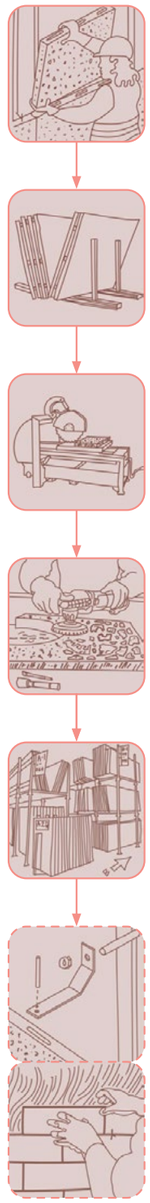
Re-worked



Deconstruct
Careful removal to enable reuse with minimal processing

Store
Safe storage, preferably on-site

Cut
Re-dimensioning stone

Finish
Tooling or polishing the surface

Label
Accessible cataloguing of new elements for reuse

Dry install
Reusing existing hanging system. For ease of future reuse

Wet install
Smaller dimension stone is adhered to a carrier board

There are various methods that could be employed to rework the surface of the granite to achieve both regular and irregular profiles, as well as affecting the appearance through abrading, polishing and staining.

Tooled

Traditional, yet simple masonry techniques could be applied to the surface of the stone to achieve different textures including bush-hammering, punching, picking, and furrowing for a more sculpted appearance.

Cut or broken

The surfaces could be cut with shallow trenches and/or broken to achieve linework patterns and a roughed finish. Offcuts and stone dust from sawing could be used within cast or render systems (see pages 48 - 51).

Profiled

Machine cutting could be configured to introduce shallow grooves into the tiles to achieve different profiles - such as chamfers or flutings.

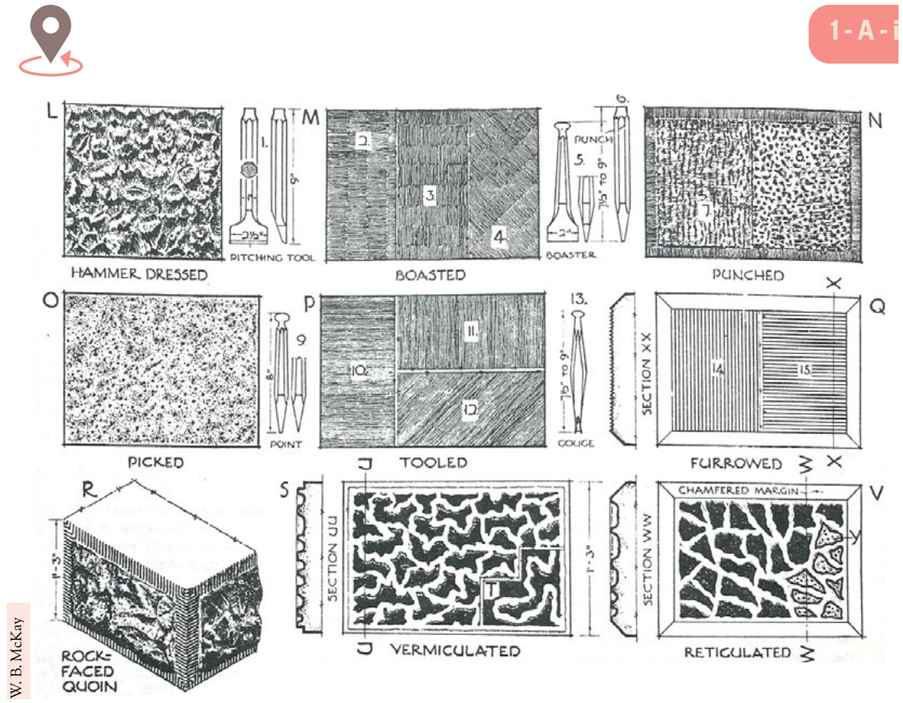
Polished

Polishing can be used as a spot treatment to define certain areas, in contrast to textured surfaces.

Stained

There is an opportunity to apply a stain to the rear, more open face of the granite to dull the tone or even add red or yellow iron oxides. The rear of the stone will be a wire-cut surface that should be porous enough to take a masonry stain.

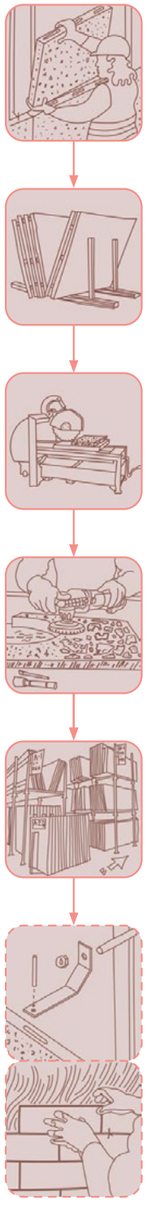
Testing could be undertaken to assess the potential for using masonry stains that have been used across London since the 19th Century to tint brick and stone masonry.




Herzog & De Meuron


Flores i Prats Architects

Channel & Fill



Deconstruct
Careful removal to enable reuse with minimal processing

Store
Safe storage, preferably on-site

Cut
Re-dimensioning stone

Finish
Tooling or polishing the surface

Label
Accessible cataloguing of new elements for reuse

Dry install
Reusing existing hanging system. For ease of future reuse

Wet install
Smaller dimension stone is adhered to a carrier board

This section explores a means of retaining larger sheets of stone, whilst alluding to smaller proportions through a cut and fill system. This could work with the existing hanging system, rather than swapping to a brick tie or slip system.

Cut & filled

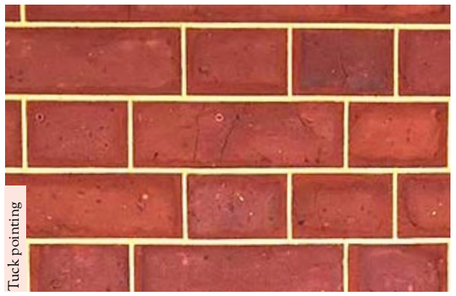
To achieve a brick appearance whilst minimising the processing of the granite, thin channels could be rebated into the existing surface and grouted to mimic neat, thin mortar beds. This strategy is not too dissimilar from tuck-pointing in brickwork - a specialist means of creating an illusion of finer brickwork using contrasting mortar colours.

This strategy requires prototyping with a combination of plunge saws and a router to achieve a believable bond. Options could be explored for varying the joint widths and using different colours of lime mortar to effect the overall tone of the facade.

Relief arches / tiled arches

Referencing the arches within the old building - arches could be formed with thin mortared tiles or rebated curved elements that are either purely ornamental or work to bridge the loading above window openings.


Tim Stannard


Tuck pointing

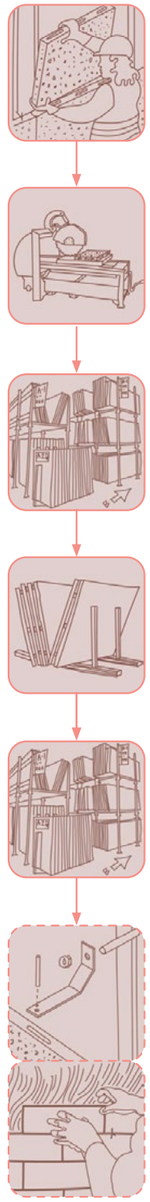

Local Works Studio


Francesca Torzo

7.3 Facade Replacement

Local Works Studio: Granite Reuse Case Study

Sculpted



Deconstruct
Careful removal to enable reuse with minimal processing

Cut
Re-dimensioning stone

Label
Accessible cataloguing of original elements for processing

Store
Safe storage, preferably on-site

Label
Accessible cataloguing of new elements for reuse

Dry install
Reusing existing hanging system. For ease of future reuse

Wet install
Smaller dimension stone is adhered to a carrier board

By re-hanging the granite, different depths and perforations could be achieved across the facade that could even include tactical shading devices.

Alter existing hanging brackets

Some of the stone elements could be fitted with longer steel brackets that are secured back to the existing hanging system to achieve a deeper, stepped facade. The existing welded s/s frame could be reused and repositioned to affect the angle - and thus overall form - of the granite facade in some areas.

Shingle tiles

Using a traditional hung shingle tile system (as shown on page 15) could create a lightly stepped texture with shadow gaps that has a similar appearance to brick bonds when see from below or afar.

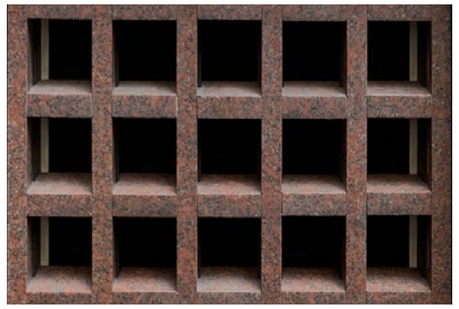
Fins for shading

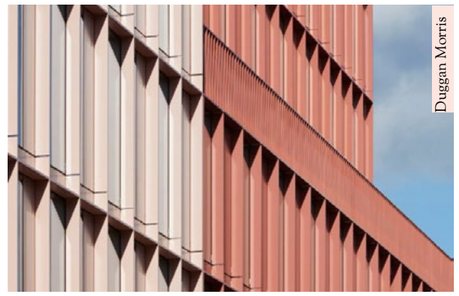
Granite could be dimensioned in long, narrow strips and hung perpendicular to the facade to create shading fins (also known as brise soleil) over or close to glazed areas. By facing the original rebated end outwards, these fins would be readable as reused elements - where the surface grooves directly reference the original hanging system.

Perforations

The existing facade features elaborate granite vents with angled horizontal pieces that screen the grate behind. Building on this assembly method, the new facade could incorporate perforations within the hanging matrix - leaving different sized gaps between projecting elements to reveal or obscure what lies behind.

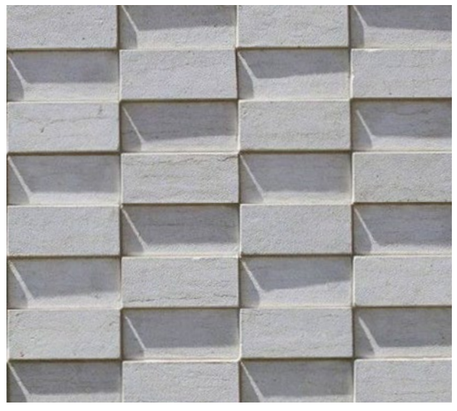
1-A-





Duggan Morris

Francesca Torza



Reused for features

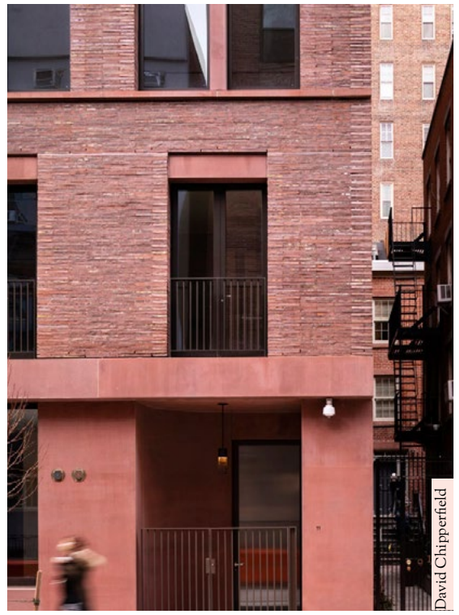
1 - A

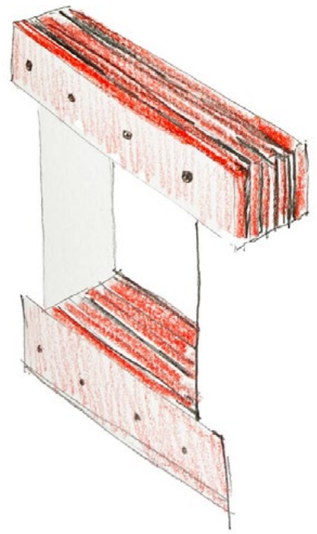
Outside of the main cladding areas, the granite could be reused for features such as lintels, reveals, soffits, cills and hard landscaping. If applied internally, this could also include flooring, counter tops, wet rooms, skirting, and sinks.

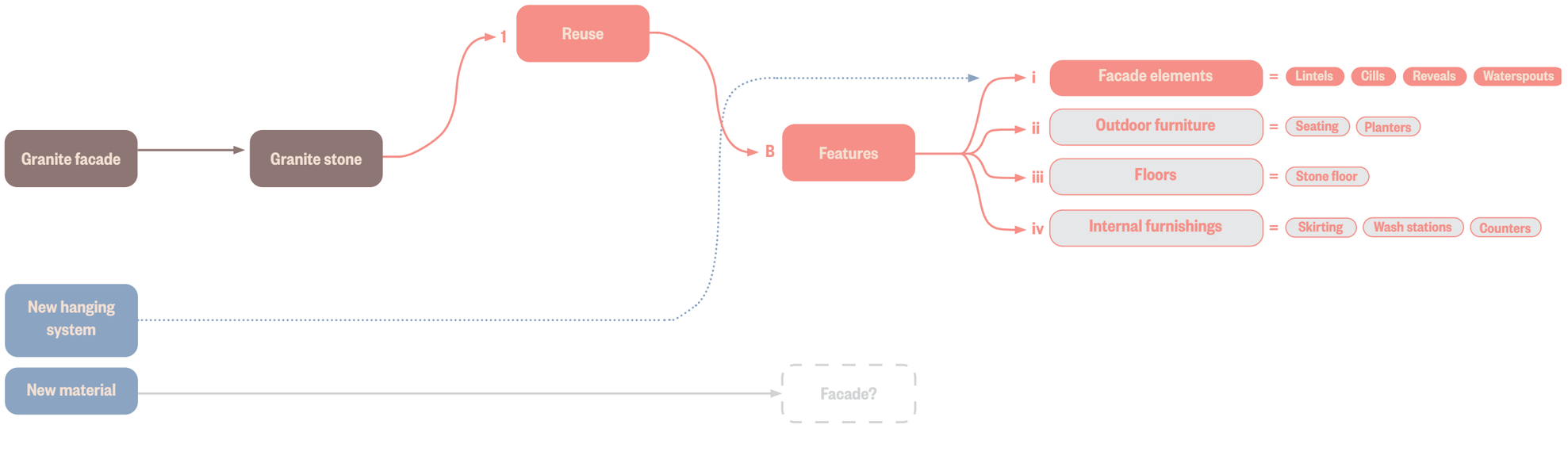
We suggest that laminating stacked granite sheets together using straps, soft mortar or bolts could make for innovative, deconstructable structural elements. These could be used horizontally and/or vertically within any of the features mentioned within this section. Assembled in this way, these features would double-up as a granite sheet store ready for future adaptation and reuse.

Without the need for laminating sheets, the existing 40mm thickness is ideal for use as countertops and tables within kitchens, bathrooms and living spaces. Together, these would create a family of bespoke internal artefacts that give grandeur to the interior space.

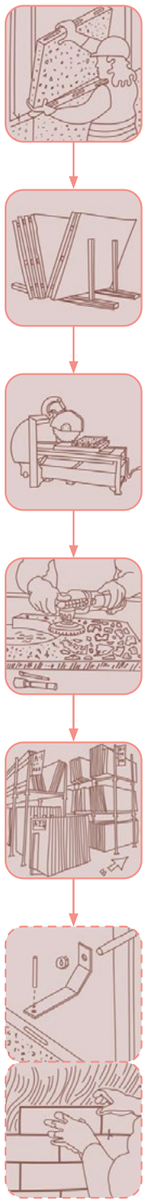

Chelon


David Chipperfield





Facade elements



Deconstruct
Careful removal to enable reuse with minimal processing

Store
Safe storage, preferably on-site

Cut
Re-dimensioning stone

Finish
Tooling or polishing the surface

Label
Accessible cataloguing of new elements for reuse

Dry install
Reusing existing hanging system. For ease of future reuse

Wet install
Smaller dimension stone is adhered to a carrier board

Referencing the language of masonry structural elements, the granite could be used to frame openings within the facade.

Lintels and cills

Laminated 40mm tiles of granite could be strapped or bolted together to form strong lintels and cills, with many aesthetic possibilities for affecting the surface texture and colour (see pages 32-33).

Window reveals

The s/s welded frame pieces could be rearranged to create the skeleton for splayed window reveals, or these could be formed using the same laminating technique mentioned above.

Rainwater management

The original building features masonry gargoyles at high-level and the courtyard displays a contemporary granite spout between arches. Further iterations of this ornamental, yet functional feature could be integrated within the rainwater treatment on the facade at parapet level.

1-B-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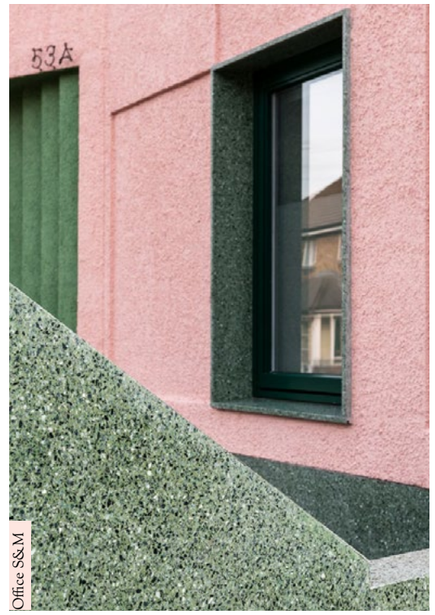
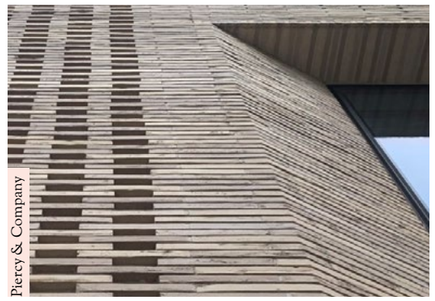
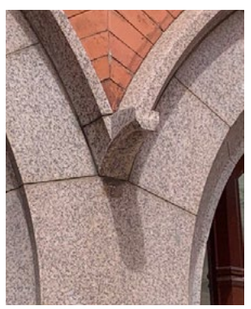
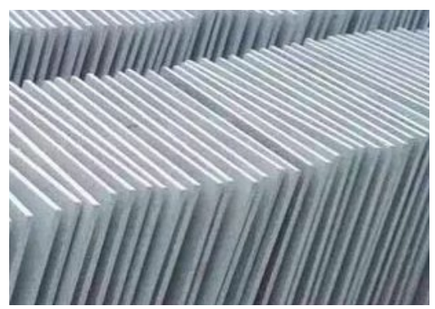


Office SS.M


David Chipperfield


Piercy & Company





Outdoor Furniture

Deconstruct
Careful removal to enable reuse with minimal processing

Store
Safe storage, preferably on-site

Cut
Re-dimensioning stone

Finish
Tooling or polishing the surface

Label
Accessible cataloguing for reuse

Dry install
Reusing existing hanging system. For ease of future reuse

Wet install
Smaller dimension stone is adhered to a carrier board

Beyond its possible use within the facade finish, the granite is a durable, smooth material that could be featured within tactile, outdoor furniture. There is already precedent for its use within the circular bench in the main courtyard.

Facade bench

To better address the market and its visitors on Leather Lane (to the north-east of the site), a bench could be integrated within the facade's plinth base. It would be efficient and poetic to bring the existing curved cornice down to street level to be revived as a seat similar to the one built within the walls of Palazzo Medici in Florence.

Planters & seating

Whether stacked or assembled in sheets, the granite could be integrated within the courtyard in additional 3D elements that could include sculptural seating and planters.

Assemble

Palazzo Medici

Joo Ho Young

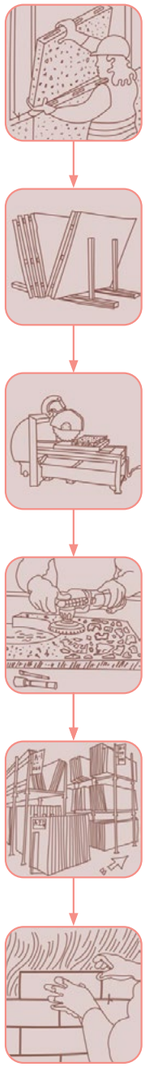
Gabriel Orozco

Local Works Studio

7.3 Facade Replacement

Local Works Studio: Granite Reuse Case Study

Floors



Deconstruct
Careful removal to enable reuse with minimal processing

Store
Safe storage, preferably on-site

Cut
Re-dimensioning stone

Finish
Tooling or polishing the surface

Label
Accessible cataloguing for reuse

Wet install
Smaller dimension stone is adhered to a carrier board

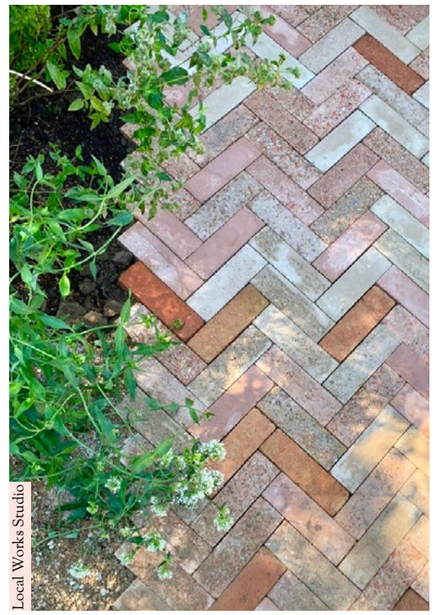
The granite could be redimensioned and resurfaced to be used within internal or external floors and steps.

Stone pavers

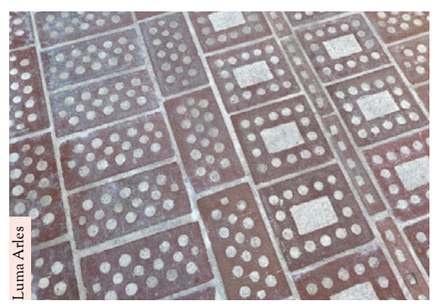
The existing floor within the courtyard features the same two types of granite as the facade; it includes drainage channels with linear holes and inlaid circular pieces within a square tile. New external flooring could be made to match the existing, or amended - perhaps breaking the regularity of the grid with hints of spolia that obviously reference the reuse.

1-B-i

Local Works Studio

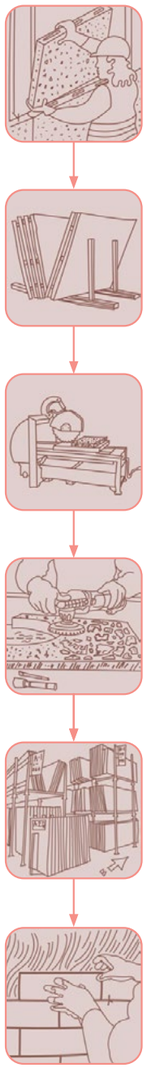


Local Works Studio



Luma Arles

Internal Features



Deconstruct
Careful removal to enable reuse with minimal processing

Store
Safe storage, preferably on-site

Cut
Re-dimensioning stone

Finish
Tooling or polishing the surface

Label
Accesible cataloguing for reuse

Wet install
Smaller dimension stone is adhered to a carrier board

The granite could be redimensioned or reprofiled to be used within tactile internal furnishing for assured durability and grandeur.

Skirting

Re-profiled granite used within stone skirting would be an effective way of preserving walls in areas of greater footfall and easing cleaning.

Stone wall cladding

Dado height wall panelling and door linings would further preserve walls in high traffic areas, and could contribute towards clear wayfinding.

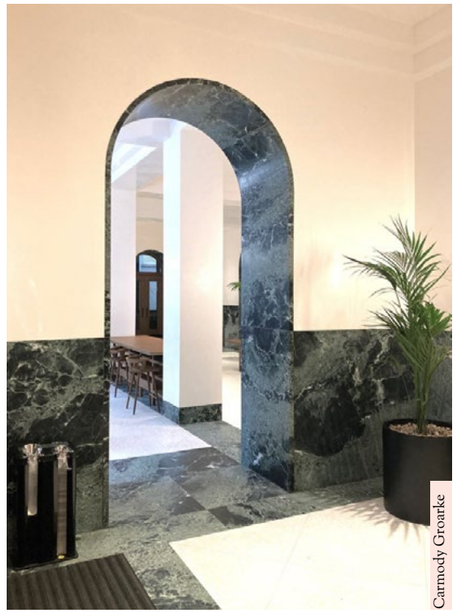
Sinks & counters

Sinks and counters could be made with a slab construction that makes use of the 40mm thick granite sheets. This would contribute to statement furnishings that could even be continuous with the floors (see pages 44-45).

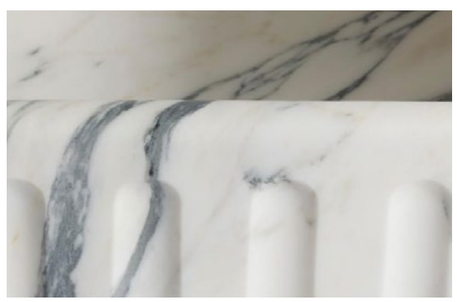
Stone furniture

Using the same assembly methods as the sinks and counters could produce a family of bespoke granite tables and shelving.

1-B-i



Carmody Groarke



Crushed for cladding

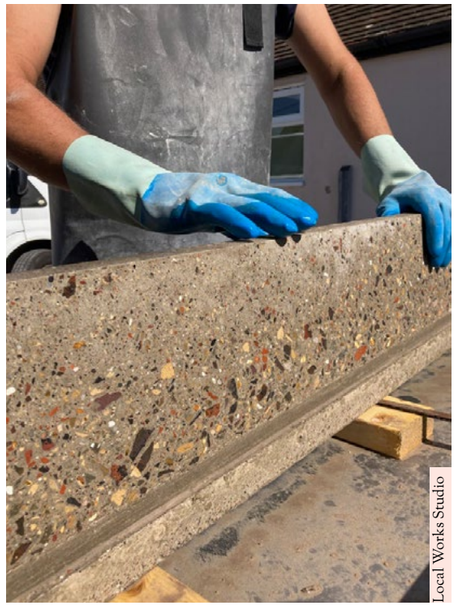
2 - A

We think this option suits the fabrication of a few, bespoke features, but not the majority of the facade treatment.

We advise that aggregate sources are restricted to the waste streams from redimensioning the granite sheets (including offcuts and stone saw sludge) and possibly other demolition material near the site.

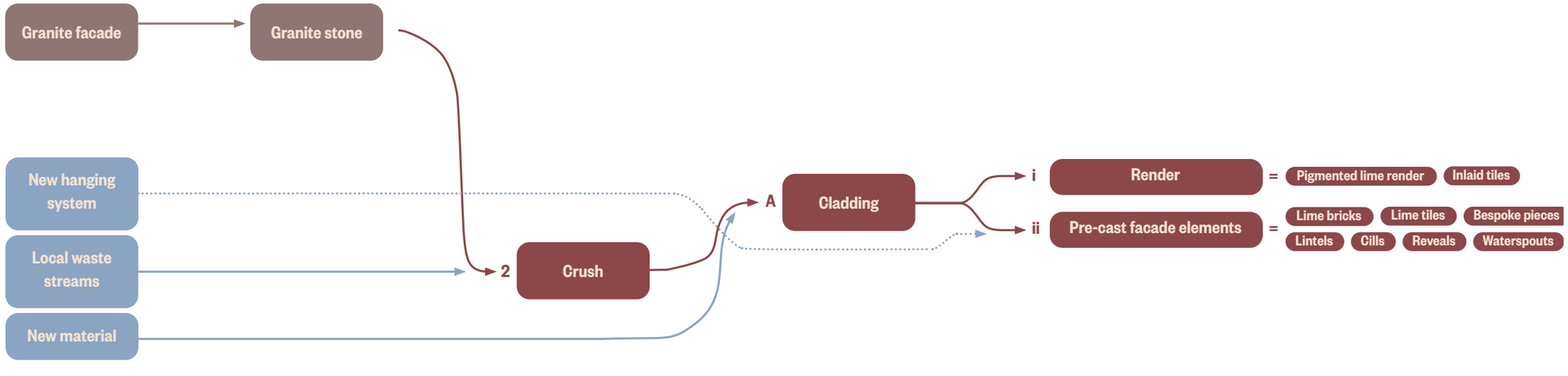
Ideally the crushing and grading would happen on-site - preventing unnecessary material movements and contamination from harmful or inappropriate materials that can turn a useful aggregate into waste material. Good grading of the granite aggregates will open up countless possibilities for precast finishes.

We recommend using one of two methods: hydraulic-pressed lime tiles/bricks or a waste-based concrete mix that unlocks more options for pre-cast forms (with a reduced cement content and up to 95% waste materials). Either option would create a *liquid stone* material that could be formed into many forms and finishes.



Local Works Studio

Local Works Studio



Render

Deconstruct
Careful removal to enable reuse with minimal processing

Transport to processor
If unable to process on-site

Crush
Ideally crushing only damaged stones

Additional new materials
Binders and other waste aggregates

Transport to site
If unable to process on-site

Mix
Cast into moulds

Wet install
Smaller dimension stone is adhered to a carrier board

This section outlines an opportunity for producing pigmented render using offcuts and stone dust from the cutting & polishing of the granite, rather than losing valuable pieces.

Lime renders

Producing a lime render would provide a relatively cheap application for infilling large areas, making a use of crushed granite waste to give textured, coloured finishes.

If using lime binder, this material would be more appropriate for future deconstruction (and reuse) and less carbon intensive than its cement alternative. The render would be applied to a woodwool backing board, and could be framed within timber or granite beads to break up the monolithic aesthetic. These panels could be stepped or splayed to create depth.

This option provides a convenient solution to isolated treatments within more hidden sections - within soffits or recessed entrances, for instance.

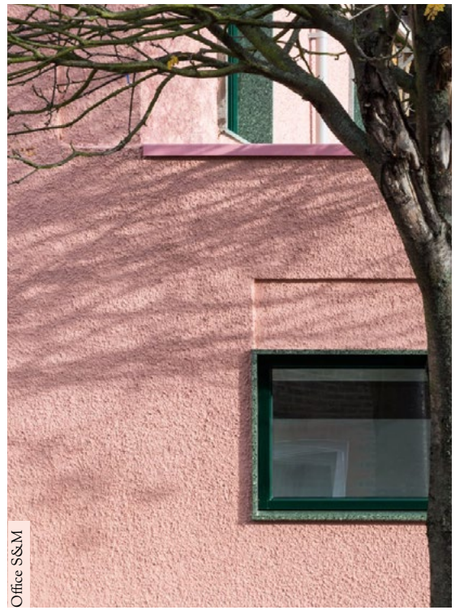
Banded pigments

It is possible to create a gradient or banded effect by incorporating different pigments across one surface. By mixing the two different granite aggregates and/or natural oxide pigments, a new spectrum of colour could be revealed.

Inlaid tiles

This solution would work well in conjunction with stone or precast tiles (see pages 30-31 and 52-53). These pieces could be inlaid to create a flush surface finish with areas of patterning and calmer surrounds.

2 - A -



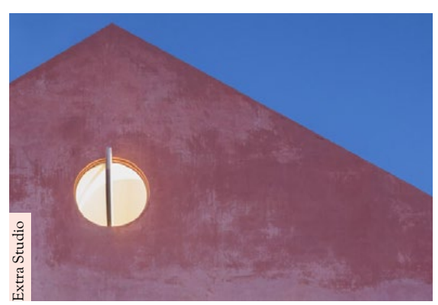
Office S&M

Local Works Studio

Francesca Torzo

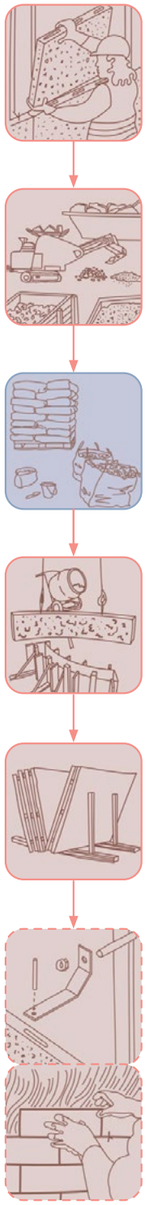
Local Works Studio

Francesca Torzo



Extra Studio

Pre-cast facade elements



Deconstruct
Careful removal to enable reuse with minimal processing

Crush
Ideally crushing only damaged stones

Additional new materials
Binders and other waste aggregates

Mix
Cast into moulds

Store
Safe storage, preferably on-site

Dry install
Reusing existing hanging system. For ease of future reuse

Wet install
Smaller dimension stone is adhered to a carrier board

Lime Tiles & Bricks

When hydraulic-pressing lime tiles and bricks, no kiln firing is required - meaning that this type of fabrication can take place in an urban setting, preferably on-site.

We have previously designed and specified these systems on a facades in Belgium, for which they were tested and verified for external use.

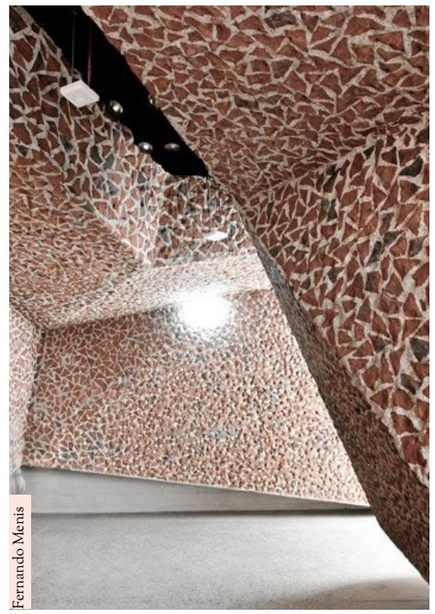
Bespoke elements

It is possible to achieve complex geometries with by casting into resuable formworks, which also allow for easy repetition or variations of a form. These features could have different finishes that include polishing the surface to reveal the different sizes of granite aggregate for a terrazzo effect or embedding granite tiles within a slab for a mosaic effect.

2-A-

Local Works Studio

BC Materials & Local Works Studio



Fernando Menis

BC Materials & Local Works Studio

Crushed for features

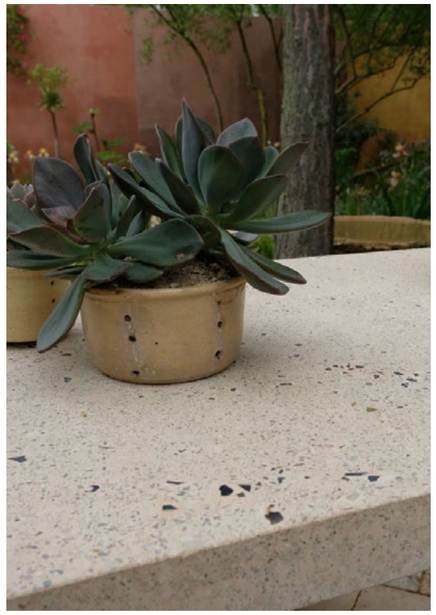
2 - B

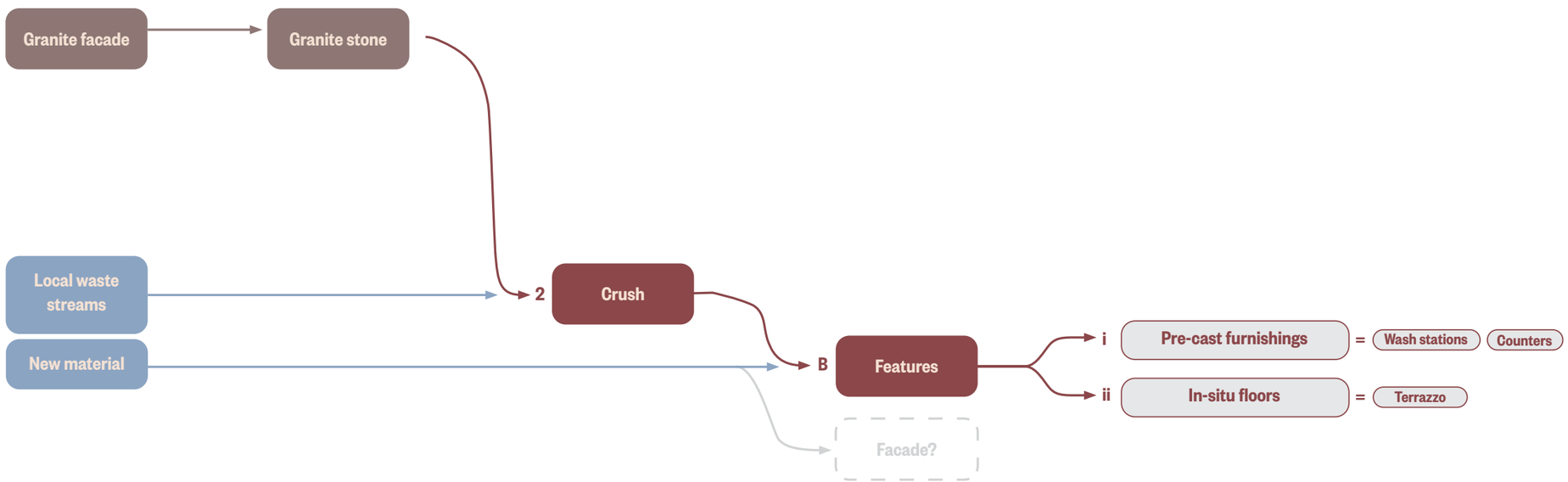
This sections considers how to achieve similar forms to those explored in 1B, but making the most of the increased flexibility that pre-casting allows for. Each of these options rely on the crushing of granite waste, and the addition of new material that could come from waste streams as well as mainstream supply chains.

Terrazzo surfaces are an ideal way of showcasing the reuse of waste aggregates. Through polishing the surface of the features, waste materials become readable in the surfaces - giving them their individual character. This method is process-heavy and can be costly, but there are cheaper options for revealing the aggregates in a more textured finish that is ideal for non-slip applications.

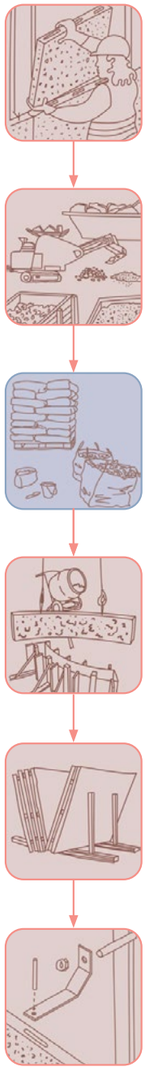
Assemble

Local Works Studio





Pre-cast furnishings



Deconstruct
Careful removal to enable reuse with minimal processing

Crush
Ideally crushing only damaged stones

Additional new materials
Binders and other waste aggregates

Mix
Cast into moulds

Store
Safe storage, preferably on-site

Dry install
Reusing existing hanging system. For ease of future reuse

Further to the internal and external solid granite feature design explored on pages 42-47, more complex forms can be achieved using a pre-cast method. This application is ideal for any form that does not resemble a thin slab - for these assemblies, the granite is best used in its existing form.

Furniture

Pre-cast waste-based concretes could be used to within the interiors to make tables, counters and other furniture items.

Other features

Pre-cast panels could be used to form shower screens, skirtings, door linings and other wall cladding features.

Note: The existing surface of granite is not too disimilar from terrazzo - it has a flecked pattern owing to its mineral composition that includes mica, quartz and feldspar. It already behaves as a terrazzo panel would, and should only be reformed as a pre-cast element if the required new form cannot be achieved with a slab assembly.

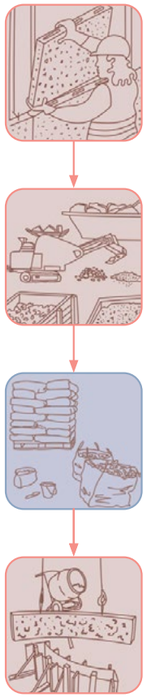
Local Works Studio

Paul Cocksedge

Assemble

Local Works Studio

In-situ floors



Deconstruct
Careful removal to enable reuse with minimal processing

Crush
Ideally crushing only damaged stones

Additional new materials
Binders and other waste aggregates

Mix
Cast into moulds

A waste-based concrete floor provides a practical surface in which the waste aggregate can become a decorative feature.

Terrazzo Flooring

Pre-cast terrazzo tiles or in-situ cast and polished flooring could contain crushed granite waste alongside other waste aggregates to introduce new colours. An in-situ poured floor is not well suited to future deconstruction and should only be if no other option is feasible (see pages 44-45).


Assemble

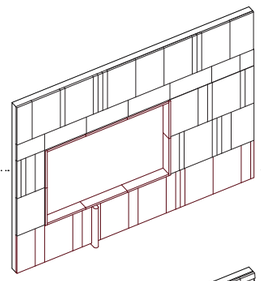
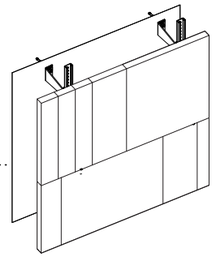
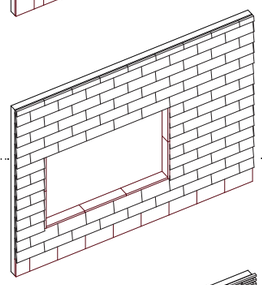
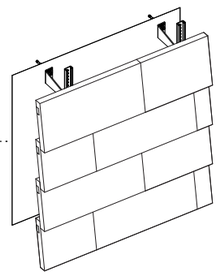
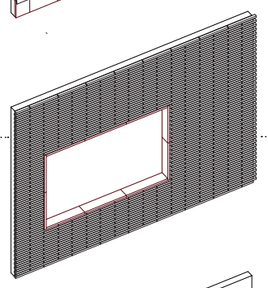
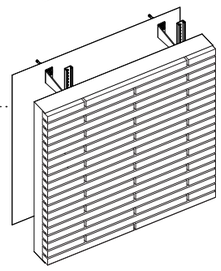
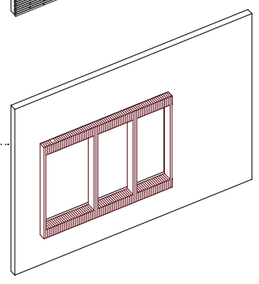
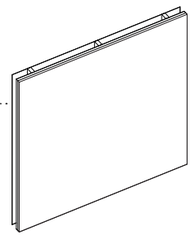
2-B-


Molonglo


Local Works Studio

Early comparisons

This section includes a summary of early-stage embodied carbon calculations for four different facade treatments. These are indicative figures, and do not contain allowances for insulation or wall membranes.

	Example wall panel	Example wall panel - m2	Approximate embodied carbon per square metre	
1. Large dimension reuse The granite is reused with minimal cutting and processing.			**11.5 kgC02e/m²**	The lowest embodied carbon solution is to reus the cladding with minimal processing. This valu would be reduced even further if the hangin system was also reused.
2. Small dimension reuse The granite is reused by cutting it into a shingle tile.			**11.9 kgC02e/m²**	Re-dimensioning the granite into a standard size unit still offers a low embodied carbon solution. The unit dimension should be calculated to be th most efficient cut from the sheets available.
3. Pre-cast The granite is crushed and used as an aggregate in pre-cast concrete.			**135.9 kgC02e/m²**	The highest embodied carbon solution is th concrete pre-cast panel with embedded granite til slips. This could be reduced by using a bespok waste-based concrete material.
4. Lime render and stone window treatment The granite is reused around window and door openings, and the walls are lime rendered using crushed granite aggregate.			**20.4 kgC02e/m²**	Potentially the best way to reuse the crushe granite aggregate (including a waste stream fror stone cutting) is within a thin lime render, ont woodwool boards.

Looking Ahead

In this report we have given a brief overview on numerous viable strategies for reusing the granite cladding. At this early stage, we have gathered information from fabrication drawings and site visits to inform initial decisions about deconstruction, storage and processing.

'Waste' materials often arise as one-off, sporadic supplies, or they are only intermittently available and thus require ample foresight and responsiveness to intercept and redirect. The retrofit of 2 Waterhouse Square faces a unique opportunity whereby high-quality cladding materials exist on-site; these materials just require careful decontruction and potentially very little alteration for large-scale reuse. For those slabs of granite that are not used on the new facade, an ideal solution would be to reuse them internally for showers screens, counter-tops, flooring, sinks, skirting and dado panels.

Any broken sections of stone from deconstruction and off-cuts from re-dimensioning works can be crushed and used as aggregate within the fabrication of bespoke pre-cast forms that cannot be achieved with the existing slabs. Pre-cast features can be finished to make a readable surface - giving a visual clue to the inclusion of the original granite.

At Local Works Studio, we follow circular economy construction principles (see below) to achieve the best long-term carbon positive outcomes for resource use in design projects.

These circular economy guidelines could be interpreted for the facade strategy at Waterhouse Square as follows:

1. Keep all materials on site & in use in their original state for as long as possible
2. Observe waste hierarchy – maintain, repair, retain, reuse, repurpose before recycling
3. Prioritise careful deconstruction, sorting & storage, over quick demolition and waste.
4. Invest in permanent infrastructure for saving high-quality by-products and waste for future use, including storage areas, moulds, and formwork for modular components
5. Design for ease of disassembly & cyclical rebuilding
6. Use mechanical fixings and connectors before chemical adhesives
7. Avoid permanently mixing different materials
8. Use modular construction & components that can be readily repaired or replaced without deconstructing the whole
9. Design components at a scale that makes best use of available small dimension waste materials & that can be easily dismantled for future reuse.
10. Make services easily accessible & repairable
11. Design for adaptability & flexible use
12. Specify materials & features for simple maintenance & repair, with on-site skills & tools where possible
13. Eliminate unnecessary materials, layers & processes
14. Celebrate materials & make their components visible and legible

Pictured : Circular economy for construction, diagram by David Cheshire, 2016

Next steps

This Materials Strategy report should provide a reference tool for the facade design team to inform comparisons between and decisions on plausible design options, as well as being source of inspiration for potential features on the site.

If required, Local Works Studio can work with the design team on any or all of the following:

1. Hone elegant solutions for material use
2. Invent new, or amended material processes
3. Design architectural or landscape features
4. Test fabrication processes and prototype features and/or samples
5. Make detailed specifications for fabricators

Our involvement would inform a truly circular approach to procurement and construction, to overcome barriers to urban material storage and fabrication, and in doing so enhance the legacy of the building project.

There is a wealth of material opportunity at Waterhouse Square and if harnessed well, the new building skin and fit-out could achieve a material richness that inherently reflects and reveals the narrative of reuse.

Insulation
We would be interested in discussing the possibility of using a natural insulation material for this project, such as wood fibre board - we could then assist in the appropriate detailing of the facade build-up to make this possible.

LCA
We are able to offer carbon Life Cycle Assessment (LCA) for each option within our strategy.

Concept design, Material design & Prototyping
To aid decisions on the viability of different options for the cladding and contribute to a shortlist.

Fabrication strategy
To ensure that materials and processes are kept on-site and result in the highest possible quality finish.

Detailed design and Specification
Technically refine shortlisted options to aid decision-making.

Training
Contractor training for deconstruction, processing and fabrication work.


Cobbauge


Local Works Studio

Glossary

DOFF cleaning

A method of cleaning stonework and masonry using high-temperature steam. Whilst the temperature in the system is high, the pressure on the surface being cleaned is very gentle and the volume of water is low. The surface does not become saturated and dries within minutes.

Grades (Aggregate)

Sorting aggregates into different sized particles using a variety of sieves. A well graded aggregate will have a good range of particle sizes and will have equal amounts of each particle size.

Granite

Very hard, crystalline, granular rock containing feldspar, quartz and mica. Granite is capable of taking a high polish and can be cut thinly, making it an ideal cladding material.

Hanging system

Metal battens used to secure stone rainscreen cladding to a building. This can include projecting brackets that define the three-dimensional form of the facade.

Honed

The face of stone has been ground to a smooth, flat, consistent surface. For stones with a natural shine such as granite or marble, the polish or shine is removed leaving a matte (unpolished) surface with little to no reflection and no bumps or ridges.

Hydraulic-pressed tiles and bricks
(Also: Lime tiles and bricks)

A low carbon fabrication technique develop by LWS and BC Materials using Lime to bind waste aggregates into a mortar for making bricks and tiles. The process does not require a kiln for firing the products, so fabrication can happen on-site within an urban environment.

Liquid stone

Our term for describing the qualities of a waste-based concrete made with a high proportion of crushed stone material. If crushed and mixed, the granite becomes a castable, liquid substance that can be used to create an infinite variety of forms and features.

Tuck pointing

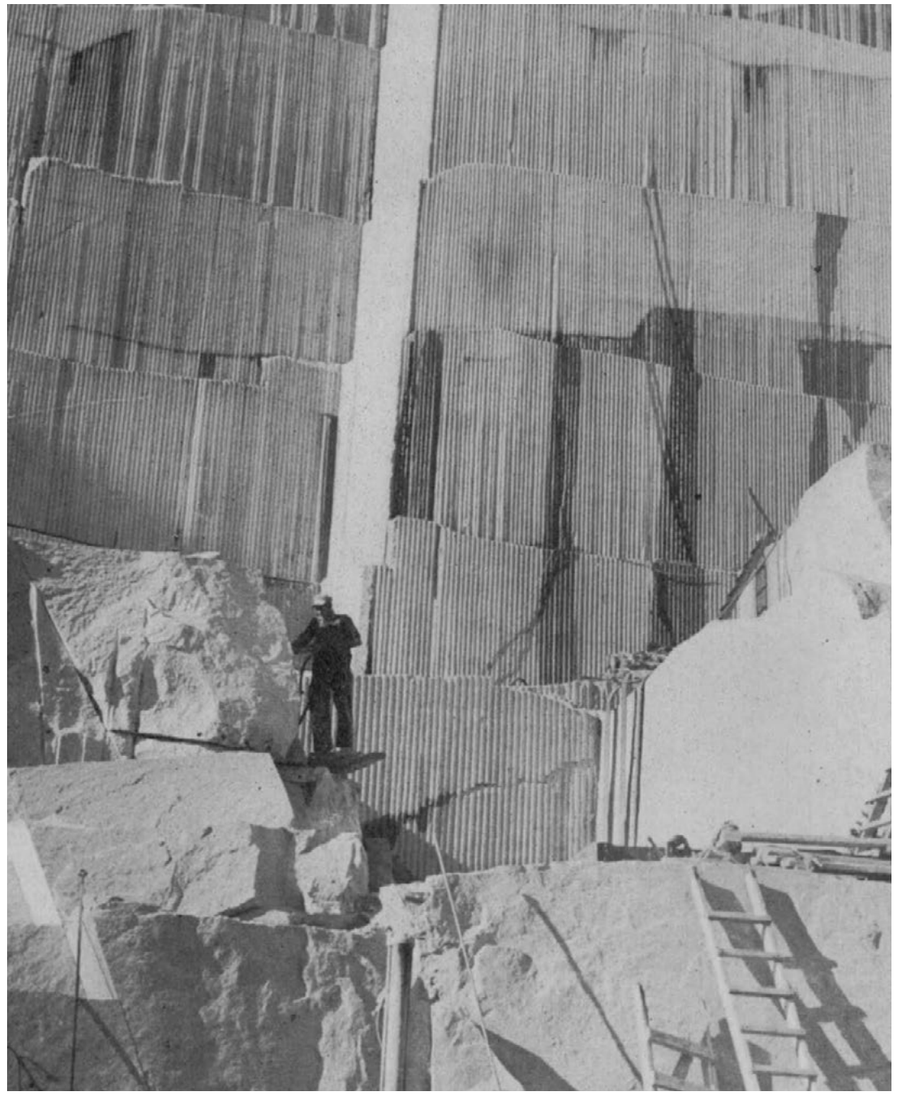
The application of lime putty lines to conceal more rugged joints in masonry. These can be a fake joint, that is filled or grouted with a contrasting mortar to give the illusion of finer or smaller dimension work.

Waste-based concrete

A term that we use to describe a castable material that is made of up to 95% waste materials. We have developed a waste-based concrete mix that has been independently tested and proven to exceed the strength required by the British Standard for Cast stone BS1217.

Polished

Granite slabs are run through a series of progressively finer diamond polishing pads in a slab polishing machine. Using finer pads will achieve a glossier surface finish.



7.4 Structure

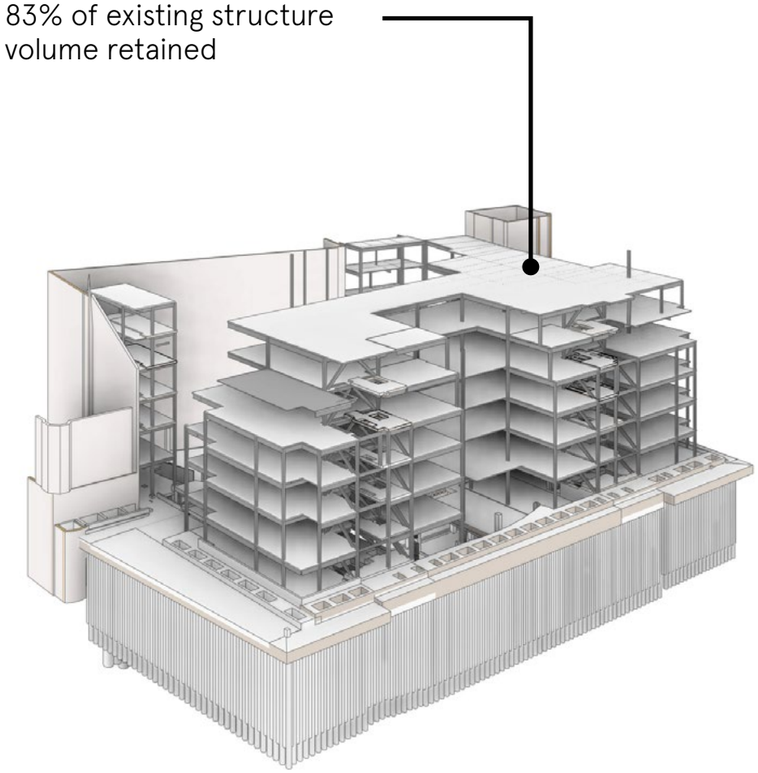
Retained Structure

The development proposes to retain and extend as much of the original structure as possible, extending its life and omitting the carbon emissions that would be required to rebuild it.

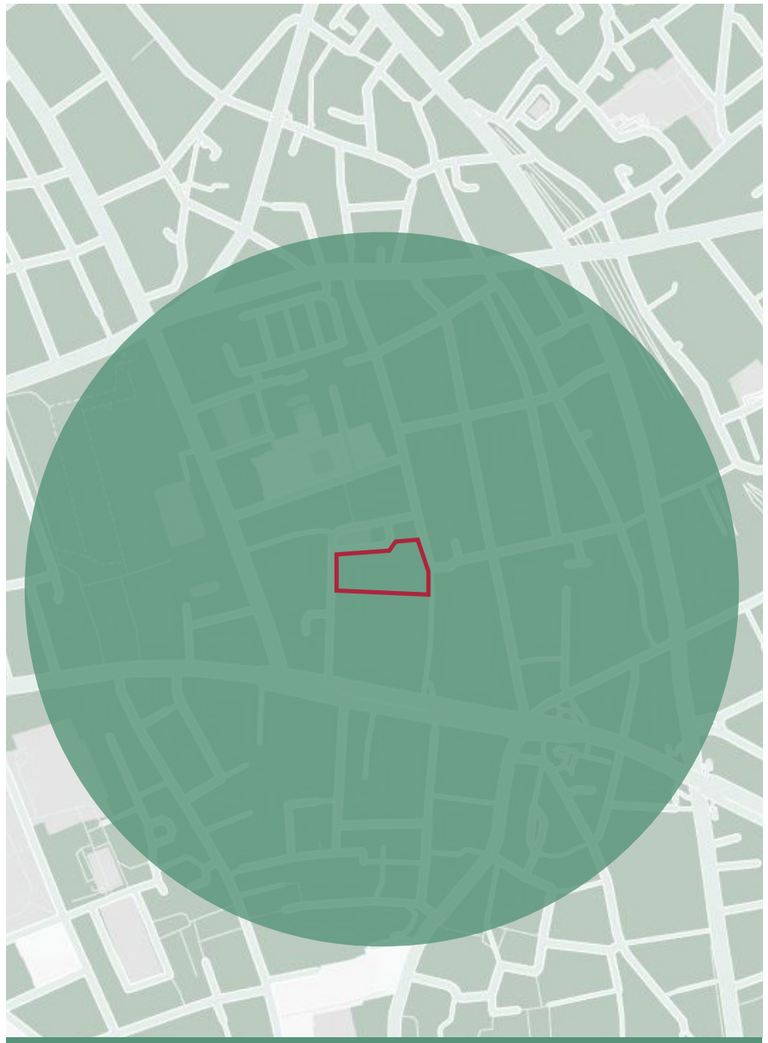
83% of the existing structural volume or 74% of the existing GIA is retained, resulting in approximately 10,648tCO_2e saved in comparison to demolition and rebuild.

Existing steelwork is proposed to be deconstructed for re-use targetting up to 60% of sections which could be sold into the reuse market and/or re-used in the proposed scheme.

Further specialist assessments will be required to confirm viability, and will be worked through as the scheme develops.



3D image showing volume of retained structure, once demolition is complete



447,216m² of native forest would be required to offset the 10,648 tonnes of embodied carbon if the retained structure were demolished & built new

Retaining most of the existing structure avoids emitting this magnitude of carbon, keeping it locked into the building

7.4 Structure

New structure & Steel Re-use

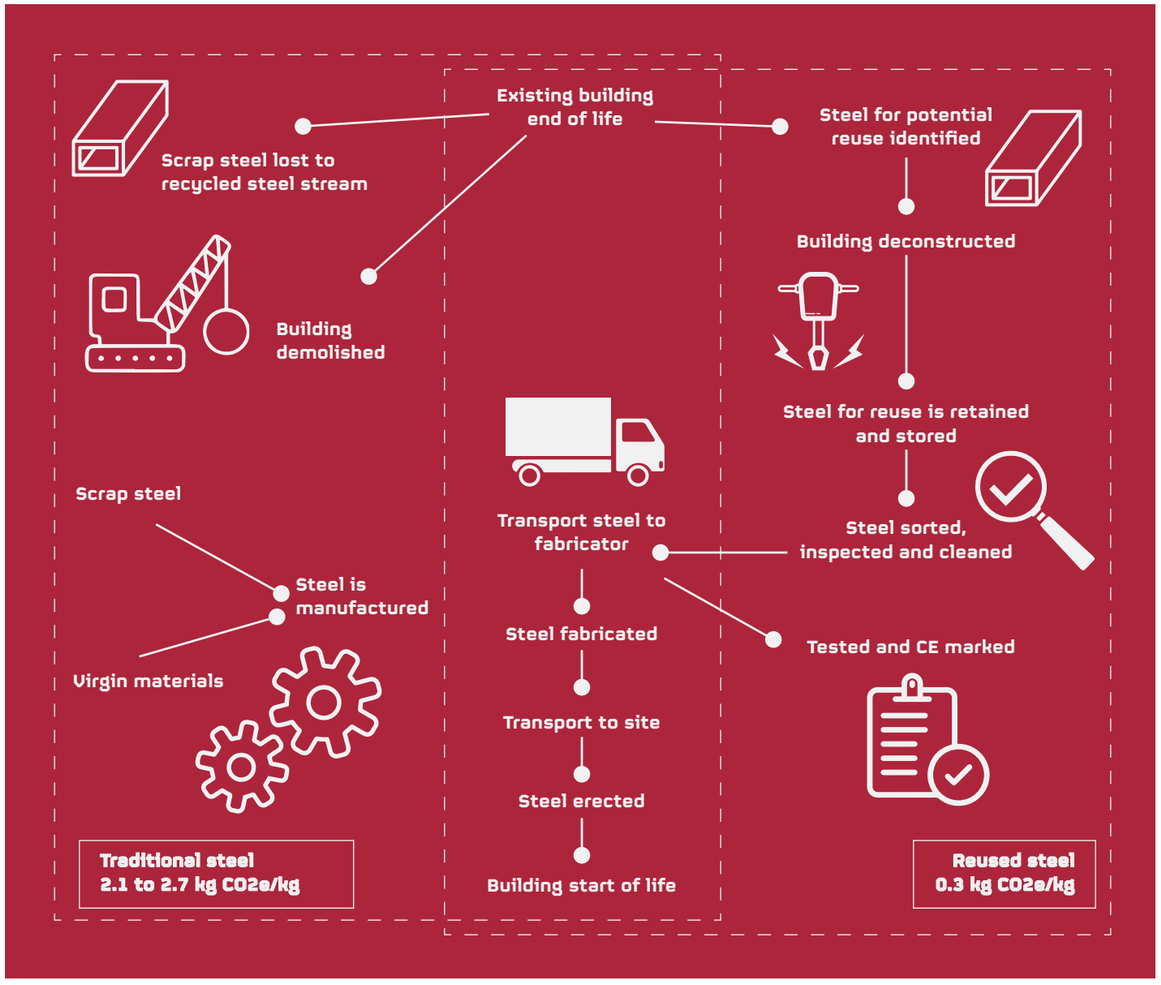
HEYNE TILLETT STEEL

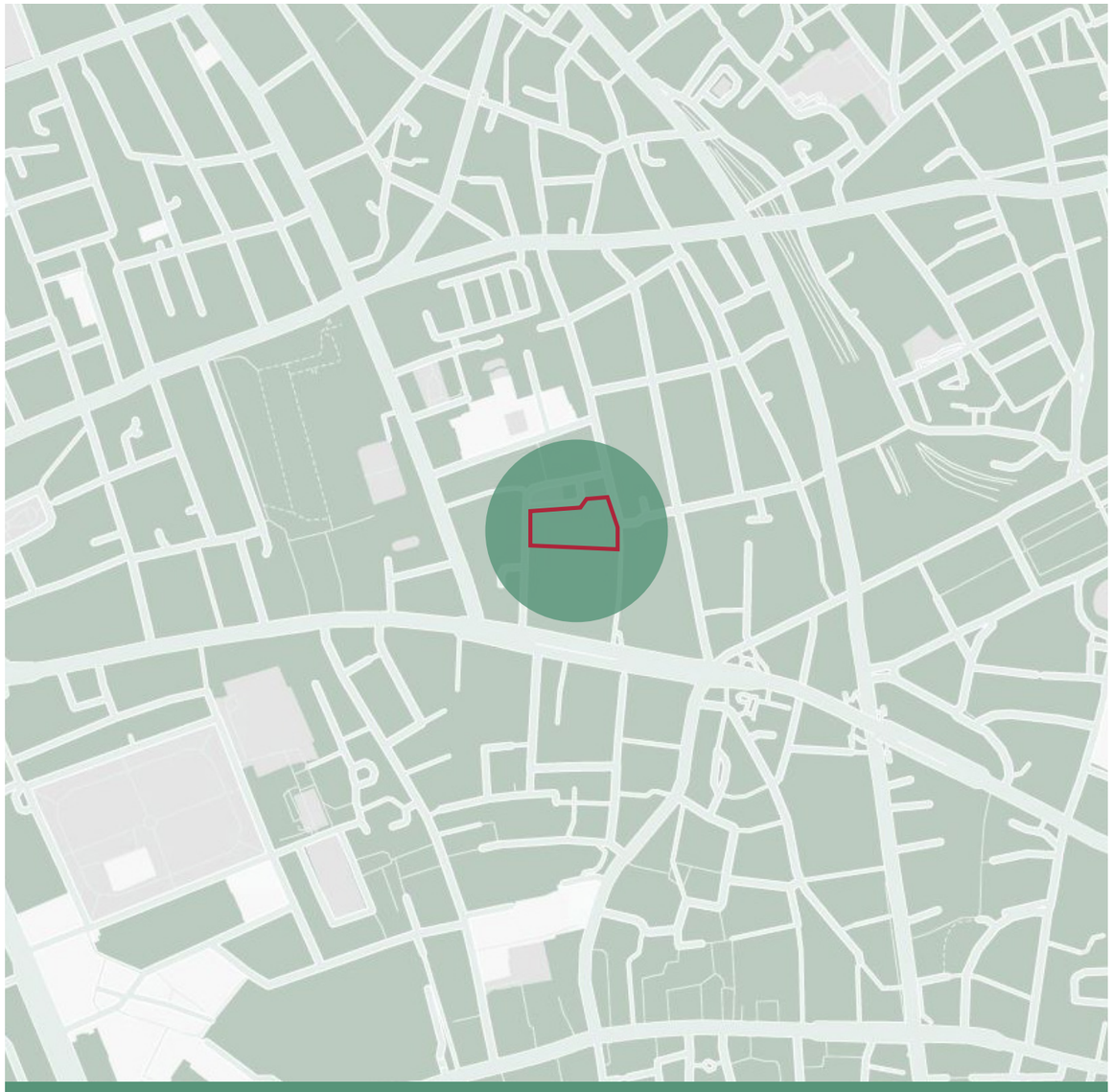
Reusing steelwork is being explored for the development - either from the host building or donor sites.

The major benefit of reusing steel is for the considerable embodied carbon savings. This saving is derived from avoiding the energy intensive manufacturing processes – and as a result, a re-used section of steel (depending on the amount of re-fabrication required) contains ~87% less embodied Carbon than a new piece of steel of the same size.

Reusing steel also provides the following benefits:

- It is a robust and dimensionally stable material
- Fairly easy to demount (relative to other construction materials)
- It supports a circular economy, more resource efficient and reduces pressure on raw materials.
- It creates a higher value, more tightly closed materials loop, avoiding downcycling and waste.





31,206m² of native forest, or 745 tCO_2e would be saved if reused steel was used instead of traditional steelwork – equivalent to ~5 football pitches

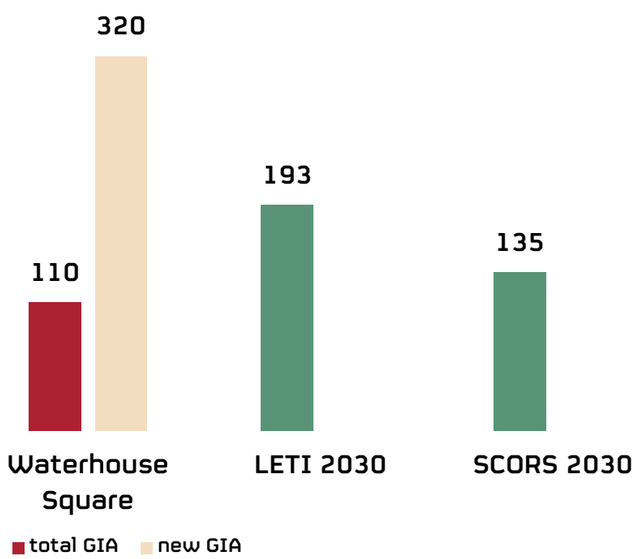
7.4 Structure
Completed Development

Looking at the completed building (the retained existing and the new structure together) shows how much embodied carbon is saved by retaining most of the existing structure in the completed scheme.

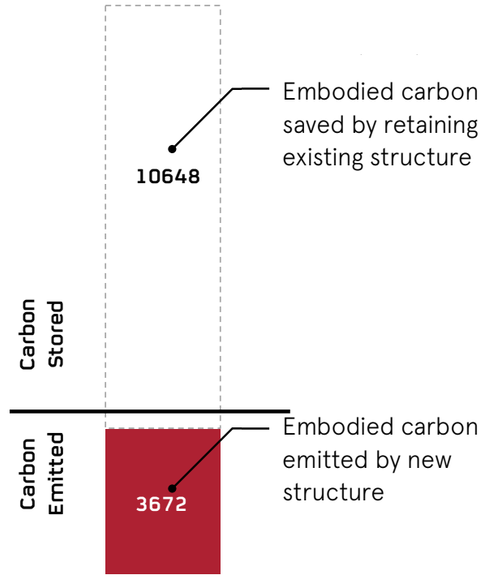
Initial emodied carbon studies show the total embodied carbon for structural elements is approximately 14,320tCO_2e of which 10,648tCO_2e is retained as existing.

This level of retention results in the new embodied carbon per m^2 of complete floor area (GIA) of 110kg CO_2e/m^2, well below the LETI aligned 2030 target (193kg CO_2e/m^2) and IStructE SCORS 2030 target (135kg CO_2e/m^2)

2030 embodied carbon targets (kg CO_2e/m^2)



Retained vs. Proposed embodied carbon (tC02e)



Embodied carbon summary

Further topics to be explored as the design develops:

+ Maximising the use of cement replacement (GGBS) for new concrete elements. Typically, it is assumed 30-50% replacement for super-structure elements, and 70% for sub-structure elements

+ Circular economy principles, including how the building can be used for different purposes in the future based on loading allowances, constructing new elements for de-construction and reuse vs. demolition.

+ Reusing steelwork is being explored for the development. The preliminary study shows 35% of the proposed steelwork can be sourced from reused steel which could potentially saves 328 tCO_2e in steel frame using the HTS reused steel stock matcher. This is to be further explored to maximise the pairing between proposed steel sections and live stocklist from suppliers

7.5 Carbon and Energy

Summary

Main Building

The main building will re-use the existing 1990s steel structural frame, therefore the existing slabs heights and structural grid are used. The existing basement will be retained in full, with extra foundation work limited to new lift shafts.

Embodied energy has been a key consideration in informing the decision to retain as much structure as possible, the team have also reviewed the benefits of different materials for extensions to the existing primary structure, such as concrete, steel and CLT.

Sustainable energy strategies including photovoltaic panels and air source heat pumps are currently being proposed.

Energy efficient Air Source Heat Pumps (ASHP) will supply low carbon heating and cooling to the development. Other low carbon technologies such as Ground Source Heat Pumps, wind generators or biomass have been explored and considered not feasible for the proposed development. Photovoltaic panels are proposed on the roof.

Heritage Blocks

The existing building is Grade II* listed. The roof of the building is intended to be upgraded with thermal insulation. The facade will retain or refurbish the existing windows and in many locations incorporate secondary windows to limit the heat losses and improve acoustic insulation.

Operational Carbon

The proposed development target is to achieve at least 35% reduction in CO2 emissions beyond the 'Part L 2021 Baseline', wth initial assessments showing a 49.6% reduction. Please refer to the sustainability statement for further information.

General

To further minimise the energy consumption, energy efficient light fittings will be specified for the building and its external areas. The majority of fixed internal light fittings will be dedicated and energy efficient, i.e. Light-emitting diode (LED) lamps. Generally in FOH areas, internal light fittings will be controlled through daylight sensors. In BOH areas, internal light fittings will be controlled through occupancy sensors. All external space light fittings and security light fittings will be dedicated, energy efficient and controlled through a time switch and daylight or occupancy sensors to prevent operation during daylight hours.

Procurement of energy efficient equipment and domestic appliances will be encouraged in order to ensure energy savings in operation.

Separate accessible energy sub-meters will be installed to facilitate the monitoring of substantial energy uses and highly energy demanding function areas within the building.

A building energy management systems (BMS) will be installed in the building to monitor and control the building services, thus minimising energy-inefficient operation.

1. PV farm
2. Air source heat pumps
3. Roof terrace and biodiverse roof
4. Improvement of existing Grade II* Listed roofs

7.6 Ecology and Water

Summary

Ecology

The proposal introduces a new courtyard and landscaping, around the new Greville Street entrance. Ecology and Biodiversity have been considered essential in the design of these public spaces at ground level. At roof level, an external terrace is seen as an opportunity to add further green space. Green and blue roofs will be used.

The site currently has limited ecological value. A full site assessment to identify the ecological value of the site has been undertaken. The design team has participated in a workshop and defined an ecology outcome for the design.

All existing trees around the site will be retained and protected and surrounding habitats will be protected during construction. Biodiverse roofs, vegetation in the courtyard of the new building and landscaping around the Greville Street entrance, will support the biodiversity on site and will lead to an overall net increase in species density.

Water

The proposed development will incorporate measures to reduce the use of potable water. Low water flow fittings, fixtures and appliances will be evaluated and used where appropriate, including dual flush WC cisterns and efficient shower heads.

Appropriate Sustainable Urban Drainage Systems (SUDs) will be employed to reduce and mitigate the impacts of flood events. A blue roof system and vegetated areas at the ground floor are proposed for the development, which will be able to restrict the surface water runoff.

A rainwater harvesting system is being considered for collection and storage of rainwater. This water could be used for irrigation and will therefore reduce the consumption of potable water. A grey-water recycling system could reuse water for toilet flushing.

Vegetation will be carefully selected to reduce irrigation water demand.

Each separately demised area will have water meters installed which will help to encourage water economy and assist in major leak detection.

Water-consuming plant or building areas (with 10% or more of the total water demand) will be fitted with sub metres or water monitoring equipment.

1. Green and blue roof system
2. Roof terrace with planting/ green roof and blue roof system
3. Public realm upgrades around the main entrance

7.7 BREEAM

Summary

The heritage and modern blocks will be assessed together under a bespoke BREEAM assessment, targeting an “excellent” rating with aspirations for “Outstanding”.

Overall, the development is aiming for very high standards in sustainability. Further information on BREEAM can be found in the sustainability statement.