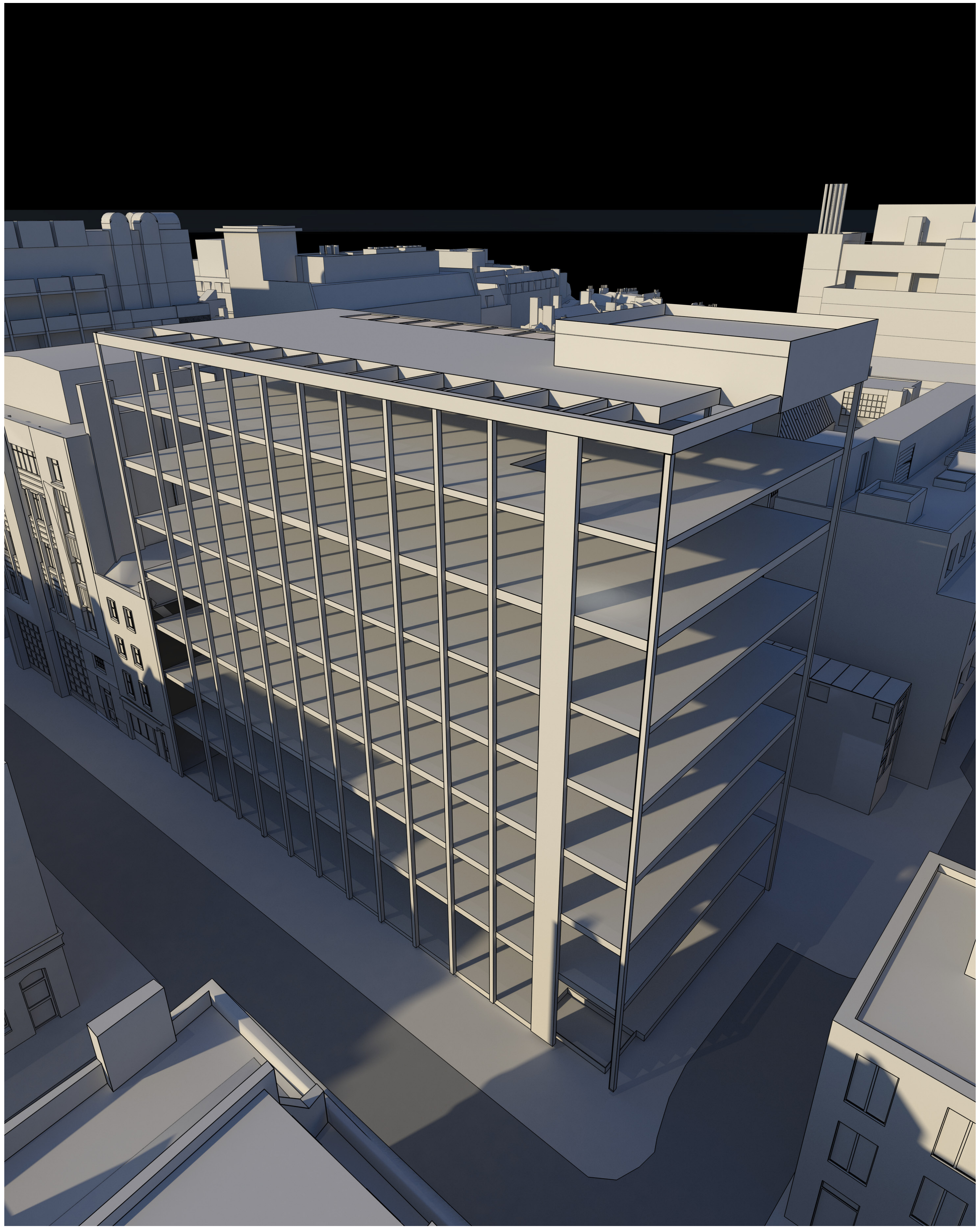
6.0 Structure & energy



6.1. Existing structural format

The building is rectangular on plan and eight storeys high plus basement, with a double basement to the rear. The structure of Arthur Stanley House does not appear to have been altered since its construction in 1965 except for an 8th floor level over the original expressed concrete roof slab. The roof extension has been incorporated within the piloti (expressed external RC frames) which were roof features regularly used in the 1960's era on multi-storey buildings. The rooftop construction at 8th floor is comprised of precast units comprising autoclaved aerated concrete, and the vertical cladding is a mixture of masonry and steel sheeting with steel windposts. All of the remaining upper floors, and possibly parts of the ground floor are comprised of clay hollow pot construction with a concrete topping spanning between a strip of solid RC slab along the single row of spine columns.

The roof over the ground floor construction at the rear of the building is constructed using high level cranked steel roof beams to form a double-height space. It is believed that wood wool slabs have been used as the roof deck. Below ground floor level at the rear is a part single basement leading to a double level basement. The basement construction appears to be of concrete floors and RC framed walls with masonry infilling. The far north elevation of the double basement wall is wholly comprised of brick masonry from the floor to ceiling. Judging by the quantity of water entering the lower basement it is likely that the masonry forms the inner skin of a traditional cavity drain system. The earth retaining structure(s) to the basements are unknown.

The long facades to the building are comprised of dado brickwork walling between ribbon fenestration. On the end walls the façade is built entirely in brickwork. At a closer inspection it would appear that the end walls are built in solid 330mm thick masonry, comprising brick facings in a Flemish bond with a brick thick inner skin of Fletton brickwork. The outer brick skin runs past the intermediate RC columns, whilst the inner leaf brickwork is pinned vertically between the structural frames. We believe that this status quo repeats on the long elevations; however the dado masonry is likely to be part supported on the precast panels that are attached to the RC floor slab In short, the structure of the Arthur Stanley building has an RC frame with monolithic slabs supported by a combination of RC columns and possibly some loadbearing masonry walls.

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6.2 Energy Statement and Sustainability

6.2.1 Energy summary

The proposed development at Arthur Stanley House consists of the refurbishment and redevelopment of the existing Sixties building and its extension to the north of the site. The current, out-dated building fabric will be upgraded during the planned works to meet the same performance of a new build façade; and the building services installation will aim to be as energy efficient as practicable and generate its own energy where feasible.

The following graph summarises the site wide percentage improvements on Part L 2013 carbon emissions that are achieved by the current energy strategy. This shows significant improvements in carbon emissions given the constraints of the site and its location. It is estimated that a total of 33.8 tonnes of CO2 per annum could be abated which is equivalent to a 24.0% reduction in carbon emissions against the Part L 2013 baseline.

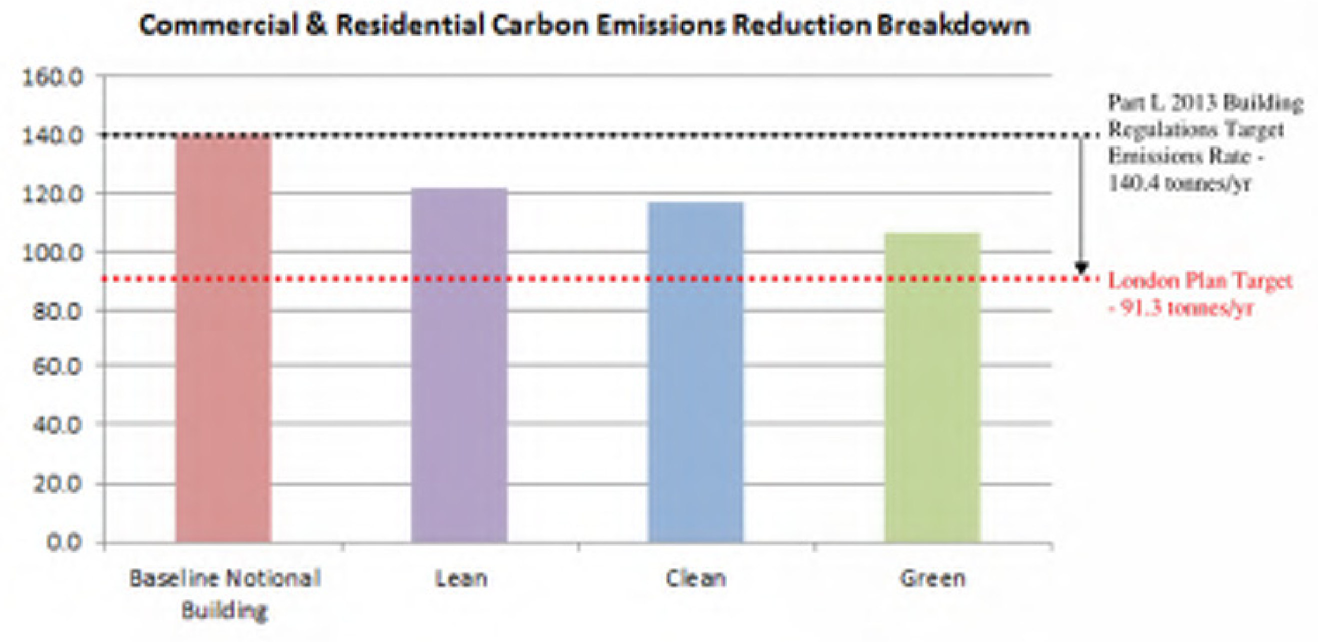
Arthur Stanley House Reduction in Carbon Dioxide Emissions CHP and CCHP were deemed to be unfeasible, though capped pipework to the Residential and Commercial plant rooms will be provided such that a future connection to a district heating and cooling network could be facilitated. The measures shown in the Arup Energy statement report allow the development to achieve the required energy credits for BREEAM Very Good and Code for Sustainable Homes Level 4 to meet requirements for planning. However, the target of a 35% improvement over the Part L 2013 notional building has not been met.

An 11% annual shortfall has been recorded which is equivalent to 15.3 tonnes per year. Over an assumed 30 year lifetime for services, this is equivalent to 459 tonnes of carbon dioxide.

The project has been assessed against BREEAM and Code for Sustainable Homes and the pre-assessment is included in the Energy Statement appendices.

To achieve the target BREEAM rating of Very Good, the project will target 70 credits which equates to a score of 60.9%.

To achieve the target CfSH Level 4, the project will target 78 credits, equivalent to a score of 72.5%.



Arthur Stanley House reductions in Carbon Dioxide Emissions

6.2.2 Energy strategy

The starting point for the Arthur Stanley House energy strategy is to minimise energy consumption as much as possible through passive measures. Optimising passive design is the most effective means, both in carbon dioxide and financial terms, of ensuring both the commercial and residential buildings are inherently low in energy usage.

There are a range of energy-efficiency measures that have been applied to the buildings as an integral part of the design process:

The existing façade will be removed and replaced with a high performing thermal envelope. This reduces the heating and cooling load for the building.

- Balconies on a number of the apartments reduce the direct solar gains they receive.
- Glazed area of facade incorporates high efficiency glazing throughout. The glazing performance serves to reduce the heat gain and heat loss at the building perimeter, which reduces the heating energy consumption.
- The glazed areas have been optimised for daylight while limiting heat gains and losses.
- Envelope air tightness for the residential & commercial buildings has been enhanced by 40% over notional facades (now $3m^3/hr/m^2$ @ 50Pa leading to savings in heating and cooling energy consumption throughout the year and optimising the potential for heat recovery.
- Passive solar gain allows solar gain to offset the perimeter heat loss in the winter. The active building controls will automatically adjust the amount of heating in each zone, thereby reducing the energy demand of the heating system.
- Low energy lighting has been introduced to reduce both lighting input power and internal cooling loads in both developments. In the commercial offices this equates to lighting efficiencies of 76lm/W.
- Overheating analysis has been conducted and this has led to high performance solar control being incorporated in to the facades that require it.

Of the renewable technologies available, a combination of photovoltaics and air source heat pumps are considered the most practical and feasible for the Arthur Stanley House. It is estimated that approximately 10.7 tonnes of CO^2 could be abated on the site by the renewable technologies; 4.5 tonnes of CO^2 by the introduction of efficient technologies; and 18.6 tonnes of CO^2 by passive measures alone. In total, the energy efficient strategy is able to achieve a 24.0% reduction in carbon emissions against the Part L 2013 baseline.