk factor of 4 or more require special management and an action plan to be agreed with the CDM co-ordinator.

## 5 OUTLINE SPECIFICATION

Stage D Report  
Grenfell Tower Regeneration Project

### UNDERCROFT

- H92 Rain-screen Cladding  
Soffit ceiling
- Demountable 6mm HPL cladding (Trespa or similar) Uni-Strut sub-frame system. (colour coded surface fixings)
- L20 Roller Shutters  
New Garage Doors  
New gates to cycle lockup
- Superstructure: Roof – Investigate source of leaks, repair if possible.
- C20 Demolition  
Removal of stepped ramp and planters.

### TOWER EXTERIOR

- H11 PPC Aluminium thermally broken curtain walling system including:
- Aluminium access and fire escape doors and fixed light panel
  - Automatically opening vents (AoV) linked to fire alarm system
  - External louvers to smoke vent system air intake
  - Toughened safety glazing below 1100mm from FFL
  - Manifestation
  - System to achieve U-value of 1.6 W/m²K
- H42 Pre-cast concrete Cladding - low level columns
- Finished pre-cast concrete insulated panels fixed to existing concrete columns
- L10 PPC Aluminium thermally broken windows.
- openable windows PPC Aluminium doubled glazed
  - Inward opening casement windows (purge panels)
  - External louvers to purge panel windows 100mm max openings
  - Large tilt and turn casements. Lockable restrictors to prevent casual opening.
  - Obscure panels below 1100mm from FFL

- Opaque white insulated blanking panels between windows
- H92 Rain-screen Cladding: Pre-patinated zinc rainscreen cladding on aluminium cladding rails with insulation fixed directly to existing concrete.
- 1mm folded metal shingles on steel substrate: Rheinzink Blue
  - Pre-formed window surrounds (cill/jamb/head). Cills angled to prevent roosting.
  - Spandrel panels U-value 0.15 W/m²K (=150mm PIR)
  - Columns U-value 0.18 W/m²K (=100mm PIR)
  - Decorative strips to Strips to
- P10 Sundry Insulation / Proofing Work
- Celotex FR5000 (100mm) to existing columns
- J41 60mm min Rigid PUR roof insulation over existing membrane. Bitumous felt roof covering dressed over aluminium flashings at roof edges.
- M22 (Plant Room external walls) External Insulated render

### RECONFIGURED ENTRANCE AND OFFICE AREAS

- K10 Stud Partitions
- 100mm Typical C section metal framing to EMB Office & WC
- Fire: Type 1:
- 30min FR (2no. layers 15mm Wallboard)
- Security:
- 225mm Heavy Duty C section metal framing around Concierge desk (2no. layers 15mm Wallboard)
- Plasterboard Ceilings
- British Gypsum 9mm plasterboard on metal uni-strut sub frame to entrance lobby
- L10 Glazed Screens
- Fire rated (FD30) glazed screens Inc. Doors between entrance lobby and existing lift core.

Glazed security screens to Concierge desk.

- L20 Doors
- Internal doors: solid core with laminate facing and hardwood lipping and beading to vision panels.
  - Automatic steel fire shutter to concierge desk.
- L30 1300mm High toughened glass glazed balustrade around stair and entrance lobby void adjacent to lift and staircase. 1100mm high 40mm dia. Stainless Steel handrail to follow balustrade.
- N13 Sanitary Appliances & Fittings
- Doc M pack Disabled 'Unisex' WC
  - Lever handle taps
- N11 Domestic Kitchen Furnishings and Equipment Kitchenette
- 850mm High worktop
  - 1200mm base unit support for sink
  - Single basin sink with drainer
  - Lever handle taps
- N10 Furnishings
- Reception desk (Concierge)
  - Cabinets for CCTV equipment
  - Blinds
  - Barrier matting system to main entrance
- M40 Large format regularised porcelain floor tiles to entrance lobby and ground floor lift lobby
- M50 Carpet Tiling to EMB office  
Safety Vinyl to Kitchenette & WC  
Vinyl Flooring to Concierge and new lift lobbies  
Aluminium with vinyl insert nosing to stairs
- M60 Painting  
Walls – Emulsion  
Timber Skirting / trims – Vinyl Emulsion



## NURSERY

- K10 Internal Partitions -100mm Typical C section metal framing
- Fire: Type 1: 30min FR ( 2no. layers 15mm Wallboard)
  - Acoustic: Type A (52db TBC) (between Nursery / EMB) Overall width 150mm Staggered 100mm C sections 50 Rockwool Insulation 2No. layers of 15mm Wallboard)
- Plasterboard Ceilings
- British Gypsum 9mm plasterboard on metal furring's
- K32 Panel Cubicles: 4no. 1100mm high children's toilet cubicles no requirements for doors
- L10 Glazed Screens
- Glazed screens fixed light around internal Doors between entrance lobby and play spaces.
- L20 Internal Doors
- Solid core laminate-faced, hardwood lippings
  - Vision panels, anti-finger trap
  - Stainless steel kickplates and ironmongery
  - Electrically powered security roller shutters installed internally behind curtain walling / windows
- N10 General Fixings
- Barrier matting system to main entrance
  - Baby change unit and storage under
  - Roller blinds to all windows
- N11 Domestic Kitchen Furnishings and Equipment Kitchen
- 850mm High worktop
  - 1200mm base unit support for sink
  - Double basin sink with double drainer
  - (hand wash) 1no. WHB & 1no. childrens WHB
- N13 Sanitary Appliances & Fittings
- Doc M pack Disabled 'Unisex' WC
  - 5no. children's WHB & WC
  - 2No. Belfast Sinks and worktop located within play areas

- M50 Sheet flooring
- Vinyl Flooring throughout
  - Safety Vinyl to Kitchen, WC's & Baby change
  - Whiterock or similar splashbacks to all sinks / WHB and baby change
- M60 Painting
- Walls – washable satin Emulsion
  - Timber Skirting / trims – Eggshell

## EXISTING CORE / LIFT LOBBY

Builder's work and making good associated with M&E works on relevant floors. Existing finishes to be protected throughout works.

- K10 Plasterboard Ceilings
- British Gypsum 9mm plasterboard on metal furring sub frame
- P20 Pipework encasement Pendock profile or similar

## NEW CORE / LIFT LOBBIES

New slab at mezzanine level. New lift openings at Mezzanine and Walkway +1. New connection to stair at Walkway +1 and openings for doors to flats, new connection to refuse chute.

- K10 Plasterboard Ceilings
- British Gypsum 9mm plasterboard on metal furring sub frame
- M20 Plaster on masonry
- M50 Vinyl flooring and cove skirtings
- M60 Eggshell

## BOXING CLUB

Fixtures and fittings to accommodate equipment to be agreed. Existing screed to be lifted to allow space for new isolated floor build up.

- K10 (Inner Leaf) Structural Framing System (SFS)
- Internal Partitions:
- 100mm Typical C section metal framing

- Fire: Type 1: 30min FR ( 2no. layers 15mm Wallboard) (see SEA drg. No. RE111)
- Acoustic: (see SEA drg. No. RE111)
- Type A (52db? TBC) (between Nursery / EMB) Overall width 150mm Staggered 100mm C sections 50 Rockwool Insulation 2No. layers of 15mm Wallboard)

- L10 Glazed Screens
- Glazed screen with openable sliding light to office hatch
- L20 Internal Doors
- Vision panels / obscure glazing
- Lever handle, Kick and push plates
- K40 Demountable suspended ceilings throughout. 100% RH boards to be used in showers.
- M50 Raised access floor (100mm) for acoustic control within sports activity areas with safety vinyl flooring
- M50 Vinyl flooring to office and corridor
- Safety Vinyl Flooring to all changing, WC and Shower areas.
- N10 General Fixings
- To be agreed.
- N10 Sanitary Appliances & Fittings
- Doc M pack Disabled 'Unisex' WC
- Lever handle taps throughout
- Drinking water fountain located within sports activity area
- K32 Shower Cubicles: HPL
- N10 Kitchen Fittings
- 850mm High worktop Single sink with drainer
- P20 Isolated trims & Skirtings
- 100mm pencil rounded pre-finished timber skirting to base of all partitions and external wall dry lining. (see finishes)
- 125 x 20mm pre-finished timber cill boards (see finishes)
- N10 Furnishings

## 5 OUTLINE SPECIFICATION

Stage D Report  
Grenfell Tower Regeneration Project

Window Blinds / obscure glazing panels to be confirmed

M40 Tiled splashbacks to all sinks / WHB  
Tiled shower floors and walls.- full height.

M60 Water based Eggshell

### NEW RESIDENTIAL FLATS - MEZZANINE & WALKWAY +1

Fixtures and fittings based on minimum needs TMO to agree on level of finishes, fit out for kitchen and furnishings to be included as part of the works.

K10 Internal Partitions:  
100mm Typical C section metal framing throughout flats  
Fire: Type 1: 30min FR ( 2no. layers 15mm Wallboard)  
Acoustic:  
- Type A (52db? TBC) (between flats) Overall width 150mm  
Staggered 100mm C sections 50 Rockwool Insulation  
2No. layers of 15mm Wallboard)  
- Type B (32db? TBC) (within flats) 100mm C section 2  
layers of 12mm wallboard)

L20 Internal Doors (Typical Flat)  
FD30 to all doors leading off internal corridor spaces  
Additional allowance for FD30 external door to flat entrance.

K10 Plasterboard Ceilings  
British Gypsum 9mm plasterboard on metal furring sub frame  
British Gypsum 9mm moisture resistant plasterboard to  
bathrooms on metal furring sub frame.

N10 Sanitary Appliances & Fittings

N11 Domestic Furnishings - *(level of finish / storage requirements to be agreed)*  
850mm High worktop continuous around 2 walls  
1200mm base unit support for sink  
Single basin sink with drainer (lever handle taps)  
4 ring cooking hob  
Extractor hood *(fan covered in M&E)*

P20 Isolated trims & Skirtings  
100mm pencil rounded pre-finished timber skirting to base of  
all partitions and external wall SFS lining. (see finishes)  
25mm square edged pre-finished timber architrave to all  
internal doors. (see finishes)  
125 x 20mm pre-finished timber cill boards (see finishes)  
Bath enclosure panel

N10 Window Blinds (to be confirmed by TMO)

M50 Timber laminate flooring & acoustic underlay to internal  
corridor, living, bedrooms and storage spaces  
Safety Vinyl to Kitchen, WC & Bathroom

M40 Wall Tiling to Kitchen splashback around extent of worktop,  
WHB in WC and 2no. walls in Bathroom (WHB & Bath)

M60 Painting  
Walls – Emulsion  
Timber Skirting / trims – Vinyl Emulsion

### EXISTING RESIDENTIAL FLATS

Builder's work and making good associated with M&E works:  
replacement of radiators and new heating pipework. Existing finishes  
to be protected throughout. New window cill/surround required to  
making good around replacement windows.

K10 Plasterboard Ceilings  
British Gypsum 9mm plasterboard on metal furring sub frame

P20 Pipework encasement Pendock profile or similar

Finished timber surround to new window head, jambs and cill  
along with architrave to conceal décor area disturbed by  
removing existing window. Finish to be left clean or agreed  
with existing resident

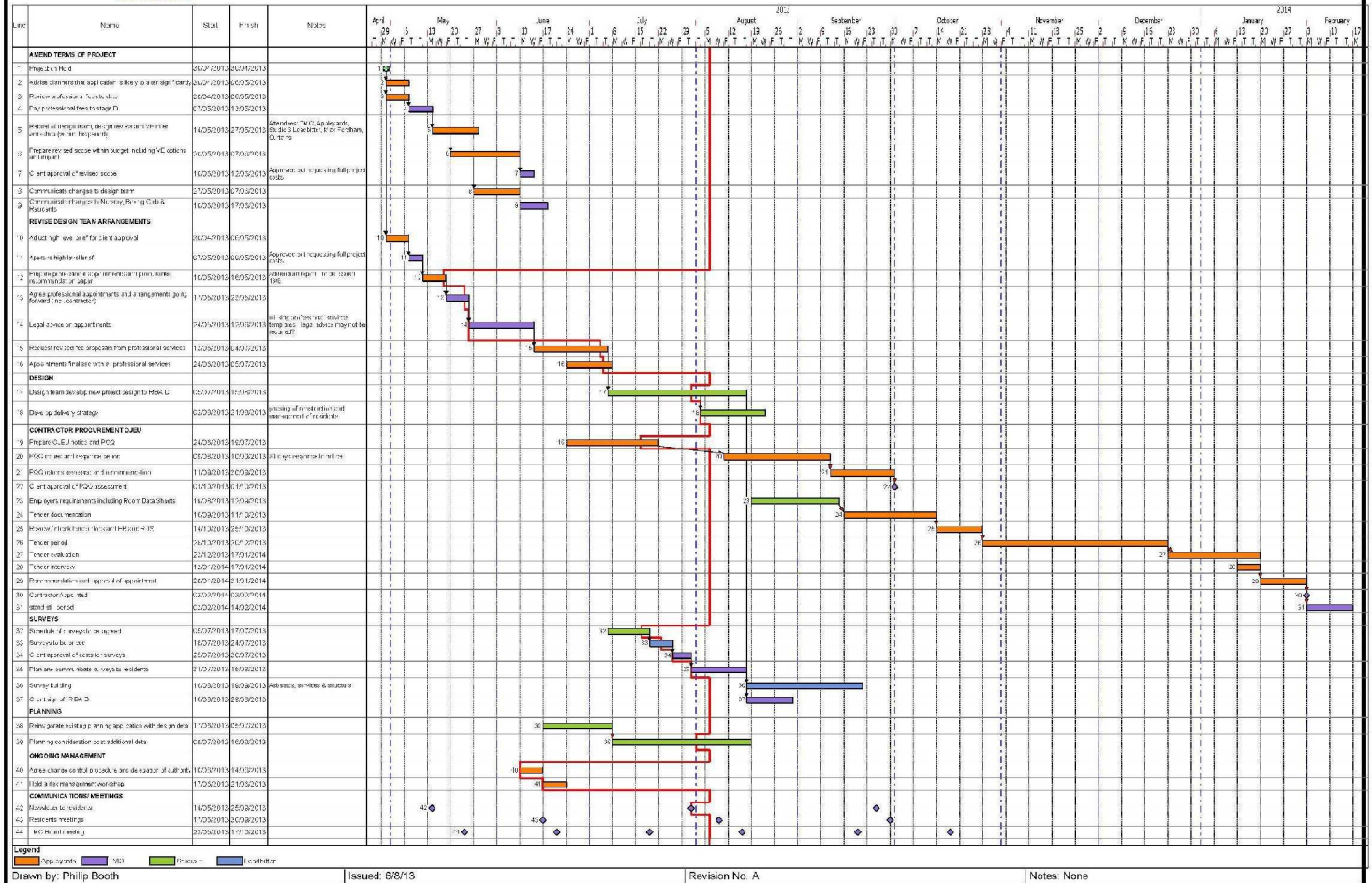
### PLANT ROOM / ROOF LEVEL





## 6 PROJECT MANAGER AND COST





11833 Grenfell Tower Regeneration Project

| Ref  | Main Elements   | Artelia UK (Updated on 07/6/13) |
|--|---|---------------------------------|
| <b>(A) Refurbishment of social housing units (Warr 3 units + Office level 4, total 7 units, Reduced from 8 units )</b>   |   |                                 |
| 1  | Demolition  | Included in (g)                 |
| 2  | Super-structure (in-fill flooring)  | 73,524.01                       |
| 3  | External wall - new enclosure 132m2   | 159,000.00                      |
| 4  | Staircase   | 444,000.00                      |
| 5  | Internal wall, partition and doors  | £110,389.00                     |
| 6  | Internal Wall, Floor & Ceiling finishes   | £189,915.91                     |
| 7  | Fittings and furnishing   | £96,500.00                      |
| 8  | Sanitary appliances   | inc in M&E                      |
| 9  | Mechanical services including above ground drainage, cold water installation, ventilation, fire alarm, BMS Excludes heating (in (i) Central Services) | £145,208.44                     |
| 10   | Electrical including lighting and power and External lighting   | £183,569.40                     |
| <b>(B) Minor refurbishment works to existing 20 storey flats and lodges, i.e. services encasement and bulkhead plasterboard ceiling (120 units) including external decorations works</b> |   |                                 |
|  |   | 385,619.00                      |
| <b>(C) Nursery and Meeting, Concierge (Ground floor - 490m2)</b>   |   |                                 |
|  |   | 475,597.80                      |
| 1  | Demolition  | Included in (g)                 |
| 1a   | Allowance for moving nursery to temporary location, storage cost, removal company   | £70,000.00                      |
| 2  | Super-structure (in-fill flooring)  | £18,020.00                      |
| 3  | External wall - new enclosure   | £24,760.00                      |
| 4  | Staircase   | £44,000.00                      |
| 5  | Internal wall, partition and doors  | £51,899.00                      |
| 6  | Internal Wall, Floor & Ceiling finishes   | £78,680.00                      |
| 7  | Fittings and furnishing   | £40,762.90                      |
| 8  | Sanitary appliances   | inc in M&E                      |
| 9  | Mechanical services including cold water installation, ventilation, fire alarm, BMS, heating  | £122,434.01                     |
| 10   | Electrical including lighting and power   | £87,908.00                      |
| <b>(D) Baseline work spaces/Storage Offices - OMITTED except Undercroft lighting and suspended ceiling (500m2 floor - 280m2)</b>   |   |                                 |
|  |   | £50,000.00                      |
| 1  | Keep undercroft soffit, new uplighting and downlighting with new suspended ceiling cover  | £50,000.00                      |
| <b>(E) Boxing club (Walkway level - 460m2, with B&amp;B office 61m2)</b>   |   |                                 |
|  |   | £475,692.73                     |
| 1  | Demolition  | Included in (g)                 |
| 2  | Super-structure (in-fill flooring)  | £37,020.00                      |
| 3  | External wall - new enclosure   | £115,500.00                     |
| 4  | Staircase   |                                 |
| 5  | Internal wall, partition and doors  | £83,518.00                      |
| 6  | Internal Wall, Floor & Ceiling finishes   | £76,483.15                      |
| 7  | Fittings  | £56,225.25                      |
| 8  | Sanitary and other appliances   | inc in M&E                      |
| 9  | Mechanical services including cold water installation, ventilation, fire alarm, BMS, heating  | £11,922.33                      |
| 10   | Electrical including lighting and power   | £38,165.00                      |
| <b>(F) Public realm</b>  |   |                                 |
|  |   | 222,680.00                      |
| 1  | Removal of stepped ramp   | £52,000.00                      |
| 2  | New permeable rubber crumb safety surface & New exposed aggregate concrete pavers   | £52,490.00                      |
| 3  | Fences, shrubs  | £6,000.00                       |
| 4  | Cycle stands, bollards and fencing  | 33,000.00                       |
| <b>(G) Demolitions</b>   |   |                                 |
|  |   | 182,170.00                      |
|  | Demolition to existing staircases, steps, partitions, doors, fittings, link bridge  |                                 |

| Ref  | Main Elements  | Artelia UK (Updated on 07/6/13) |
|--|--|---------------------------------|
| <b>(H) External Facade and Roof to main building</b>   |  |                                 |
|  |  | 2,302,220.00                    |
| 1  | Remove existing and install new central pivot windows  | 1,020,370.00                    |
| 2  | New cladding to facade   | £844,007.00                     |
| 3  | New curtain wall   | £227,250.00                     |
| 4  | New render and brickwork   | £195,903.00                     |
| 5  | Scaffolding, skips removal, survey, design and site management Preliminaries   | Included above & prelim         |
| 6  | Remove existing cladding clancy  | £15,000.00                      |
| 7  | Roof covering and PFC screen   | £90,000.00                      |
| <b>(I) Central Services</b>  |  |                                 |
|  |  | £1,943,714.79                   |
| 1  | Cap off existing services and remove redundant plants and pipework   | £99,000.00                      |
| 2  | Heating system including new gas absorption heat pump, radiators and pipework hot and cold water to existing flats   | £1,127,069.70                   |
| 3  | Allow a provisional sum for new extract smoke extract system   | 198,300.00                      |
| 4  | Domestic Smoke detectors & Carbon Monoxide (CO) detectors  | £7,500.00                       |
| 5  | Kitchen extract ventilation & VVC and bathroom extract fans replacement  | £198,000.00                     |
| 6  | Allowance for extra cover to existing communal substation  | £15,000.00                      |
| 7  | Allowance for 10 New CCTV camera   | £93,000.00                      |
| 8  | New emergency lighting to common/lobby areas, LED lighting to underside of canopy, new lighting in common area, upgrade of existing lighting in existing 20 storey dwellings | £110,072.00                     |
| 9  | Builder's Work in Connection with Services   | 75,000.00                       |
| 10   | New UKPN electrical connection (allow £75,000 if require)  | -                               |
| 11   | Upgrade door entry system (option 1 as on Lancaster West 1)  | £123,773.00                     |
| <b>(J) Estimated Construction Cost Excluding Preliminaries and Contingency, Sub-total (A to J)</b> |  |                                 |
|  |  | £6,930,275.00                   |
| 2  | Preliminaries (15% of construction costs) Sub-total 1  | 1,038,541.40                    |
| 3  | Client's Contingency Allowance   | 7,969,817.40                    |
|  |  | 753,000.00                      |
| <b>(K) Estimated Construction Costs</b>  |  |                                 |
|  |  | £8,738,000.00                   |
| 5  | Total professional fees and surveys Planning and Building Control Fees KCTMOY 5106 Fees  | £190,000.00                     |
| 6  | Contingency  | £123,000.00                     |
| 7  | Estimated total overall project costs  |                                 |
| 8  | Total overall project funding from TMO   | £10,068,000.00                  |
| 9  | Difference between overall project Funding and Estimated Project Costs   | £9,859,000.00                   |
| 10   |  | £235,000.00                     |
| 11   |  |                                 |

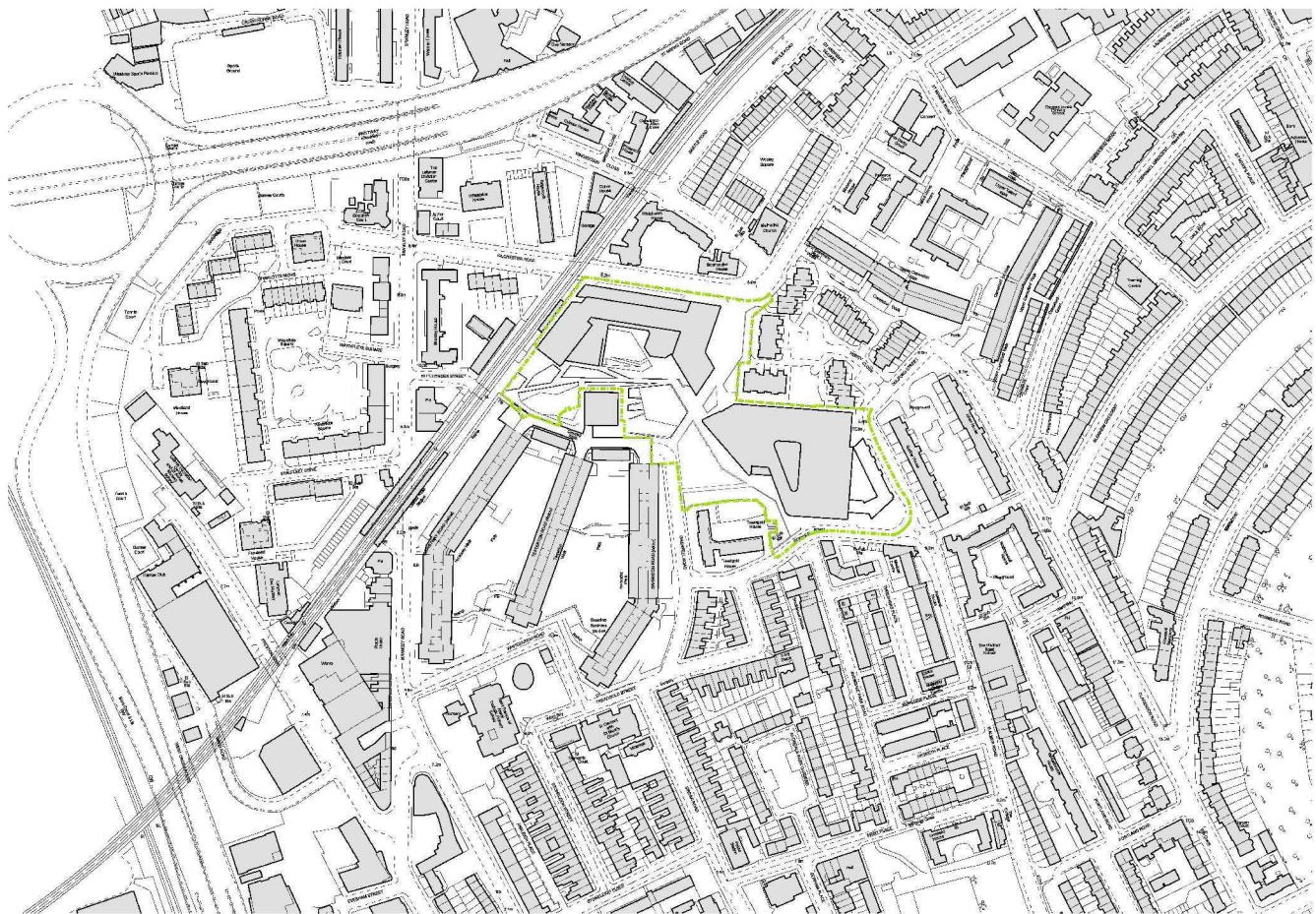
Artelia UK

7 August 2013 P111811833 - Grenfell Tower Improvement Works/Project01 Q&Estimate/Est Stage B111833 Grenfell Regeneration Stage D Cost Plan A

TMO00834924\_0036



## APPENDIX A – ORIGINAL DRAWINGS



Location Plan

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TOWER MILLS ORGANISATION  
TMO

**PLANNING**

**STUDIO E UP**

Project Name: Grenfell Tower Regeneration Project

Project: Grenfell Tower Regeneration Project

Location Plan

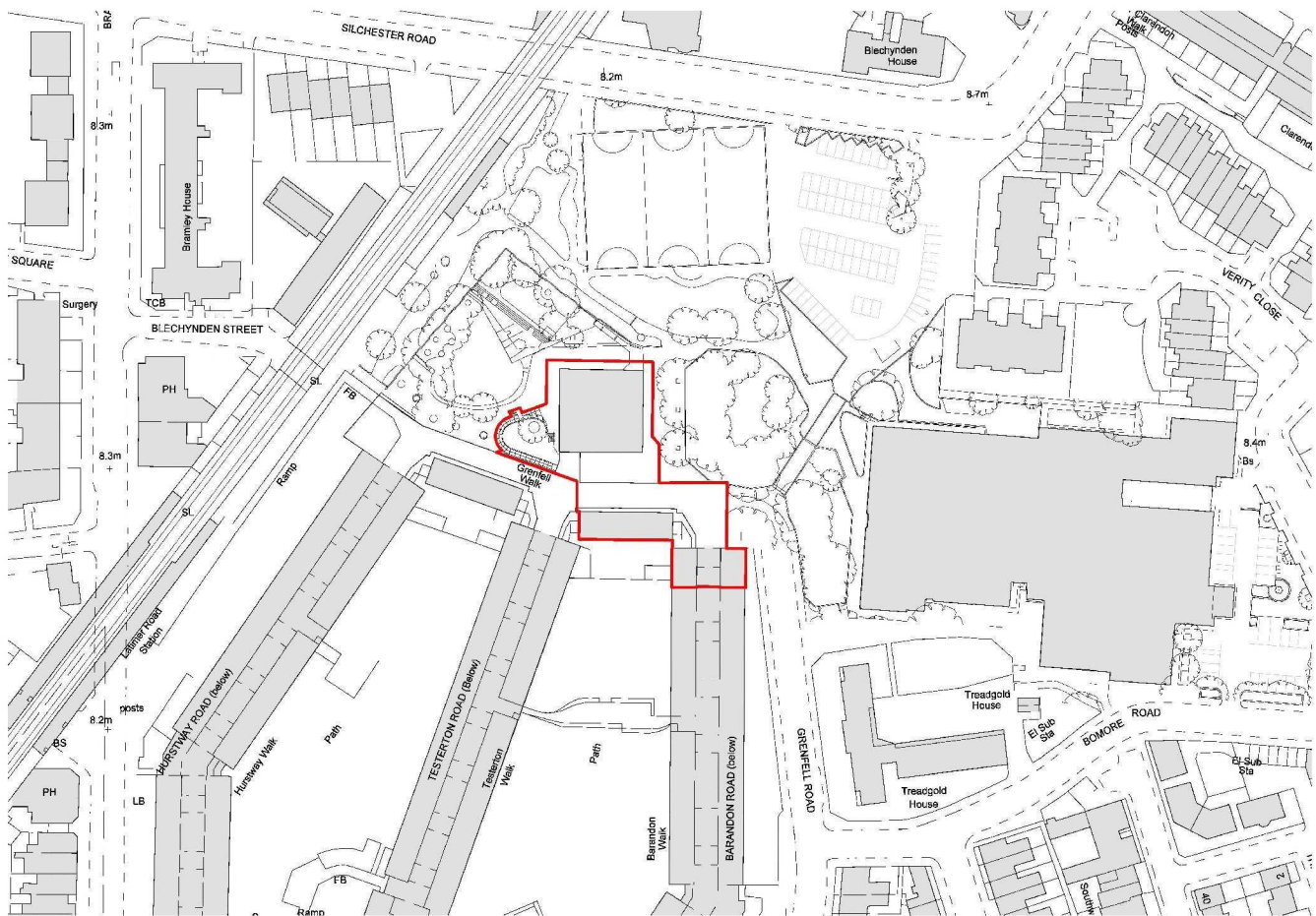
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Date: 12/9/11

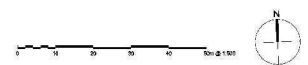
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Site Plan



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#### PLANNING

##### SILDO E UP

12/12/2011

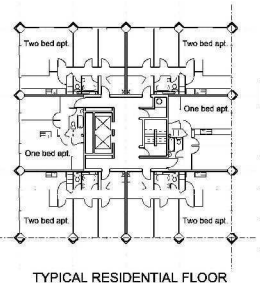
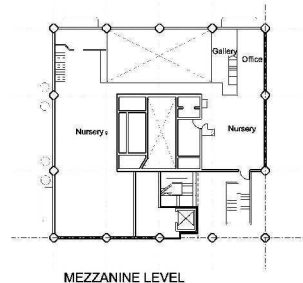
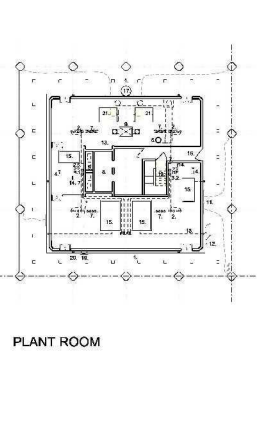
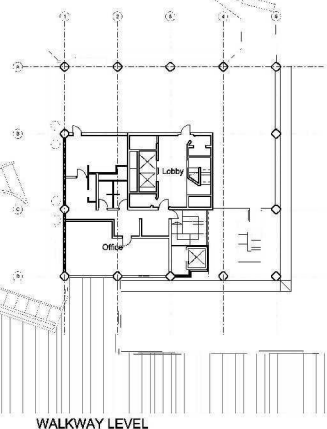
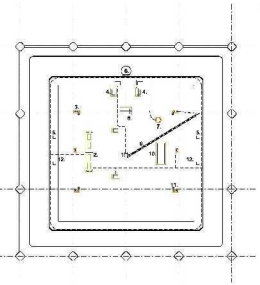
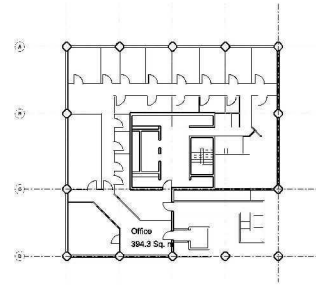
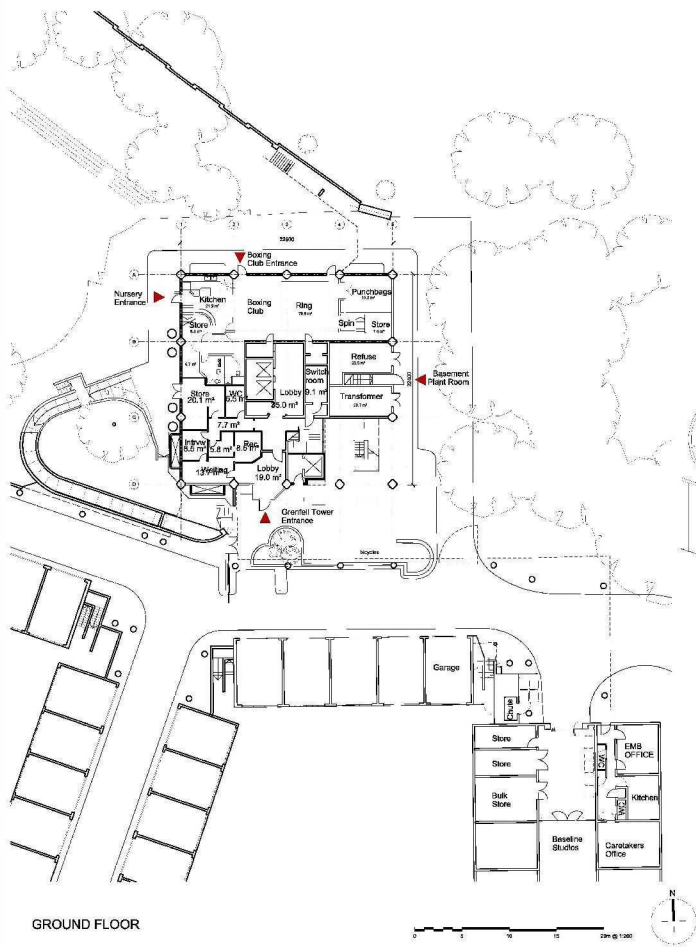
GRENFELL TOWER  
REGENERATION PROJECT

Existing  
Site Plan

1:500 @ A1 15/08/12

12/12/2011 00:00

12/12/2011 00:00



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Grenfell Tower  
Regeneration Project  
EXISTING  
FLOOR PLANS  
1:200 @ A1 15/08/12  
1279 PLOT 00  
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### Keyplan

7

1.2.2.2

1



STUDIO E LIP

Palace Wheel, Rainville Race  
 Local 1000  
 Tel. 1000

GRENfell TOWn

## REGENERATION PROJECT

EXISTING  
SECTIONS

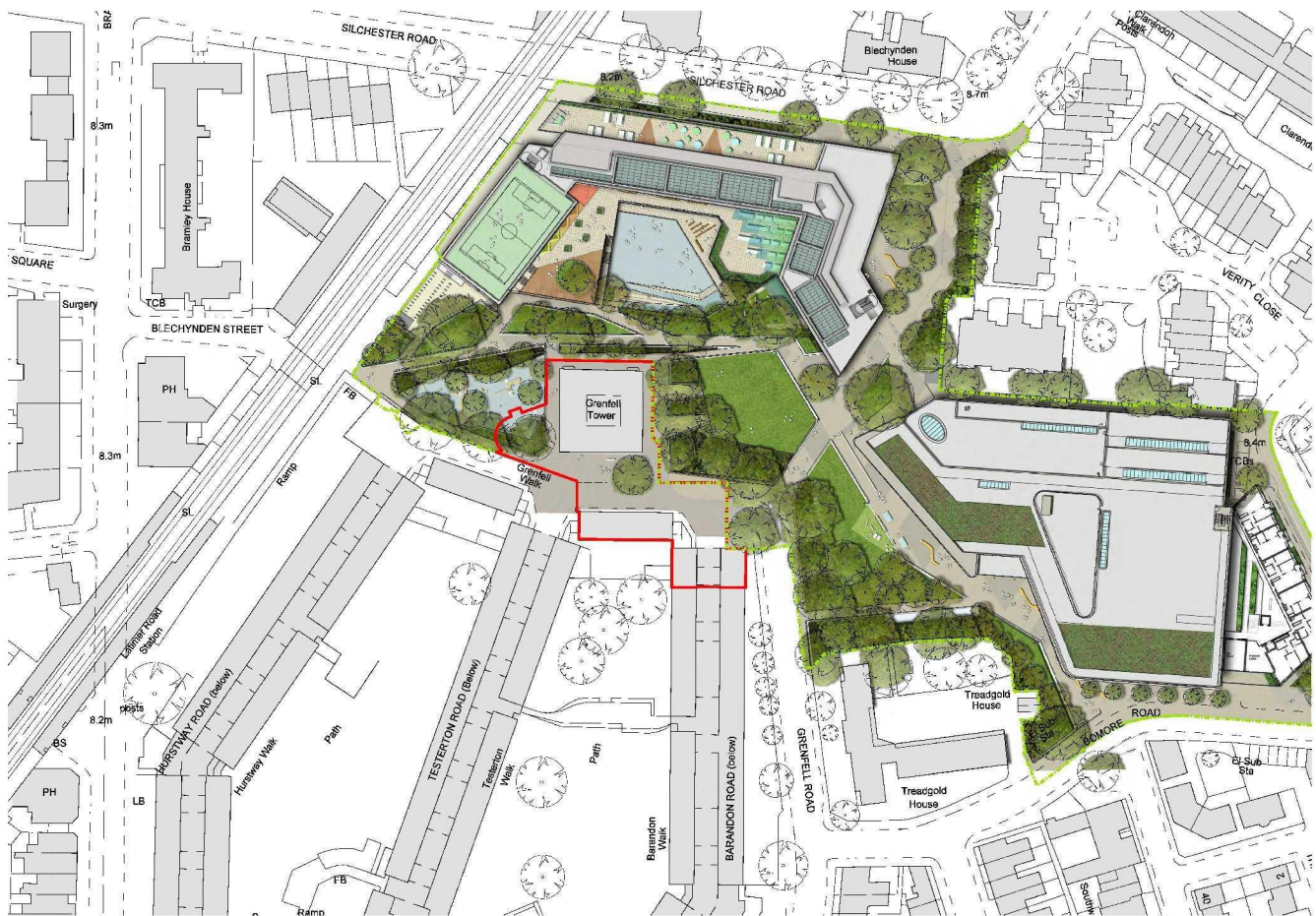
**(OPTIONAL)**

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SCALE DATE

1279 FL020 (

ENV. MON. ASSESS.

## APPENDIX B – PROPOSED DRAWINGS



Site Plan

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Legend:

- Current Boundary KALC
- Proposed Boundary Grenfell

STUDIO E.I.P.

STUDIO E.I.P.

GRENFELL TOWER REGENERATION PROJECT

Proposed Site Plan

1:500 @ A1 15/08/12

1279 PL 003 01

DATE: 15/08/12

15/08/12

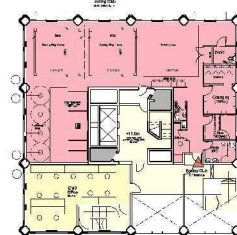




GROUND FLOOR



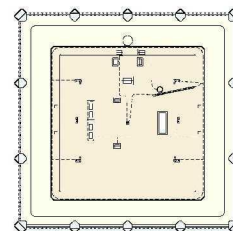
WALKWAY +1



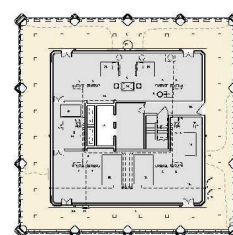
WALKWAY LEVEL



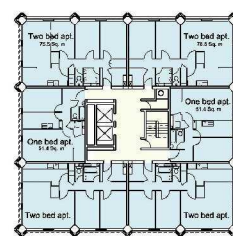
MEZZANINE LEVEL



ROOF PLAN



PLANT ROOM



TYPICAL RESIDENTIAL FLOOR

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Map

- Yellow: Circulation / Public Admin. Use
- Pink: Community Use
- Blue: New Residential
- Grey: Existing Removed

Prepared by: 01.10.2019 (Project Manager)



PLANNING

STUDIO E.I.P.

GRENFELL TOWER REGENERATION PROJECT

PROPOSED FLOOR PLANS

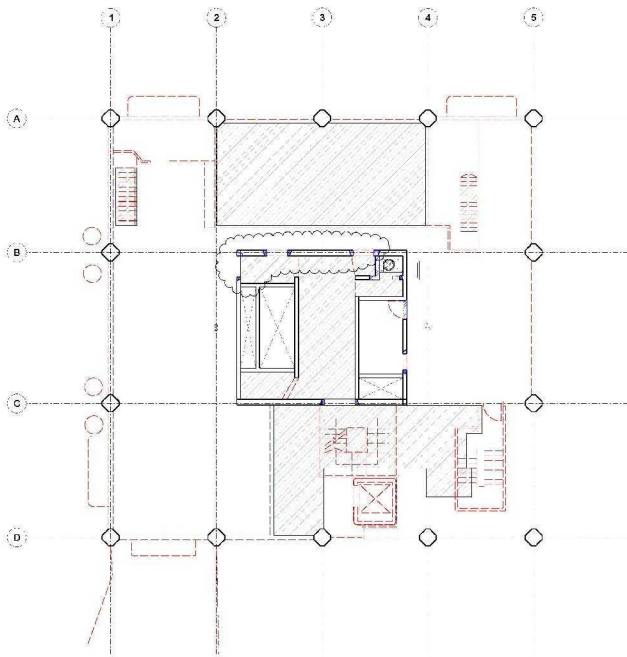
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1279 FL110 01

1279 FL110 01

TMO00834924\_0046





EXISTING FLOOR PLAN MODIFIED



PROPOSED FLOOR PLAN

- NOTE
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  3. THE CONSTRUCTION OF THE PROPOSED STRUCTURE SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE BRITISH STANDARD BS 5400-2:2000
  4. THE CONSTRUCTION OF THE PROPOSED STRUCTURE SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE BRITISH STANDARD BS 5400-3:2000

- KEY
- Yellow: Circulation / Public Admin. Use
  - Pink: Community Use
  - Blue: New Residential

- LEGEND
- Existing Removed
  - Acoustic high rated partitions
  - Fire Rated Partitions (30 FR)

20.11.2019 Designated access to the building



PLANNING

STUDIO E IUP

10.11.2019

GREENTOWER REGENERATION PROJECT

PROPOSED MEZZANINE FLOOR PLANS

1:100 @ A1 1508/12

1279 PL112 01

1279 PL112 01

1279 PL112 01

1279 PL112 01

1279 PL112 01

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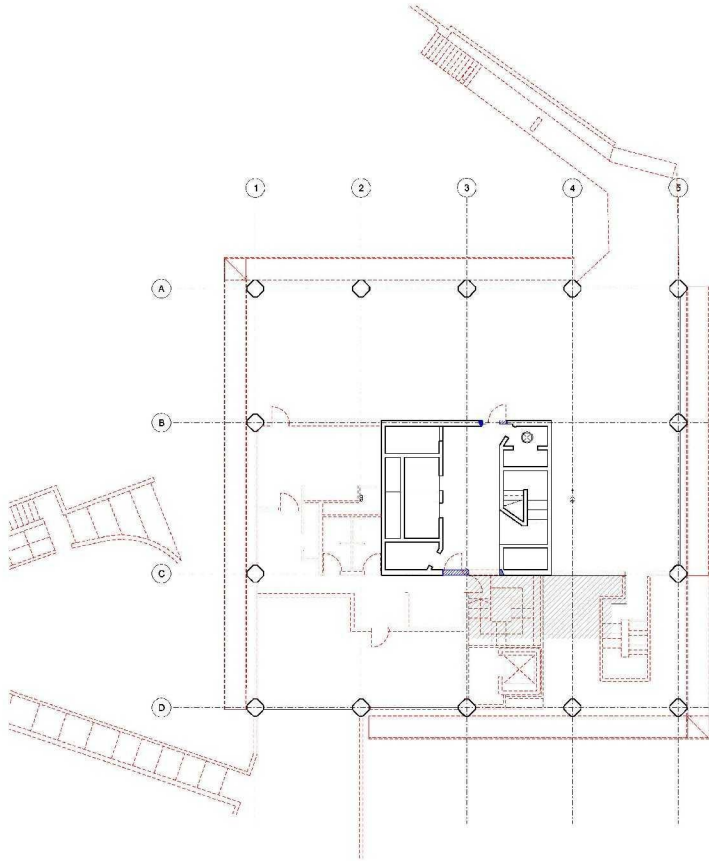
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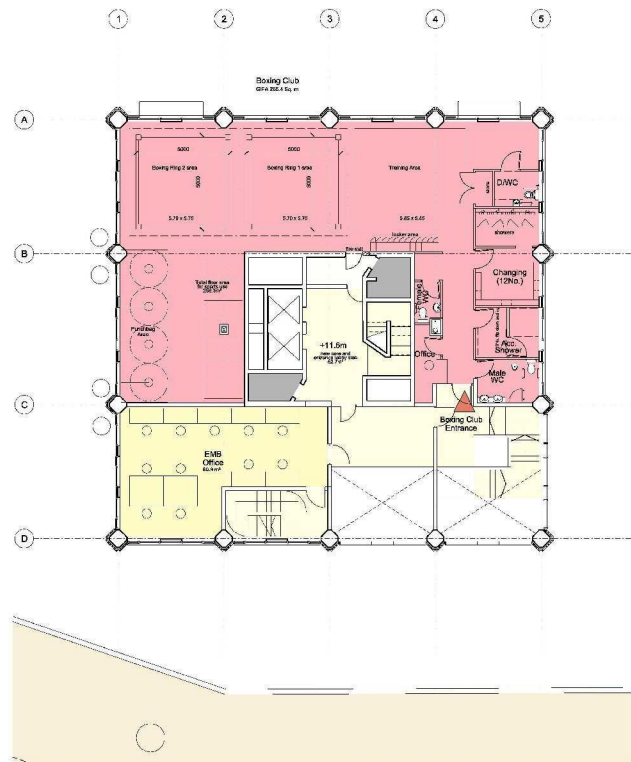
1279 PL112 01

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1279 PL112 01



EXISTING FLOOR PLAN MODIFIED



PROPOSED FLOOR PLAN

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  4. THE CONTRACTOR MUST FOLLOW THE DIMENSIONS AND LOCATIONS OF THE EXISTING STRUCTURE.

- Map
- Yellow: Circulation / Public Access, Use
  - Pink: Community Use
  - Blue: New Residential
  - Dashed line: Existing Removed

Prepared by: TMO



PLANNING

STUDIO E (L.P.)

GREENFELL TOWER

REGENERATION PROJECT

PROPOSED BUILDING PLAN

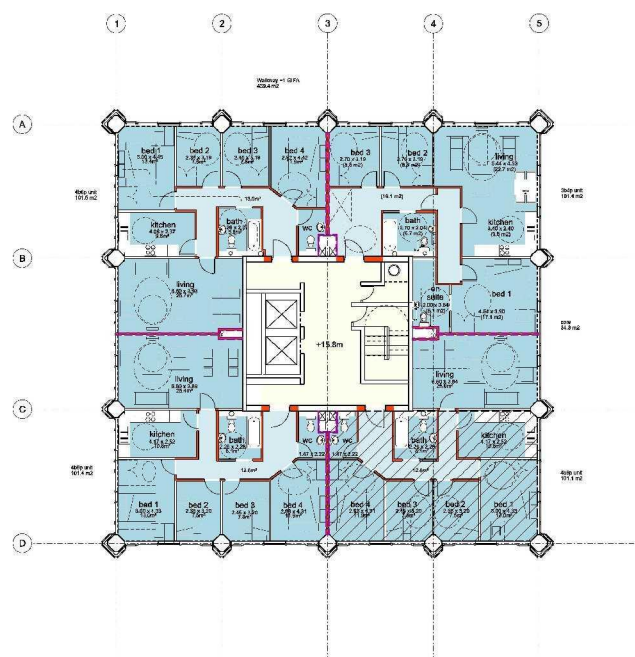
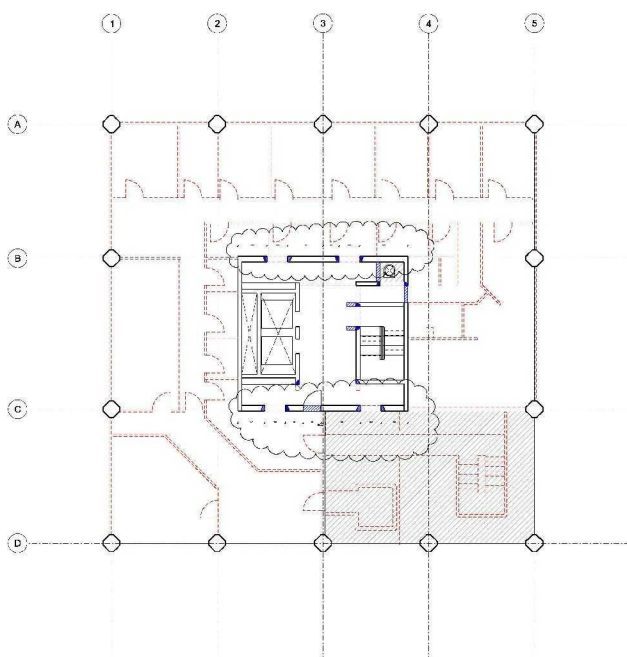
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DATE: 12/08/12

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4. WHERE DISCREPANCIES ARISE  
BETWEEN DIMENSIONS OR  
AMOUNTS OF DIMENSIONS &  
DATE DIMENSIONS, THE  
LATTER TAKE PRECEDENCE.

Legend

- Circulation / Public Admin. Use
- Community Use
- New Residential

Existing Removed

Acoustic high rated partitions

Fire Rated Partitions (30 FR)

01 22/07/13 Checked corner  
adapted to 80W fit



|          |  |
|----------|--|
| PLANNING |  |
|----------|--|

STUDIO E LLP

Fax: [REDACTED]  
 E-mail: [REDACTED]

**GREENFELD TOWER  
REGENERATION PROJECT**

PROPOSED  
WALKWAY +1  
FLOOR PLAN

1:1002A1 10/08/12

DATE

| DATE | DESCRIPTION | AMOUNT |
|------|-------------|--------|
|------|-------------|--------|

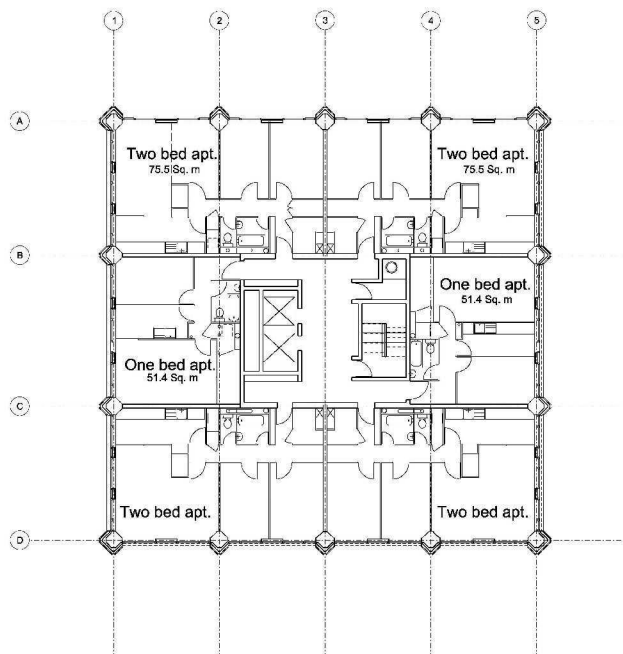
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  4. THE CONTRACTOR MUST ENSURE THAT ALL WORK IS COMPLETED TO THE SATISFACTION OF THE LOCAL AUTHORITY

Map

- Circulation / Public Admin. Use
- Community Use
- New Residential

Existing Removed



PLANNING

STUDIO E (L.P.)

Phase 1: Initial Consultation

12

GREENFELL TOWER

REGENERATION PROJECT

Project

PROPOSED RESIDENTIAL

FLOOR PLANS

1:100 (A1) 10/08/12

SCALE DATE

1279 FL115 00

DATE: 10/08/12

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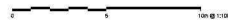
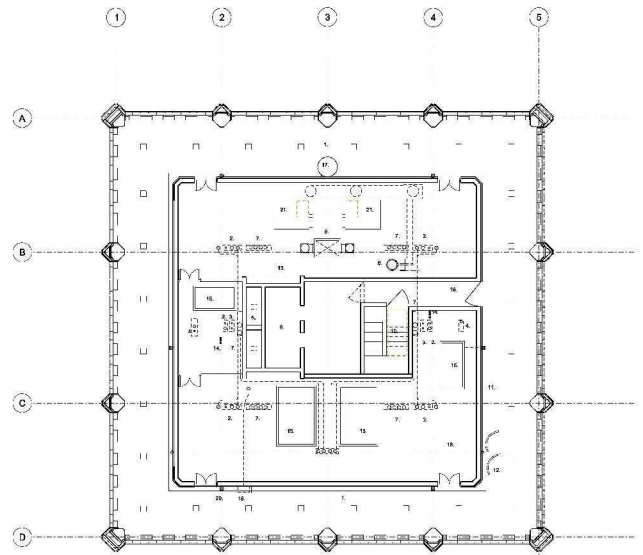
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Rev



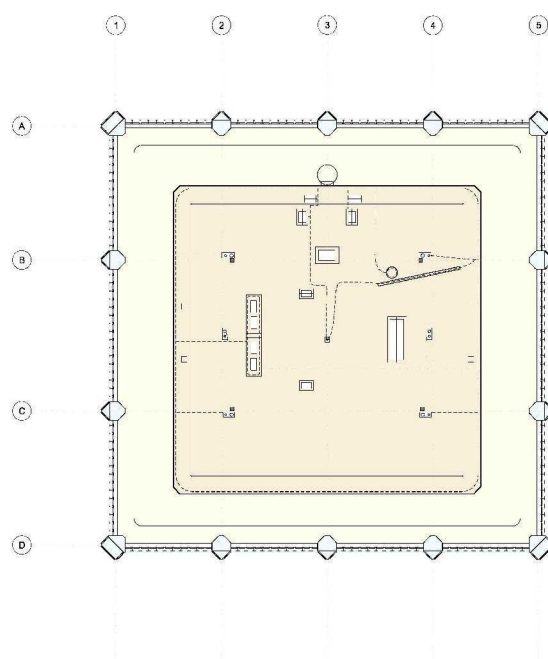
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| <b>PLANNING</b>  |
| <b>STUDIO E (L.P.)</b>                                   |
| Project Name: [REDACTED]                                 |
| Project Location: [REDACTED]                             |
| Project Description: GREMFELL TOWER REGENERATION PROJECT |
| Project Type: PROPOSED PLANT FLOOR PLAN                  |
| Project Number: 1279                                     |
| Project Date: 10/06/12                                   |
| Project Scale: 1:100 @ A1                                |
| Project Status: FL116 00                                 |
| Project Author: [REDACTED]                               |
| Project Checker: [REDACTED]                              |
| Project Approver: [REDACTED]                             |

TMO00834924\_0051

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Map



01 10/2012 Final Plans approved



PLANNING

STUDIO E (L.P.)

Greffell Tower Regeneration Project

PROPOSED FLOOR PLAN

1:100 (BA1) 10/2012

SCALE DATE

1279 FL117 01

000000 000000 000000



10m @ 1:100

TMO00834924\_0052



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- KEY
- Yellow: Circulation / Public Area Use
  - Blue: Community Use
  - Light Blue: New Residential
  - Red: Existing Removed

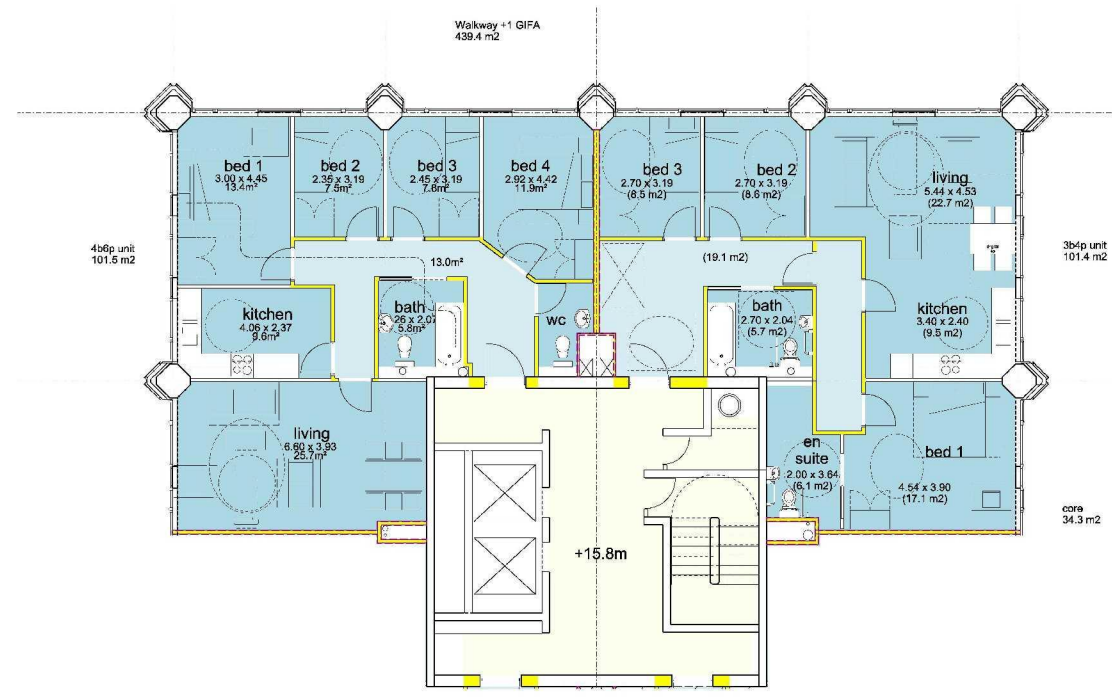
North East End  
21 22/12/12 Chapter 10/10/12

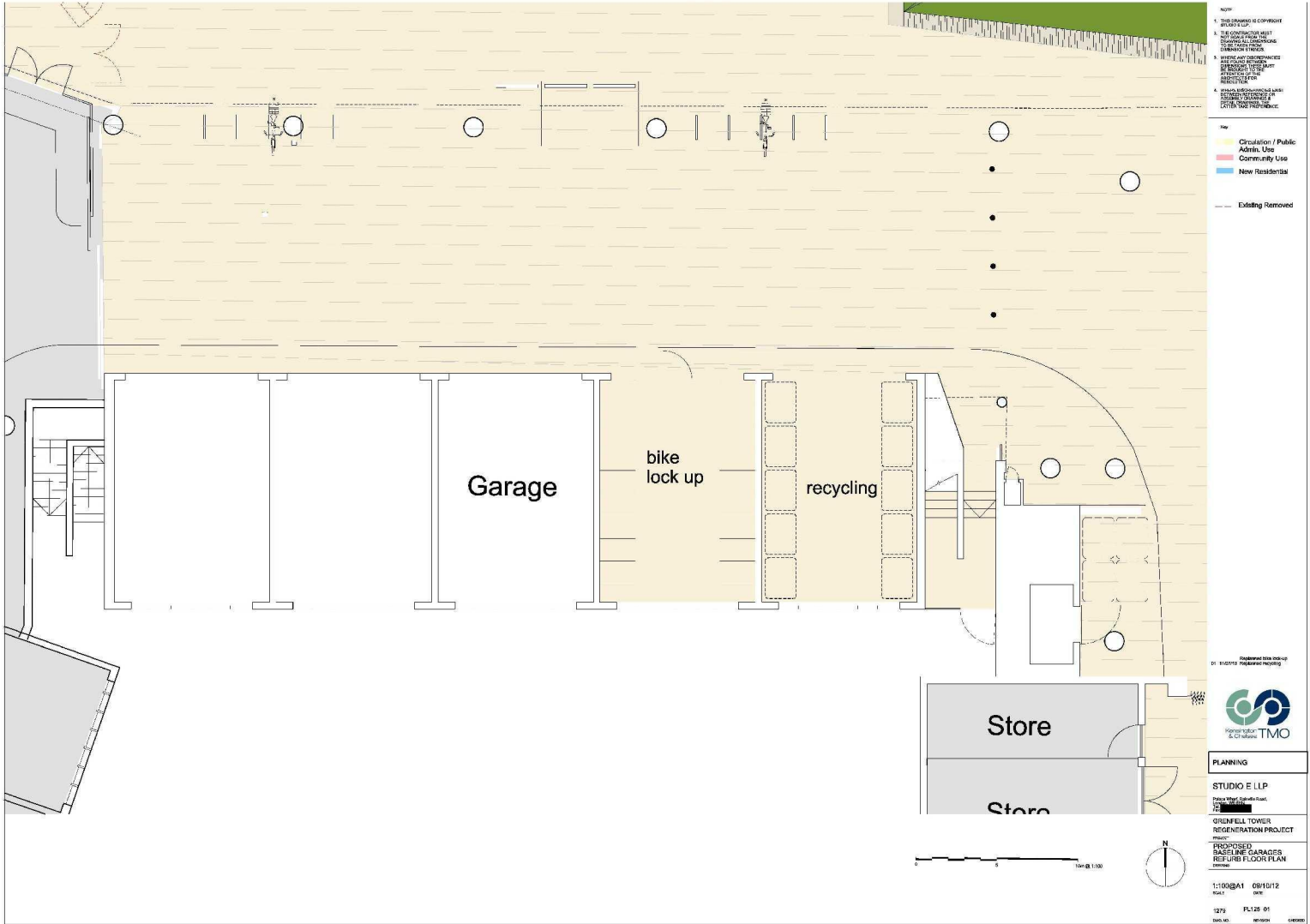


| PLANNING   |                |
|--|----------------|
| STUDIO E.I.P.                                      |                |
| Project Name: Greenfell Tower Regeneration Project |                |
| Project: 4 BED & 3 BED (Accessible)                |                |
| Project: FLOOR PLAN                                |                |
| 1:5000 A1 10/08/12                                 | DATE           |
| 1279   | FL118 01       |
| DATE: 10/08/12                                     | DATE: 10/08/12 |



10m @ 1:5000









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  4. THE ARCHITECT IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED BY THE CONTRACTOR.

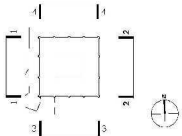
Map

Project Owner:  
Planning Officer:  
Planning Department



|   |
|---|
| <b>PLANNING</b>                                   |
| <b>STUDIO E (L.P.)</b>                            |
| Project Name: Grenfell Tower Regeneration Project |
| Project: Grenfell Tower Regeneration Project      |
| Proposed: West Elevation                          |
| Drawn: 12/10/12                                   |
| Scale: 1:200                                      |
| Sheet: 01   |
| Drawn: 12/10/12                                   |
| Checked: 12/10/12                                 |

Keyplan



1 WEST ELEVATION  
1:200

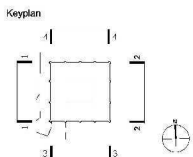
0 5 10 15 20m @ 1:200

TMO00834924\_0056





2 EAST ELEVATION  
T006



0 5 10 15 20m @ 1:200

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Map

01/10/2019  
Revised Drawing  
Revised Drawing  
Revised Drawing



FOR INFORMATION

STUDIO E LLP  
Studio E LLP  
12

GRIMFELL TOWER  
REGENERATION PROJECT

PROPOSED  
EAST ELEVATION

1:200 @ A1 16/10/12  
SCALE  
DATE

1279 FL003 01  
DATE: 16/10/12 16/10/12

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Map

01/10/12  
Studio E  
Studio E  
Studio E



PLANNING

STUDIO E LLP

Studio E LLP

GRIMFELL TOWER  
REGENERATION PROJECT

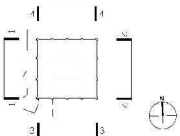
PROPOSED  
SOUTH ELEVATION

01/10/12

1279 FLR 01

01/10/12 01/10/12

Keyplan



3 SOUTH ELEVATION  
TMO

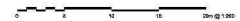
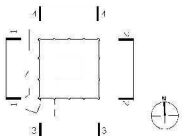
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TMO00834924\_0058



2 NORTH ELEVATION  
020

Keyplan



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10. THE DRAWING IS NOT TO BE USED FOR ANY OTHER PURPOSE.

Map

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# PLANNING

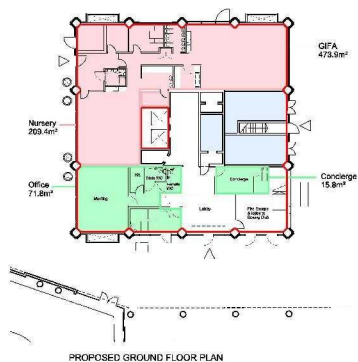
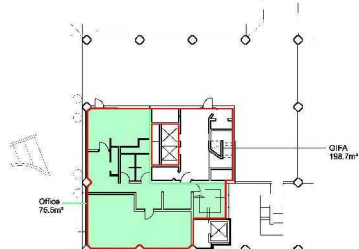
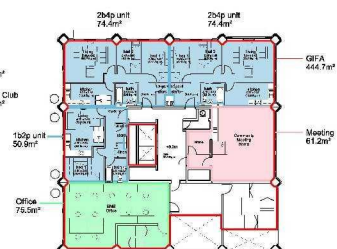
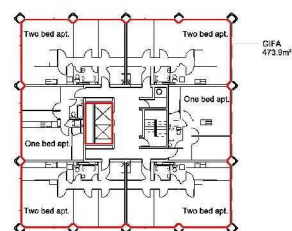
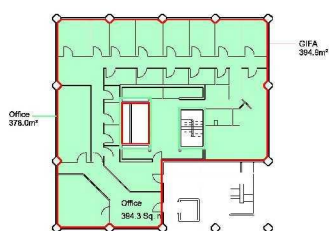
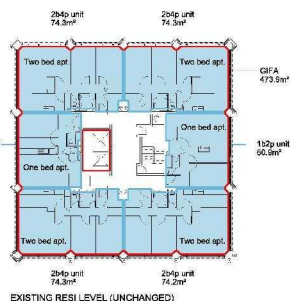
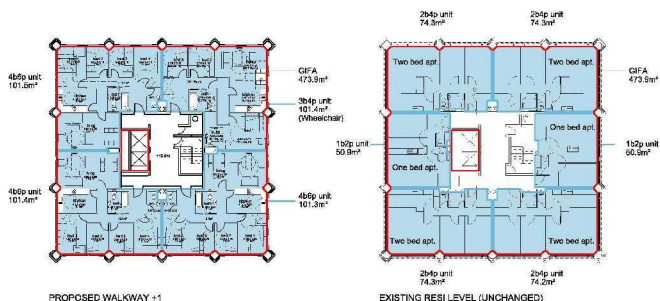
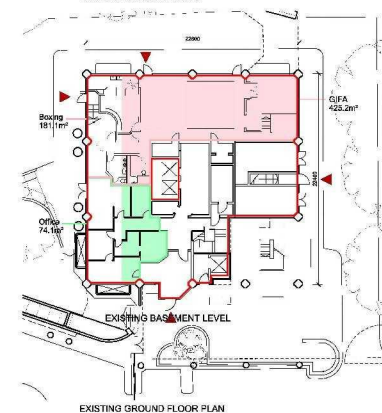
STUDIO E (L.P.)  
12

GRIMFOLL TOWER  
REGENERATION PROJECT

PROPOSED  
NORTH ELEVATION

1:200 @ A1 16/10/12  
SCALE DATE

1279 FLOOR 01  
DATE: 16/10/12 16/10/12

[illegible]

**NOTE**

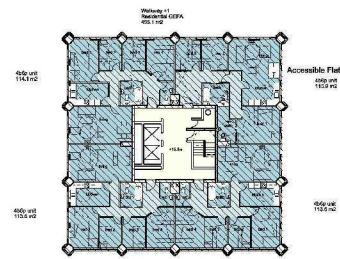
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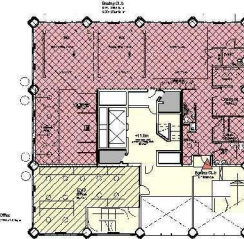


GROUND FLOOR

0 5 10 15 20m @ 1:200



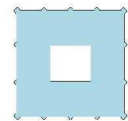
WALKWAY +1



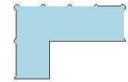
WALKWAY LEVEL



MEZZANINE LEVEL

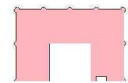


455.1 m<sup>2</sup>  
Walkway +1 Level



226.6 m<sup>2</sup>  
Mezzanine Level

TOTAL  
Residential 681.7 m<sup>2</sup>



Walkway Level

TOTAL  
Boxing Club 279.9 m<sup>2</sup>



68.8 m<sup>2</sup>  
Walkway Level



68.4 m<sup>2</sup>  
Mezzanine Level



82.7 m<sup>2</sup>  
Ground Level

TOTAL  
Office 219.9 m<sup>2</sup>

- NOTES
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  3. THE CONTRACTOR MUST FOLLOW THE INSTRUCTIONS OF THE ARCHITECT AND THE LOCAL AUTHORITY.
  4. THE CONTRACTOR MUST FOLLOW THE INSTRUCTIONS OF THE ARCHITECT AND THE LOCAL AUTHORITY.

Legend

- Yellow: Circulation / Public Admin. Use
- Pink: Community Use
- Blue: New Residential
- Grey: Existing Removed

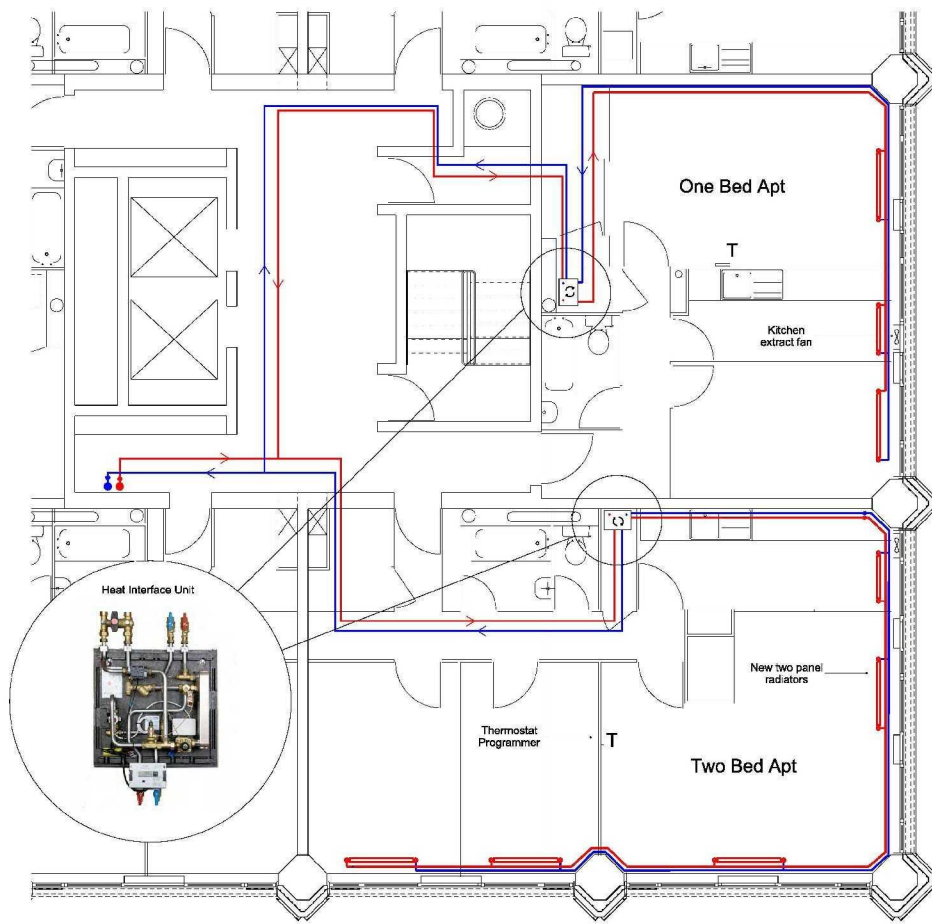


| PLANNING                   |                                     |
|----------------------------|-------------------------------------|
| STUDIO E UP                | 12/08/13                            |
| DATE                       | 12/08/13                            |
| PROJECT                    | GRENFELL TOWER REGENERATION PROJECT |
| PROPOSED AREA CALCULATIONS | DATE: 12/08/13                      |
| 1:200 @ A1                 | 12/08/13                            |
| SCALE                      | DATE: 12/08/13                      |
| 12/08/13                   | 12/08/13                            |
| DATE: 12/08/13             | DATE: 12/08/13                      |

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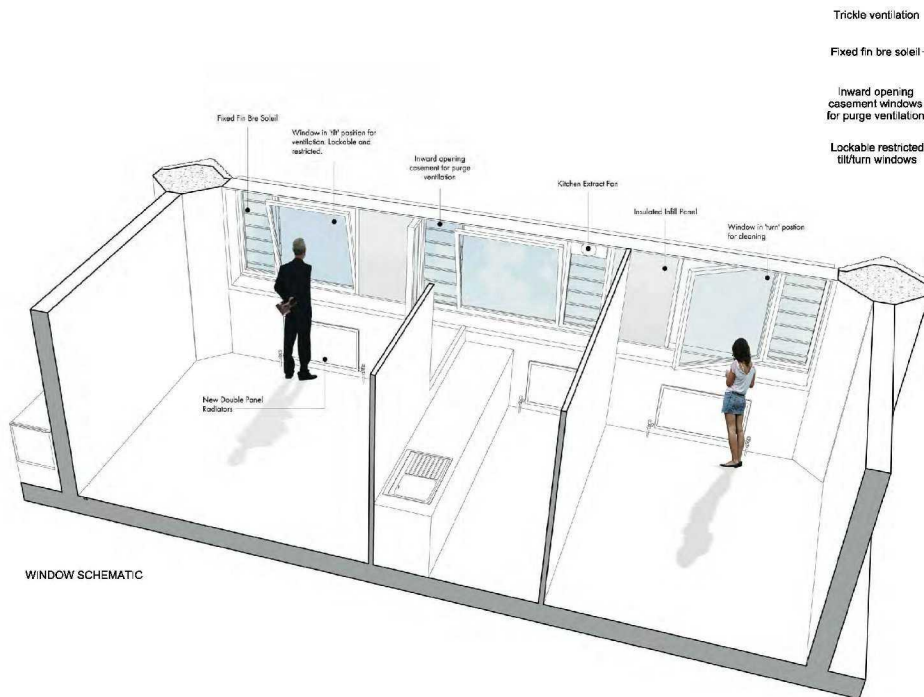


SCHEMATIC HEATING PLAN (1:50)

Radiator flow and return

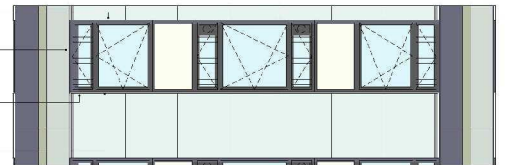


SOUTH ELEVATION (1:200)

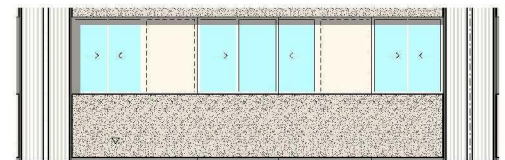


WINDOW SCHEMATIC

- Trickle ventilation
- Fixed fin bre soill
- Inward opening casement windows for purge ventilation
- Lockable restricted tilt/turn windows

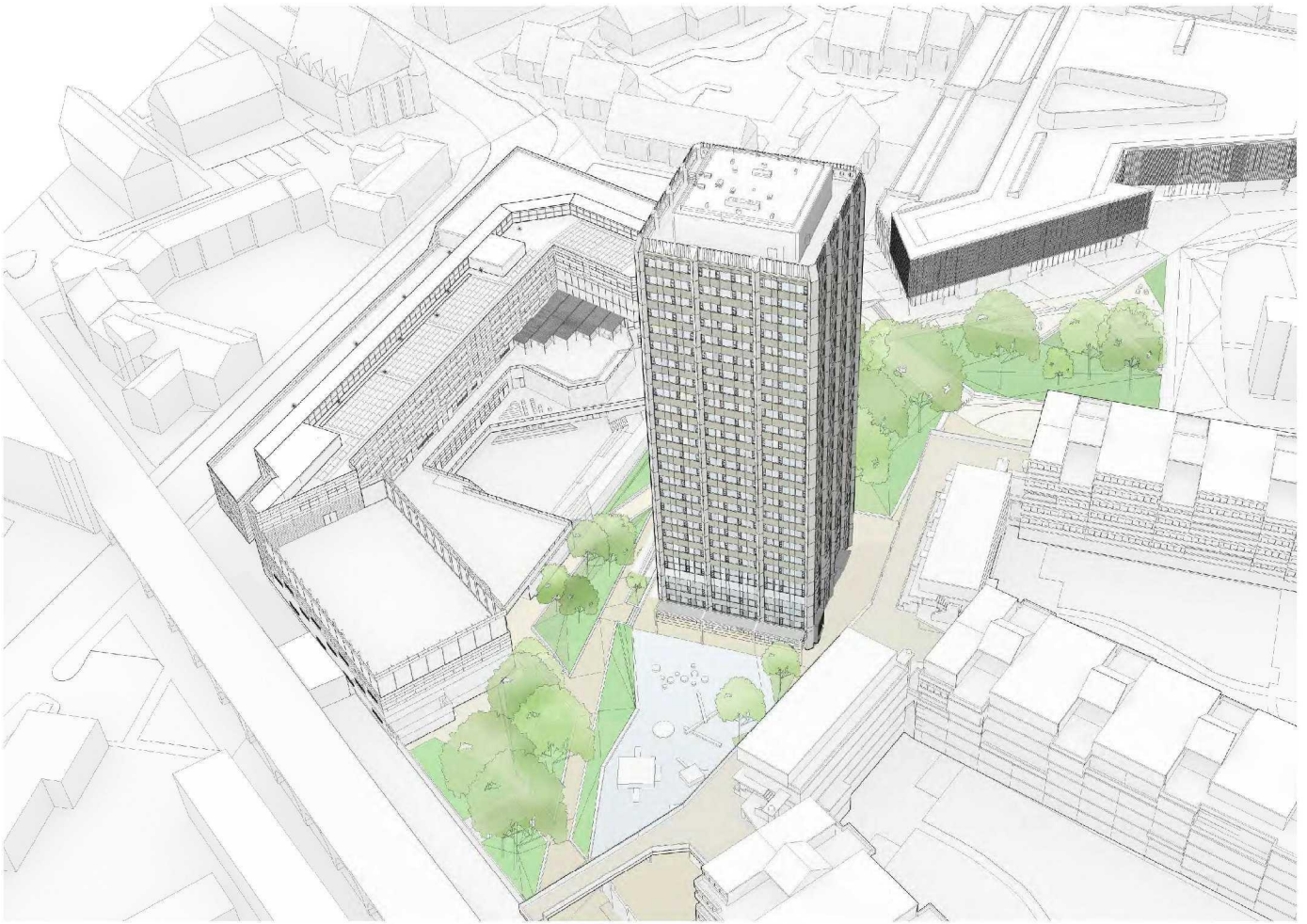


PROPOSED ELEVATION (1:50)



EXISTING ELEVATION (1:50)





PROPOSED



EXISTING

# GRENELL TOWER REGENERATION AERIAL PERSPECTIVE SOUTH WEST VIEWS





PROPOSED



EXISTING

# GRENFELL TOWER REGENERATION AERIAL PERSPECTIVE NORTH EAST VIEWS (NTS)



## APPENDIX C – BREEAM PRE-ASSESSMENT



## BREEAM Domestic Refurbishment Pre-Assessment, Rev C



Grenfell Tower, London.

July 2013

2

### Table of Contents

|   |    |
|---|----|
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| 2.0 Executive Summary.....  | 4  |
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| 4. BREEAM Domestic Refurbishment.....   | 5  |
| 5. Grenfell Tower BREEAM Domestic Refurbishment Pre-assessment performance result.....    | 10 |
| 6. Grenfell Tower BREEAM Domestic Refurbishment Pre-Assessment Issues Scoring Report..... | 11 |

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Registered Company No. 0642066

VAT Registration No. 9101504

E: [info@synutra-esp.co.uk](mailto:info@synutra-esp.co.uk)



3

|                |            |            |            |
|----------------|------------|------------|------------|
| Revision:      | A          | B          | C          |
| Date:          | 22/06/2012 | 27/07/2012 | 07/06/2013 |
| Prepared by:   | CC         | CC         | BN         |
| Checked by:    | BNK        | BNK        | NE         |
| Authorised by: | BNK        | BNK        | NE         |

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Registered Company No. 0642066

VAT Registration No. 9101504

E: [info@synutra-esp.co.uk](mailto:info@synutra-esp.co.uk)



4

### 1.0 Scope

This BREEAM Domestic Refurbishment Pre-Assessment Estimate for Grenfell Tower, a twenty three storey residential block in London, has been prepared to support the planning application for the Grenfell Tower refurbishment scheme, to be submitted to the Royal borough of Kensington & Chelsea. Also, the BREEAM pre assessment estimate aims to provide the outline sustainability strategy and act as a sustainable design guide for the refurbishment scheme. The Pre-assessment is an estimate that sets out the method for which the proposed refurbishment could achieve a BREEAM rating of "Good".

This report and estimate has been based on information provided by:

- Studio E architects
- Appleyards (Project Management)
- Max Fordham (Energy & M&E Consultancy)
- KALC

### 2.0 Executive Summary

The Pre-Assessment Estimate shows that at by achieving the minimum standard requirements together with assumptions of good sustainable design practice the proposed refurbishment project could achieve a BREEAM rating of "Good".

The Mechanical and Electrical specification of the building and materials used in the refurbishment of the building will be essential to the sustainable performance of the building and need to be addressed at an early stage in the design process. This assessment together with the Sustainability and Energy statement prepared by Max Fordham are therefore the starting point for developing the overall strategy of the building's sustainable design.

The BREEAM "Very Good" rating is a planning policy requirement as it is set out in Core Strategy Policy CE1 of the Royal Borough of Kensington & Chelsea Local Development Framework. However, BREEAM "Very Good" rating will not be able to be achieved for this project since the mandatory requirement for Wat 01 category cannot be met. The mandatory requirement of Wat 01 is not met since it falls outside the scope of the Grenfell Tower project. The reduction in CO<sub>2</sub> emissions is achieved by energy efficient design measures incorporated into the building fabric such as High Efficiency Gas Fired Boilers and Low U value windows.

TMO00834924\_0068

TMO00834924/68



### 3.0 Project Details

|  |                     |
|--|---------------------|
| <b>PROJECT :</b>                               | Grenfell Tower.     |
| <b>CLIENT:</b>                                 | KOTWO               |
| <b>ARCHITECT:</b>                              | Studio E Architects |
| <b>BUILDING SERVICES &amp; LZC CONSULTANT:</b> | Max Fordham         |
| <b>BREEAM CONSULTANT:</b>                      | Syntegra Consulting |
| <b>Structural Engineer</b>                     | Cutline Consulting  |
| <b>PRINCIPAL CONTRACTOR:</b>                   | Leadbetter          |

### 4. BREEAM Domestic Refurbishment

BREEAM Domestic Refurbishment is a performance based assessment method and certification scheme for refurbished buildings. The primary aim of BREEAM Domestic Refurbishment is to mitigate the life cycle impacts of refurbished buildings on the environment in a robust and cost effective manner. This is achieved through integration and use of the scheme by clients and their project teams at key stages in the design and procurement process.

BREEAM Domestic Refurbishment has been developed to meet the following principles:

- Ensure environmental quality through an accessible, holistic and balanced measure of environmental impacts.
- Use quantified measures for determining environmental quality.
- Adopt a flexible approach, avoiding prescriptive specification and design solutions.
- Use best available science and best practice as the basis for quantifying and calibrating a cost effective performance standard for defining environmental quality.
- Reflect the social and economic benefits of meeting the environmental objectives covered.

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Registered Company No. 6642656 VAT Registration No. 9101504 E: mail@syntegra-esp.co.uk



- Provide a common framework of assessment that is tailored to meet the 'local' context including regulation, climate and sector.
- Integrate construction professionals in the development and operational processes to ensure wide understanding and accessibility.
- Adapt existing industry tools, practices and other standards wherever possible to support developments in policy and technology, build on existing skills and understanding and minimize costs.
- Stakeholder consultation to inform ongoing development in accordance with the under-lying principles and the pace of change in performance standards.

### 4.1 BREEAM Domestic Refurbishment Environmental Issues

The environmental issues under which BREEAM assesses a building are divided up into the following seven categories:

- Management
- Health and well-being
- Energy
- Water
- Materials
- Waste
- Pollution

### 4.2 BREEAM Domestic Refurbishment Scoring & Rating

These elements that determine the overall performance of a refurbished project assessed using BREEAM Domestic Refurbishment, the following:

- The BREEAM rating level benchmarks
- The minimum BREEAM standards
- The environmental section weightings
- The BREEAM assessment issues and credits

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#### The BREEAM rating level benchmarks:

The BREEAM Domestic Refurbishment rating benchmarks are shown on the following table:

| BREEAM RATING | %Score |
|---------------|--------|
| Outstanding   | 85     |
| Excellent     | 70     |
| Very Good     | 55     |
| Good          | 45     |
| Pass          | 30     |
| Unclassified  | <30    |

An unclassified BREEAM rating represents performance that is non-compliant with BREEAM, in terms of failing to meet either the BREEAM minimum standards of performance for key environmental issues or the overall threshold score required for formal BREEAM certification.

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#### The minimum BREEAM Domestic Refurbishment standards:

In order to ensure that performance against fundamental environmental issues is achieved in pursuit of a desired BREEAM rating, minimum standards of performance are set in key areas such as energy, water, waste etc. To achieve a particular BREEAM rating, the minimum overall percentage score must be achieved together with the minimum standards, detailed in the Table below:

| BREEAM issue  | Minimum standards by BREEAM rating level |                  |                  |                  |                  |
|---|--|------------------|------------------|------------------|------------------|
|   | Pass                                     | Good             | Very Good        | Excellent        | Outstanding      |
| Ena 02: Energy Efficiency Rating Post Refurbishment | 0.5 Credits                              | 1.0 Credits      | 2 Credits        | 2.5 Credits      | 3.5 Credits      |
| Wat 01: Internal Water use                          | -  | -                | 1 Credit         | 2 Credits        | 3 Credits        |
| Hea 05: Ventilation                                 | 1 Credit                                 | 1 Credit         | 1 Credit         | 1 Credit         | 1 Credit         |
| Hea 06: Safety                                      | 1 Credit                                 | 1 Credit         | 1 Credit         | 1 Credit         | 1 Credit         |
| Pol 03: Flooding                                    | -  | -                | -                | 2 Credits        | 2 Credits        |
| Mat 02: Responsible sourcing of materials           | Criterion 3 only                         | Criterion 3 only | Criterion 3 only | Criterion 3 only | Criterion 3 only |

#### The environmental section weightings:

BREEAM uses an explicit weighting system derived from a combination of consensus based weightings and ranking by a panel of experts. Each of the environmental sections consists of a differing number of assessment issues and BREEAM credits. Hence, each individual assessment issue and credit varies in terms of its contribution to a building's overall score.

The Table below outlines the weightings for each of the nine environmental sections included in the BREEAM 2011 New Construction scheme

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| Environmental section   | Weighting |
|-------------------------|-----------|
| Management              | 12%       |
| Health & Wellbeing      | 17%       |
| Energy                  | 43%       |
| Water                   | 11%       |
| Materials               | 8%        |
| Waste                   | 3%        |
| Pollution               | 6%        |
| Total:                  | 100%      |
| Innovation (additional) | 10%       |

**The BREEAM assessment issues and credits:**

BREEAM Domestic Refurbishment consists of thirty three individual assessment issues spanning the seven environmental categories, plus an eighth category called 'innovation'. Each issue addresses a specific building related environmental impact or issue and has a number of 'credits' assigned to it. BREEAM credits are awarded where a building demonstrates that it meets the best practice performance levels defined for that issue. **Innovation credits** are available for the recognition of sustainability related benefits or performance levels which are currently not recognised by standard BREEAM assessment issues and criteria. In that way, buildings that go beyond best practice in terms of a particular aspect of sustainability may be awarded.

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## 5. Grenfell Tower BREEAM Domestic Refurbishment Pre-assessment performance result

This project has achieved a Pre-Assessment target score of 45.28% against the BREEAM Domestic Refurbishment Pre-assessment criteria. This translates to a Pre-Assessment target rating of 'Good'. The mandatory standard for 'Very Good' of Wat 01 issue cannot be met due to the fact of being outside the scope of this project. Hence the BREEAM rating targeted for the project is 'Good'.

| BREEAM Environmental Category        | Environmental Weighting | Credits Available | Credits Targeted | Section Score             |
|--------------------------------------|-------------------------|-------------------|------------------|---------------------------|
| Management                           | 12%                     | 11                | 11               | 100%                      |
| Health & Wellbeing                   | 17%                     | 12                | 4                | 33.33%                    |
| Energy                               | 43%                     | 29                | 10               | 34.48%                    |
| Water                                | 11%                     | 4                 | 1                | 25.00%                    |
| Materials                            | 8%                      | 45                | 31               | 68.89%                    |
| Waste                                | 3%                      | 5                 | 3                | 60.00%                    |
| Pollution                            | 6%                      | 6                 | 3                | 50.00%                    |
| Innovation                           | 10%                     | 10                | 1                | 10.00%                    |
| <b>Total Indicative BREEAM Score</b> |                         |                   |                  | <b>45.28% GOOD Rating</b> |

**Note:** As the design is progressed, the pre-assessment may be subject to change and the score therefore is indicative only at this stage.

**Specialist Reports, Calculations and other specialist items:**

In order to achieve the GOOD rating the below specialist reports need to be produced:

- Flood Risk Assessment, (Curtins Consulting)
- Ecology Report (KALC)
- Hydrologist Report (Surface Water Run-off calculations), (Curtins Consulting)
- Building User guide
- Site Waste Management Plan, (Leadbitter)

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## 6. Grenfell Tower BREEAM Domestic Refurbishment Pre-Assessment Issue Scoring Report

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# BREEAM Domestic Refurbishment 2012 Pre-Assessment Estimator v0.6: Results Summary



|                            |             |
|----------------------------|-------------|
| Building name              |             |
| Indicative Building Score  | 45.25%      |
| Indicative Building Rating | BREEAM Good |

This assessment and indicative BREEAM rating is not a formal certified BREEAM assessment or rating and must not be communicated as such. The score presented is indicative of a dwelling's potential performance and is based on a simplified pre formal BREEAM assessment and unverified commitments given at an early stage in the design process.

|            | Issue  | Credits Available | Indicative Credits Achieved | Weighting | Section Score |
|------------|--------|-------------------|-----------------------------|-----------|---------------|
| Management | Man 01 | 3                 | 3                           | 12%       | 12.00%        |
|            | Man 02 | 2                 | 2                           |           |               |
|            | Man 03 | 1                 | 1                           |           |               |
|            | Man 04 | 2                 | 2                           |           |               |
|            | Man 05 | 1                 | 1                           |           |               |
|            | Man 06 | 2                 | 2                           |           |               |

|                      |        |   |   |     |       |
|----------------------|--------|---|---|-----|-------|
| Health and Wellbeing | Hea 01 | 2 | 0 | 17% | 5.67% |
|                      | Hea 02 | 4 | 0 |     |       |
|                      | Hea 03 | 1 | 1 |     |       |
|                      | Hea 04 | 2 | 1 |     |       |
|                      | Hea 05 | 2 | 1 |     |       |
|                      | Hea 06 | 1 | 1 |     |       |

|        |        |   |     |     |        |
|--------|--------|---|-----|-----|--------|
| Energy | Ene 01 | 6 | 3   | 43% | 14.83% |
|        | Ene 02 | 4 | 2.5 |     |        |
|        | Ene 03 | 7 | 4.5 |     |        |
|        | Ene 04 | 2 | 0   |     |        |
|        | Ene 05 | 2 | 0   |     |        |
|        | Ene 06 | 1 | 0   |     |        |
|        | Ene 07 | 2 | 0   |     |        |
|        | Ene 08 | 2 | 0   |     |        |
|        | Ene 09 | 2 | 0   |     |        |
|        | Ene 10 | 1 | 0   |     |        |

|       |        |   |   |     |       |
|-------|--------|---|---|-----|-------|
| Water | Wat 01 | 3 | 0 | 11% | 2.20% |
|       | Wat 02 | 1 | 1 |     |       |
|       | Wat 03 | 1 | 0 |     |       |

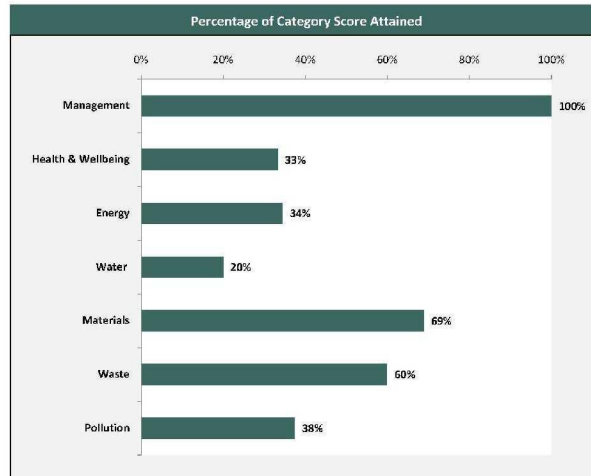
|           |        |    |    |    |       |
|-----------|--------|----|----|----|-------|
| Materials | Mat 01 | 25 | 19 | 8% | 5.51% |
|           | Mat 02 | 12 | 4  |    |       |
|           | Mat 03 | 8  | 8  |    |       |

|       |        |   |   |    |       |
|-------|--------|---|---|----|-------|
| Waste | Was 01 | 2 | 0 | 3% | 1.80% |
|       | Was 02 | 3 | 3 |    |       |

|           |        |   |   |    |       |
|-----------|--------|---|---|----|-------|
| Pollution | Pol 01 | 3 | 0 | 6% | 2.25% |
|           | Pol 02 | 3 | 1 |    |       |
|           | Pol 02 | 2 | 2 |    |       |

|            |    |   |     |       |
|------------|----|---|-----|-------|
| Innovation | 10 | 1 | N/A | 1.00% |
|------------|----|---|-----|-------|

|        | Minimum Standards |      |           |           |             |
|--------|-------------------|------|-----------|-----------|-------------|
|        | Pass              | Good | Very Good | Excellent | Outstanding |
| Ene 02 | ✓                 | ✓    | ✓         | ✓         | ✗           |
| Wat 01 | ✓                 | ✓    | ✗         | ✗         | ✗           |
| Hea 05 | ✓                 | ✓    | ✓         | ✓         | ✓           |
| Hea 06 | ✓                 | ✓    | ✓         | ✓         | ✓           |
| Pol 03 | ✓                 | ✓    | ✓         | ✓         | ✓           |
| Mat 02 | ✓                 | ✓    | ✓         | ✓         | ✓           |



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**BREEAM Domestic Refurbishment 2012 Pre-Assessment Estimator v0.6**

This is a summary and indicative BREEAM rating. It is not a final certificate. BREEAM assessment is only possible once the project has been completed. The BREEAM assessment is only possible once the project has been completed. The BREEAM assessment is only possible once the project has been completed.

**Building name:** ALDON  
**Indicative BREEAM score:** BREEAM Good

**Management:** Health & Wellbeing, Energy, Water, Materials, Waste, Pollution

**Section Weighting: 10%**

**Indicative Section Score: 1.00%**

**Comments:**

**MANAGEMENT** Section Weighting: 13% Indicative Section Score: 13.00%

**Man 01: Health & Wellbeing**

No. of BREEAM credits available: 5  
No. of BREEAM innovation credits: 0

**Assessment Criteria:** Where a Health & Wellbeing credit is provided to all dwellings, covering all factors set out in the 'Health & Wellbeing' section, three credits may be awarded.

**Comments:**

**Man 02: Sustainable Construction Practices**

No. of BREEAM credits available: 2  
No. of BREEAM innovation credits: 1

**Assessment Criteria:** Where a compliant construction scheme will be used, credits are awarded depending on the score achieved as outlined below:

**Large Scale - project with more than 5 units:**

| One Credit                     | Two Credits      |
|--------------------------------|------------------|
| Compliance: Contractors Scheme | Score of 24-35.5 |
| Alternative Compliance Scheme  | Compliance       |

**Small Scale - project with 5 units or fewer:**

| One Credit                     | Two Credits               |
|--------------------------------|---------------------------|
| Compliance: Contractors Scheme | 24-35.5                   |
| Alternative Compliance Scheme  | Compliance                |
| Checklist A-4                  | 35% of the optional items |

**Exemplary Credit:**

|                                |                                  |
|--------------------------------|----------------------------------|
| Compliance: Contractors Scheme | Score of >36                     |
| Alternative Compliance Scheme  | Exemplary Level Compliance       |
| Checklist A-4                  | All items (Optional & Mandatory) |

**Comments:**

2/10 Credit has been awarded since it is assumed that the principal contractor will use the Compliance Contractors Scheme (CCS) with a score of 32-35.5.

**Man 03: Sustainable Site Practices**

No. of BREEAM credits available: 1  
No. of BREEAM innovation credits: 0

**Assessment Criteria:** Where evidence demonstrates that site for projects will be enhanced, as detailed below:

**One Credit:**

|             |  |
|-------------|--|
| Large Scale | Where there is evidence to demonstrate that 2 or more of the sections in Checklist A-3 are completed |
| Small Scale | Where there is evidence to demonstrate that 2 or more of the sections in Checklist A-3 are completed |

**Section of Checklist:**

| Large Scale - Checklist A-3   | Small Scale - Checklist A-3   |
|---|---|
| Monitor, report and set targets for CO2 production of energy use arising from site activities | Set objectives for reducing CO2 production from energy use arising from site activities |
| Monitor, report and set targets for water consumption arising from site activities            | Set objectives for reducing water consumption from site activities                      |
| A main contractor with an environmental materials policy                                      | A main contractor environmental materials statement                                     |
| A main contractor that operates an Environmental Management System                            | 80% of the timber is reclaimed, or used or responsibly sourced                          |

**Comments:**

3/10 Credit will be achieved since it is assumed that the main contractor will:

- (i) monitor, report and set targets for CO2 production of energy use arising from site activities and
- (ii) operate an Environmental Management System.

**Man 04: Security**

No. of BREEAM credits available: 2  
No. of BREEAM innovation credits: 0

**Assessment Criteria:** Where the following requirements will be met:

|             |                          |  |
|-------------|--------------------------|--|
| One Credit  | Secure windows and doors | External doors and accessible windows meet minimum standards and appropriately certified |
| Two Credits | Secured by design        | Principles and guidance of Secured by Design section 2 are complied with                 |

**Comments:**

2 No credit will be achieved since if the Design and Sustainability Statement states that the external doors and accessible windows meet the following criteria:

- Doors are certified to PAS 24:2001 or LPS 1175 door / security rating 1 or equivalent
- Windows are certified to BS 7958:2001 (2) and LPS 1175 window / security rating 1 or equivalent

**Man 05: Protection and Enhancement of Ecological Features**

No. of BREEAM credits available: 1  
No. of BREEAM innovation credits: 1

**Assessment Criteria:** Where the following requirements will be met:

|                  |                                |   |
|------------------|--------------------------------|---|
| One Credit       | Protecting Ecological Features | Site survey carried out to determine presence of ecological features              |
| Exemplary Credit | Ecological enhancement         | A suitably qualified ecologist recommends measures to enhance ecology of the site |

**Comments:**

It is expected that a site survey will be carried out to determine presence of ecological features and if any, these will be protected during refurbishment works.

**Man 06: Project Management**

No. of BREEAM credits available: 2  
No. of BREEAM innovation credits: 2

**Assessment Criteria:** Where the following requirements will be met:

|                   |                                    |  |
|-------------------|------------------------------------|--|
| One Credit        | Project roles and responsibilities | Where all of the project team are involved in the project decision making                          |
| Exemplary Credits | Handover and Aftercare             | Where a BREEAM Accredited Professional has been appointed to oversee key stages within the project |

**Comments:**

2/10 Credit will be achieved since a BREEAM AP has been appointed (Design) and the Project Manager (Project) has assigned individual and shared responsibilities across the following key design and refurbishment stages:

- (i) Planning and Building control notification (Design)
- (ii) Handover and Aftercare (Project)

HEALTH & WELLBEING

Section Weighting: 17%

Indicative Section Score: 5.67%

Item 01 Daylighting

No. of BREEM credits available: 2

Achievable contribution to overall score: 2.83%

No. of BREEM innovation credits: 0

Minimum Standards applicable: No

Assessment Criteria

Where this refurbishment results in a neutral impact on daylighting or where minimum daylighting standards are met, up to two credits may be awarded as follows:

For building Drawings and Change of Use Projects

First Credit

Maintaining Good Daylighting

The refurbishment results in a neutral impact on the daylighting levels in the kitchen, living room, dining room and study

Where the property is being extended

First Credit

Maintaining Good Daylighting

New spaces achieve minimum daylighting levels

For All Properties

Second Credit

Maintaining Good Daylighting

The dwelling achieves minimum daylighting levels in the kitchen, living room, dining room and study

Indicative Credits

2

Comments

As a sustainability and energy statement present the results of the daylight calculations. These show that the daylighting is existing areas, reduce post refurbishment. Hence no credits can be awarded.

Item 02 Sound Insulation

No. of BREEM credits available: 4

Achievable contribution to overall score: 3.67%

No. of BREEM innovation credits: 0

Minimum Standards applicable: No

Assessment Criteria

To ensure the provision of acceptable sound insulation standards and to minimise the likelihood of noise complaints:

Properties where sound testing has been carried out

Up to Four Credits

Four credits awarded according to the improvement over building regulations. See table in additional information in Technical Manual

Properties where sound testing is not feasible and not required by the approved Building Control body

Two Credits

Where existing separating walls and floors are designed to meet the requirements of Building Regulations with complete construction details

Up to Four Credits

Where a Suitable Qualified Acoustician (SQAs) provides recommendations for the specification of all existing separating walls and floors

SQAs confirm in their professional opinion that they have the potential to meet or exceed the sound insulation credit requirements

Where these recommendations are implemented

See table in additional information in Technical Manual

Historic Buildings

Up to Four Credits

Where the dwelling is a historic building and sound testing results demonstrate existing separating walls and floor meet the historic building credit requirements

See table in additional information in Technical Manual

Detached Properties

Four Credits

By Default

Properties with separating walls and floors only between non habitable rooms OR Testing not required by building control body

Up to Four Credits

Indicative Credits

4

Comments

As a sustainability and energy statement present the results of the sound insulation calculations. These show that the sound insulation is existing areas, reduce post refurbishment. Hence no credits can be awarded.

Item 03 Volatile Organic Compounds

No. of BREEM credits available: 1

Achievable contribution to overall score: 1.67%

No. of BREEM innovation credits: 0

Minimum Standards applicable: No

Assessment Criteria

Where the refurbishment avoids the use of VOCs with new products meeting the following requirements:

One Credit

Reducing the use of VOCs

Where all decorative paints and finishes used in the refurbishment have met the requirements listed in table 3.4 in the Technical Manual

Where at least five of the eight roofing product categories listed in table 3.4 have met the testing requirements and emission levels for Volatile Organic Compound (VOC) emissions against the relevant standards specified within table 3.4 in the Technical Manual

Where five or less products are specified within the refurbishment, all must meet the requirements in order to achieve this credit

Indicative Credits

1

Comments

It is assumed that all test fees of the categories listed in table 3.4 of the BREEM document will be met. The testing requirements and emission levels for VOC emissions against the relevant standards specified in table 3.4. If a sustainability and energy statement also suggests that this credit will be achieved.

Item 04 Inclusive Design

No. of BREEM credits available: 2

Achievable contribution to overall score: 2.83%

No. of BREEM innovation credits: 1

Minimum Standards applicable: No

Assessment Criteria

Where an access statement has been carried out using Checklist A & B of the Technical Manual to appraise the accessibility of the home as follows:

Checklist A & B of the Technical Manual

Section 1

Section 2

One Credit

Minimum Accessibility

Complied with Evidence

Two Credits

Advanced Accessibility

Complied with Evidence

Exemplary Performance

Where an access report fully qualified member of the design team has completed sections 1, 2 and 3 of Checklist A & B, access statement template with evidence provided of the measures implemented in the refurbishment

Indicative Innovation Credits Achieved

1

Comments

As a sustainability and energy statement present the results of the accessibility calculations. These show that the accessibility is existing areas, reduce post refurbishment. Hence no credits can be awarded.

An Access statement will be produced and checked. A full BREEM technical manual will be completed by a member of the design team.

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| Enr 01 Primary energy demand   |   | Available contribution to overall score   |  | 15.6%   |
|--|---|---|--|---|
| No. of BREEAM credits available  | 0 | Minimum Standards applicable  | 0  | No  |
| Assessment Criteria  |   |   |  | Initiative Criteria   |
| Where the following Primary Energy use and benchmarks will be met as a result of the refurbishment:  |   |   |  | 4.5   |
| Primary Energy Demand and Net Supply-demand (kWh/m <sup>2</sup> /year)   |   | Credits   |  |   |
| ≤ 60   |   | 0.5   |  |   |
| ≤ 50   |   | 1   |  |   |
| ≤ 40   |   | 1.5   |  |   |
| ≤ 30   |   | 2   |  |   |
| ≤ 20   |   | 2.5   |  |   |
| ≤ 10   |   | 3   |  |   |
| ≤ 10   |   | 3.5   |  |   |
| ≤ 10   |   | 4   |  |   |
| ≤ 10   |   | 4.5   |  |   |
| ≤ 10   |   | 5   |  |   |
| ≤ 10   |   | 5.5   |  |   |
| ≤ 10   |   | 6   |  |   |
| ≤ 10   |   | 6.5   |  |   |
| ≤ 10   |   | 7   |  |   |
| Comments: As a result of the refurbishment the average area weighted primary energy demand will be 223 kWh/m <sup>2</sup> /year. Therefore, 4.5 No Credits will be achieved. |   |   |  |   |
| Enr 02 Renewable Technologies  |   |   |  |   |
| No. of initiative credits available  | 2 | Available contribution to overall score   | 0  | 2.57%   |
| No. of BREEAM innovation credits   | 0 | Minimum Standards applicable  | 0  | No  |
| Assessment Criteria  |   |   |  | Initiative Criteria   |
| Where the following will meet the following contribution from renewables and targets as a result of the refurbishment:   |   |   |  | Passive Solution  |
| Dwelling Type  |   | Primary Energy Demand   | Percentage from renewables   |   |
| Detached   |   | ≤ 250 kWh/m <sup>2</sup> /year  | ≥ 10%  | 2.07%   |
| Semi-Detached  |   |   | ≥ 10%  | 2.07%   |
| Terraced   |   |   | ≥ 10%  | 2.07%   |
| Local Terrace  |   |   | ≥ 10%  | 2.07%   |
| CSC Terrace  |   |   | ≥ 10%  | 2.07%   |
| CSC Area Ltd   |   |   | ≥ 10%  | 2.07%   |
| Mid Rise Flat  |   |   | ≥ 10%  | 2.57%   |
| High Rise Flat   |   |   | ≥ 10%  | 3.07%   |
| Comments: No LUT technologies have been proposed. Hence no credits can be awarded under this category.   |   |   |  |   |
| Enr 05 Energy Efficient Lighting Controls  |   |   |  |   |
| No. of initiative credits available  | 2 | Available contribution to overall score   | 0  | 2.57%   |
| No. of BREEAM innovation credits   | 0 | Minimum Standards applicable  | 0  | No  |
| Assessment Criteria  |   |   |  | Initiative Criteria   |
| Where the following will be provided as follows:   |   |   |  | Passive Solution  |
| Init Credit  |   | Appliances  | Appliances provided  | Appliances not to be provided   |
|  |   | Fridges, Freezers and Fridge Freezers   | Energy Saving "Low Power mode" appliances specified                            | LU Energy Efficiency Labelling Scheme information collect provided to all dwellings |
| Second Credit  |   |   |  |   |
|  |   | Appliances  | Appliances provided  | Appliances not to be provided   |
|  |   | Washing Machines and Dishwashers  | Energy Saving "Low Power mode" appliances specified                            | Second credit not activated   |
|  |   | Washer Dryers and Tumble Dryers   | Appliances specified with a Rating under LU Energy Efficiency Labelling Scheme | LU Energy Efficiency Labelling Scheme information collect provided to all dwellings |
| Comments: N/A. This is not in the scope of the refurbishment.  |   |   |  |   |
| Enr 06 Drilling Spacing  |   |   |  |   |
| No. of BREEAM credits available  | 1 | Available contribution to overall score   | 0  | 1.48%   |
| No. of BREEAM innovation credits   | 0 | Minimum Standards applicable  | 0  | No  |
| Assessment Criteria  |   |   |  | Initiative Criteria   |
| Where adequate, acoustic internal or external space with posts and footings or felpis is provided with the following:  |   |   |  | Passive Solution  |
| 1 Credit   |   | Drilling line installed   |  |   |
| Number of Drilling:  |   | 1 x 2m  |  |   |
|  |   | 3 x 6m  |  |   |
| Comments: N/A. This is not in the scope of the refurbishment.  |   |   |  |   |
| Enr 07 Lighting  |   |   |  |   |
| No. of BREEAM credits available  | 2 | Available contribution to overall score   | 0  | 2.57%   |
| No. of BREEAM innovation credits   | 0 | Minimum Standards applicable  | 0  | No  |
| Assessment Criteria  |   |   |  | Initiative Criteria   |
| Where energy efficient internal and external lighting is provided as follows:  |   |   |  | Passive Solution  |
| External Lighting - 1 Credit   |   | Energy Efficient Spacing Lighting and Energy Efficient Security Lighting OR<br>Where Energy Efficient Spacing Lighting is provided only |  |   |
| Internal Lighting - 1 Credit   |   | Minimum average workplane illuminance the total floor area of the dwelling of 5 watts/m <sup>2</sup>                                    |  |   |
| Comments: N/A. This is not in the scope of the refurbishment.  |   |   |  |   |



Unit 08 - Whole Energy System

No. of BREEAM credits available: 2

No. of BREEAM innovation credits: 1

Assessment Criteria

Where compliance data is displayed to occupants by a compliant energy display device

Electricity usage data displayed

Electricity usage data displayed

Electricity usage data displayed

Electricity & hot water heating & air usage displayed

Primary heating fuel

Electricity

N/A

N/A

Indicator Credits

2 credits awarded

2 credits awarded

2 credits awarded

2 credits awarded

Indicative Credits

2

Indicative Credits

2

Comments

N/A. This is not in the scope of the refurbishment.

Unit 09 - Cycle Storage

No. of BREEAM credits available: 2

No. of BREEAM innovation credits: 0

Assessment Criteria

Where individual or communal compliant cycle storage is provided as follows:

Storage area

One credit

Two credits

Storage area

One credit

Two credits

Storage area

One credit

Two credits

Storage area

One credit

Two credits

Indicative Credits

2

Indicative Credits

2

Comments

N/A. This is not in the scope of the refurbishment.

Unit 10 - Internal Office

No. of BREEAM credits available: 1

No. of BREEAM innovation credits: 0

Assessment Criteria

Where sufficient space and services will be provided to allow occupants to sit at a home office in a suitable room with adequate ventilation

Indicative Credits

1

Indicative Credits

1

Comments

N/A. This is not in the scope of the refurbishment.

WATER

Section Weighting: 15%

Indicative Section Score: 2.00%

Unit 01 - Internal Water Use

No. of BREEAM credits available: 3

No. of BREEAM innovation credits: 1

Assessment Criteria

Where the discharge water consumption meets the following consumption benchmark table, or where terminal fittings meet the following water consumption standards:

Consumption Water Consumption (litres/occupant/day)

Equivalent terminal fitting standards

Minimum Standard

Credits

140-150

All showers specified to 'Good' OR All taps and WCs to 'Good' OR Kitchen fittings specified to 'Excellent'

N/A

0

140-150

All showers specified to 'Excellent' OR All showers and bathroom taps to 'Good'

BREEAM Very Good

1

120-128

All bathroom and WC room fittings specified to 'Good' OR All bathroom fittings specified to 'Excellent'

N/A

1.5

107-117

All bathroom fittings specified to 'Excellent' and WC room fittings specified to 'Good' OR All bathroom fittings, kitchen and utility fittings specified to 'Good'

ULLIAM Excellent

2

95-106

All kitchen, bathroom, utility room and WC room fittings specified to 'Good' OR All bathroom, kitchen and utility room fittings specified to 'Good'

N/A

2.5

49

All bathroom fittings specified to 'Excellent' and WC room, kitchen and utility room fittings specified to 'Good'

BRELLAM Outstanding

3

Indicative Credits

3

Indicative Credits

3

Comments

N/A. This is not in the scope of the refurbishment. However this is a terminal fitting requirement for the VLM GOOD rating. Use this table not being within the scope of the refurbishment. A rating will be triggered for the development.

Unit 02 - External Water Use

No. of BREEAM credits available: 1

No. of BREEAM innovation credits: 0

Assessment Criteria

Where the following requirements will be met:

One Credit:

Where a compliant rainwater collection system for external/irrigation use has been provided for the development.

OR

Where dwellings have no individual or communal garden space.

Indicative Credits

1

Indicative Credits

1

Comments

The flats have no individual garden space and the residents have no access to a communal garden space.

Unit 03 - Water Meter

No. of BREEAM credits available: 1

No. of BREEAM innovation credits: 0

Assessment Criteria

Where an appropriate water meter for measuring usage of mains potable water meter has been provided to dwellings. One credit may be awarded

Indicative Credits

1

Indicative Credits

1

Comments

N/A. This is not in the scope of the refurbishment.

MATERIALS

Section Weighting: 8%

Indicative Section Score: 5.51%

Unit 01 - Environmental Impact of Materials

No. of BREEAM credits available: 35

No. of BREEAM innovation credits: 0

Assessment Criteria

Up to 35 credits can be awarded, with credits calculated using the Mat 01 table below. The table below shows the maximum number of credits available for each element:

Element

Green Guide Rating credits available

Thermal performance credits available

Roof

3

3

External walls

5

3.8

Internal walls (excluding separating walls)

5

1.2

Upper and Ground Floor

5

1.2

Windows

5

2

Indicative Credits

35

Indicative Credits

35

Comments

The full 35 credits requires all of the elements containing sub-elements to achieve a minimum of 2 credits for each element.

Unit 02 - Responsible Sourcing of Materials

No. of BREEAM credits available: 12

No. of BREEAM innovation credits: 0

Assessment Criteria

Where new materials are responsibly sourced, up to 12 credits may be awarded where 80% of new materials for ancement are responsibly sourced. No credits are awarded are dependent on % of points achieved which is based upon the responsible sourcing tool of each material sourced as detailed below:

Table 1

Material

Score

1

2

3

4

5

6

7

8

1

2

3

4

5

6

7

8

Indicative Credits

12

Indicative Credits

12

Comments

It has been assumed that 20% credits will be achieved since all materials used will be responsibly sourced as stated in the Sustainability and Energy statement prepared by the N&E Consultant.

Unit 03 - Insulation

No. of BREEAM credits available: 8

No. of BREEAM innovation credits: 0

Assessment Criteria

Where any new insulation specified for use within internal walls, ground floor, roof and buildings services meet the following requirements:

4 Credits

Where the insulation index for new insulation used in the buildings is >2

4 Credits

Where a 80% of the new thermal insulation used in the building elements is responsibly sourced.

Indicative Credits

8

Indicative Credits

8

Comments

It has been assumed that all the new insulation installed will have an insulation index of greater than 2. It is also assumed that 80% of the insulation will be responsibly sourced. (Rockwool or similar)

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|   |   |  |   |       |
|---|---|--|---|-------|
| End 103 - Surface Water Runoff  |   |  |   |       |
| Assessment Criteria   | Min. of BREEM credits available           | 3  | Available contribution to overall score | 2.25% |
|   | No. of BREEM innovation credits available | 3  | Minimum Standards applicable            | No    |
| Indicators/Criteria   |   |  |   |       |
| Where impacts of the re-establishment on surface water runoff are mitigated or where a runoff is isolated as a result of the re-establishment, up to three credits can be awarded as follows:   |   |  |   |       |
| Requirements  |   |  |   |       |
| First Credit  |   | New hard standing area must be permeable   |   |       |
| No rainfall impact on Surface Water   |   | If building on to previous permeable area additional an off-rust must be managed on site   |   |       |
| Calculations should be carried out by an appropriately qualified professional   |   |  |   |       |
| Requirements  |   |  |   |       |
| Second Credit   |   | Where all runoff from the roof is collected up to 5 mm, rainwater has been managed on site using source control methods  |   |       |
| Reducing Run-Off from Site (Bar)  |   | Install a runoff from all existing and new parts of the roof   |   |       |
| An appropriately qualified professional must be used to design an appropriate drainage strategy for the site  |   |  |   |       |
| Requirements  |   |  |   |       |
| Third Credit  |   | Where run-off as a result of the re-establishment is managed on site using source control  |   |       |
| Reducing Run-Off from Site: Advanced  |   | An appropriately qualified professional should be used to design an appropriate drainage strategy for the site   |   |       |
| The peak rate of runoff as a result of the re-establishment for the 1 in 100 year event has been reduced by 75% from the existing site  |   |  |   |       |
| The total volume of rain off discharged into the watercourses and sewers as a result of the re-establishment, for a 1 in 100 year event of one duration has been reduced by 75%   |   |  |   |       |
| An allowance for climate change must be included for all of the above calculations, in accordance with current best practice (IPCC5, 2015)  |   |  |   |       |
| Requirements  |   |  |   |       |
| Fourth Credit   |   | Where all off-rust from the development site is managed on site using source control   |   |       |
| Reducing Run-Off from Site: Advanced  |   | The peak rate of runoff off site as a result of the re-establishment for the 1 in 100 year event is reduced to zero  |   |       |
| The total volume of rain off discharged into the watercourses and sewers as a result of the re-establishment, for a 1 in 100 year event is reduced to zero  |   |  |   |       |
| An allowance for climate change must be included for all of the above calculations, in accordance with current best practice (IPCC5, 2015)  |   |  |   |       |
| Requirements  |   |  |   |       |
| Example Credit  |   | There is no problem if a runoff discharged into the watercourses and sewers as a result of the re-establishment, for a 1 in 100 year event of 6 hours duration |   |       |
| An allowance for climate change must be included for all of the above calculations, in accordance with current best practice (IPCC5, 2015)  |   |  |   |       |
| Summary   |   |  |   |       |
| The re-establishment is expected to have a neutral impact on the surface water run-off. If an off-rust that calculated calculations will be undertaken at design stage by the Flood Risk consultant and these will be detailed with the HRA. Hence 1 No. credit has been awarded. |   |  |   |       |
| End 104 - Flooding  |   |  |   |       |
| Assessment Criteria   | Min. of BREEM credits available           | 2  | Available contribution to overall score | 1.56% |
|   | No. of BREEM innovation credits available | 2  | Minimum Standards applicable            | No    |
| Indicators/Criteria   |   |  |   |       |
| Where the dwelling is located in a low flood risk zone, or where in a medium to high flood risk zone and a flood resistance/resistance strategy has been in place prior, up to three credits can be awarded as follows:   |   |  |   |       |
| Minimum Standards   |   |  |   |       |
| Option 1 - Low Flood Risk   |   | A minimum of three credits must be achieved for this site as the Location and its surrounding levels   |   |       |
| Requirements  |   |  |   |       |
| Two Credits   |   | Where a Flood Risk Assessment (FRA) has been carried out and the associated dwellings are defined as having a medium or high annual probability of flooding    |   |       |
| Three credits are awarded where as a result of the dwellings their form or materials to keep water away the dwelling is designed in achieving avoidance from flooding by following Chartered A-10, Design strategy New Chart  |   |  |   |       |
| Where avoidance is not possible, two credits are awarded where a full flood resistance/resistance strategy is implemented for the dwellings in accordance with current standards make by a Suitable Qualified building professional   |   |  |   |       |
| Summary   |   |  |   |       |
| The LA website suggests that this site lies within the Low Flood risk zone. An FRA is expected to be commissioned at design stage.  |   |  |   |       |

## APPENDIX D – FIRE SAFETY REPORT

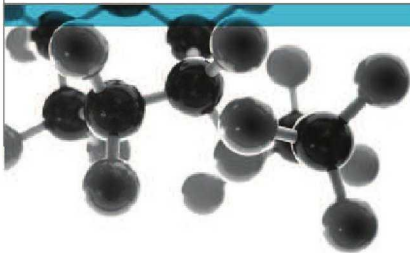
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Grenfell Tower  
Fire Safety Strategy  
**Exova**  
Warringtonfire

## Grenfell Tower Outline Fire Safety Strategy



**A Report to:** Studio E LLP  
**Project No:** 301922  
**Document Reference:** MT13779R

**Date:** 31/10/12  
**Issue No:** 01  
**Page:** 1

**Testing  
Advising  
Assuring**

Registered Office: Exova (UK) Ltd, Lochend Industrial Estate, Hemel Hempstead, Herts, United Kingdom. Reg No: SC 70429  
This report is issued in accordance with our terms and conditions, a copy of which is available on request.

EE-QUAT-COAT-PC-007 (Rev 3)

## Revision History

|                      |             |             |          |
|----------------------|-------------|-------------|----------|
| Issue No:            | 01          | Issue Date: | 31/10/12 |
| Reason for Revision: | First issue |             |          |

|              |  |
|--------------|--|
| Prepared by: | <br>Terry Ashton<br>Associate<br>(For and on behalf of Exova Warringtonfire)           |
| Reviewed by: | <br>Sean McEleneey<br>Graduate Engineer<br>(For and on behalf of Exova Warringtonfire) |

### Validity

This report is formulated on the basis of the information and experience available at the time of preparation. It is applicable to the above-mentioned project only in accordance with the client's instructions. It is only valid provided no other modifications are made other than those for which a formal opinion has been sought and given by Exova Warringtonfire.

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## 1 Introduction

The proposed development is the refurbishment of Grenfell Tower, a 24 storey residential block incorporating a boxing club at ground storey level, a nursery at mezzanine level (between the ground storey and walkway level) and office accommodation in the mezzanine level between walkway level and first storey level.

The refurbishment comprises:

- The creation of a new reception area and office at ground storey level;
- The re-siting of the nursery to ground storey level;
- The creation of new residential apartments in the mezzanine over the ground storey;
- The re-siting of the boxing club to walkway level;
- The creation of a community office at walkway level;
- The creation of new residential apartments in the mezzanine over walkway level; and
- Improvements to the building services.

This report details the applicable statutory controls in respect of fire safety and contains an outline fire safety strategy for compliance with these statutory controls.

The report is based upon discussions held with the design team and on drawings (numbers 1279 RE 110 05, 1279 RE112 04, 1279 RE113 04 and 1279 RE114 03) produced by Studio E LLP.



## 2 Statutory Considerations

### 2.1 The Building Regulations 2010

The building work will have to be carried out in conformity with the requirements of Schedule 1 of the Regulations. To satisfy Regulation 4, it will be necessary to ensure that, where a building is altered, it is no more unsatisfactory in relation to the requirements of Schedule 1 than it was before the works were carried out.

The requirements of Schedule 1 relating to fire safety are:

- a) B1 (means of warning and escape);
- b) B2 (internal fire spread (linings));
- c) B3 (internal fire spread (structure));
- d) B4 (external fire spread); and
- e) B5 (access and facilities for the fire service).

Compliance with these requirements is normally achieved by meeting the standards contained in Approved Document B (ADB)<sup>(1)</sup> and/or BS 9991<sup>(2)</sup>.

### 2.2 The Regulatory Reform (Fire Safety) Order 2005

The Regulatory Reform (Fire Safety) Order came into effect on 1 October 2006. One effect of this Order is that the owner (or the "responsible person" as defined in the Order) will have to carry out a fire risk assessment (or have a fire risk assessment carried out on his/her behalf). Compliance with the Regulatory Reform Order is normally achieved by following the guidance given in the DCLG Guide<sup>(3)</sup>.

### 2.3 London Building Acts (Amendment) Act 1939

The building is subject to the requirements of Section 20 of the London Building Acts (Amendment) Act 1939. Under the provisions of Section 20, the Council (the Royal Borough of Kensington & Chelsea) may make requirements for the provision of the following:

- a) fire extinguishing appliances and installations;
- b) effective means of removing smoke in case of fire; and
- c) adequate means of access to the site of the building for fire brigade personnel and appliances.

The Council may also make requirements in respect of defined "special fire risk" areas in the building (such as transformer rooms, generators and boiler rooms).

Compliance with the requirements of Section 20 is normally achieved by meeting the standards contained in the LDSA Section 20 Guide<sup>(4)</sup>.

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## 3 Proposed Outline Fire Safety Strategy

### 3.1 Compliance with The Building Regulations 2010

#### 3.1.1 Compliance with B1 (means of warning and escape)

##### FIRE DETECTION/ALARM SYSTEM

The nursery, the boxing club and the ground and walkway offices will all be provided with at least a Type "M" system as defined in BS 5839-1<sup>(5)</sup>. Each system in these three elements will be "stand alone" but interlinked so that an outbreak of fire in one of them will be enunciated on all fire alarm control panels.

New apartments will be provided with "LD3" systems of detection and sounders as defined in BS 5839-6<sup>(6)</sup>.

##### MEANS OF ESCAPE

###### NURSERY

The nursery will have at least two exits direct to the exterior.

###### BOXING CLUB

The boxing club will have two exits: one direct to the walkway; and the other to the lift lobby of the residential tower from where access will be available to the exterior via the new stair from walkway level to ground storey level.

###### APARTMENTS

The new apartments in the mezzanine over walkway level will have access to the existing escape stair serving the residential tower.

The new apartments in the mezzanine over the ground storey will have access to the new stair serving the residential tower.

###### OFFICES

The new office at ground storey level and community room in the mezzanine over the ground storey will have exits direct to the new stair linking the existing stair serving the residential tower with the exit at ground storey level.

###### NEW STAIR

The new stair will be separated from the remainder of the accommodation at each level by construction having a standard of fire resistance to satisfy B5 (see below). The exits to this new stair from the new office at ground storey level, the community room on the mezzanine above the ground storey and from the boxing club at walkway level will be via lobbies enclosed to a standard of fire resistance to satisfy B6 (see below) incorporating self closing inner and outer doors to at least a "FD30S" standard.

Each of these lobbies will be ventilated to the exterior by an opening at least 0.4m<sup>2</sup> in area which will either be direct to the exterior or via suitably protected ducts. The vents will be automatic in operation and activated by smoke detectors sited within each of the areas. As an alternative to this arrangement, the community room on the mezzanine above ground storey level will be vented direct to the exterior by an automatic opening vent 0.4m<sup>2</sup> in area.

###### APARTMENTS

The new apartments will have protected entrance halls (i.e. entrance halls enclosed by construction having a 30 minute standard of fire resistance with the doorways therein fitted with "FD20" doors). Bathrooms and WCs will not be enclosed by fire resisting construction but, where they abut other rooms, they will be separated from the latter by walls having a 30 minute standard of fire resistance.

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The travel distance from the apartment entrance door to the door to the furthest habitable room will not exceed 9m.

An exception to these arrangements will be the apartments on the mezzanine above the ground storey. Here, the habitable rooms will be provided with escape windows (windows with an unobstructed area of 0.33m<sup>2</sup> and at least 450mm high and 450mm wide with the bottom of the openable area not more than 1100mm above floor level).

#### SMOKE VENTILATION OF COMMON LOBBIES

The existing smoke extract arrangements within the common lobbies in the residential tower will be overhauled and the fresh air inlet/smoke extract shafts extended to serve the new common lobby in the mezzanine above walkway level.

#### EMERGENCY LIGHTING

Where necessary, emergency lighting will be provided in the escape routes from the building designed in accordance with the recommendations of BS 5266<sup>11</sup>.

### 3.1.2 Compliance with B2 (internal fire spread (linings))

All new wall and ceiling linings will be the equivalent of the following:

- in circulation spaces and escape routes other than circulation spaces within the apartments – Class 0 (using the UK testing methods) or Class B-s3, d2 (using the European testing methods); and
- elsewhere – Class 1 (using the UK testing methods) or Class C-s3, d2 (using the European testing methods) although a Class 3 standard or Class D-s3, d2 could be used within rooms not exceeding 30m<sup>2</sup> in non residential accommodation or 4m<sup>2</sup> in area within the apartments.

(NOTE: the European testing methods referred to above are the new methods developed as part of a harmonisation program for fire testing within Europe as detailed in BS EN 13501-1: 2002<sup>12</sup>. Materials achieving the classifications to either the new European test method or the UK test methods are considered to be acceptable).

### 3.1.3 Compliance with B3 (internal fire spread (structure))

#### FIRE RESISTANCE OF ELEMENTS OF STRUCTURE

All new elements of structure will be constructed to have the same standard of fire resistance as that of the existing elements. This is assumed to be 120 minutes for the structural frame and 60 minutes for floors.

#### COMPARTMENTATION

Compartment walls and/or floors will be provided:

- Between apartments and other apartments;
- Between apartments and common areas;
- Between the nursery and the remainder of the building;
- Between the boxing club and the remainder of the building; and
- Between the offices and the remainder of the building.

|               |              |             |          |
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Compartment walls and floors will have a 60 minute standard of fire resistance unless they form part of the structural frame of the building (where they will have a 120 minute standard of fire resistance). Doorways within compartment walls will be fitted with self closing doors having a 60 minute standard of fire resistance except where a different standard will be necessary to satisfy B5 (see below).

### 3.1.4 Compliance with B4 (external fire spread)

It is considered that the proposed changes will have no adverse effect on the building in relation to external fire spread but this will be confirmed by an analysis in a future issue of this report.

### 3.1.5 Compliance with B5 (access and facilities for the fire service)

A new inlet to the existing dry rising main will be provided in a location where it will be within 18m (and in sight of) where a pumping appliance could pull up.

Access to the building for fire service personnel will either be at ground storey level or walkway level. If access is obtained at ground storey level, fire service personnel will have to proceed up the internal stair to either the mezzanine above the ground storey or to walkway level. Outlets from the dry rising main will be provided in the common lobbies at both these levels and in the mezzanine over walkway level.

The entrance hall containing the stair will be separated from all the accommodation by construction having a 120 minute standard of fire resistance. All connections to the accommodation in this enclosure (except the connections to the common lobbies) will be via lobbies enclosed to the same standard of fire resistance with the openings fitted with self closing doors of the following standard:

- To the accommodation – "FD60S"; and
- To the stair – "FD30S".

As stated above, these lobbies will be ventilated.

## 3.2 Compliance with the Regulatory Reform (Fire Safety) Order 2005

It is considered that the fire safety measures described above will satisfy the requirements of the Regulatory Reform (Fire Safety) Order.

Portable fire-fighting equipment (fire extinguishers) will be provided in the nursery, boxing club and office accommodation in accordance with the recommendations of BS 5306-8<sup>13</sup>.

## 3.3 Compliance with Section 20

It is considered that the fire safety measures described above will meet most of the objectives of Section 20.

Openable windows equal to 2.5% of the area of each of the altered storeys will be provided. These will, where practicable, be sited on opposing faces of the building to provide cross ventilation.

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3. Fire Safety Risk Assessment – sleeping accommodation. Department for Communities and Local Government 2008
4. London District Surveyors Association Fire Safety Guide No. 1, Fire Safety in Section 20 Buildings – LDSA Publications 1998
5. BS 5839-1: 2002, Fire detection and alarm systems for buildings - Part 1: Code of practice for system design, installation, commissioning and servicing
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7. BS 5266: Part 1: 1999 Emergency lighting. Code of practice for emergency lighting of premises other than cinemas and certain other specified premises used for entertainment
8. BS EN 13501-1: 2002, Fire classification of construction products and building elements. Classification using data from reaction to fire tests
9. BS 5306-8: 2000, Fire extinguishing installations and equipment on premises. Part 8: Selection and installation of portable fire extinguishers – Code of practice

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