Structural Commentary

Demolition / Enabling Works

A structural condition survey of the existing garages will be undertaken as part of the design stage. This will allow a scope of remedial works to be identified and allow the impact of the proposed structural strategy described below to be assessed and updated as required.

The pitched roof's to the existing garages will need to be demolished to enable the construction of the new residential units. A temporary scaffold with roof and working platform will need to be installed above the existing roof to prevent water ingress and allow access to the existing garages.

The installation of the new foundations / columns may need to be installed ahead of the demolition works although the sequence will need to be agreed with the contractor.

The sequencing of the foundation and column installation at ground floor will need to be carefully considered and agreed with garage owners, as access to the garages will need to be maintained throughout the works.

It is assumed at this stage that the existing garage structures will be unable to accommodate any additional loading from the residential development above and the new structure will need to be totally independent.

Sub-Structure

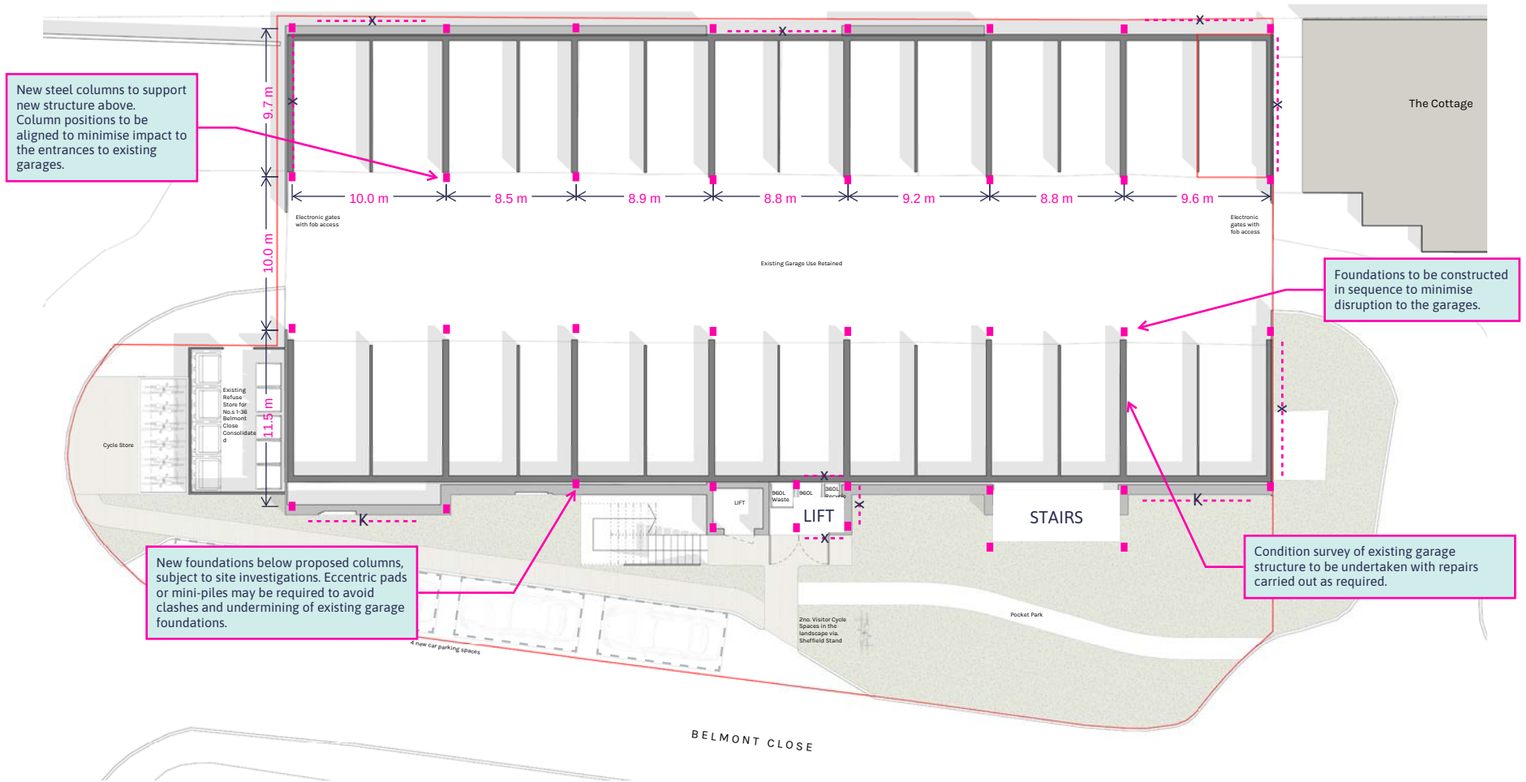
The existing garage foundations are unknown, but are assumed to be formed from shallow pad / strip foundations on gravel soil layer (Dollis Hill Gravel Member overlaying Claygate Member, based on review of British Geological Survey information.)

The new foundations are expected to be eccentric to avoid clashes with the existing foundations. They will also need to avoid undermining the existing garage foundations.

The strategy for the proposed foundations will be subject to Geotechnical investigations which will need to be undertaken and anticipated base loads from the proposed super-structure above.

Based on our experience on similar projects, we expect that the proposed loads will allow both shallow and deep foundations to be viable, however, the use of (mini) piles is likely to be preferable to minimise the disruption to the garages.

The feasibility of the pad foundations is dependent on the soil profile. If the ground near the surface is poor, larger / deeper pads will be required which may mean that underpinning is required to the existing garage foundations.



Ground Floor Plan
NTS (approx. 1:400)

Level 1 Transfer Slab

The L1 slab will need to be designed as a transfer structure to support the residential units above and transfer vertical and horizontal loads to the perimeter columns and bracing. This allows for flexibility in the form of construction to the residential units above, and deals with the constraints from the retained garages below. Options for the form of construction to the residential units is described in more detail on the next page.

To minimise the foundation works, and mitigate impact on the garage structure, we propose that the new structure should be kept lightweight where possible (both to the L1 transfer structure and the residential unit construction above).

We therefore propose, that the L1 transfer structure is formed from a steel frame, with primary and secondary beams. Additional steel beams may need to be provided below load bearing walls from above, depending on the final layout of the units and the chosen superstructure strategy.

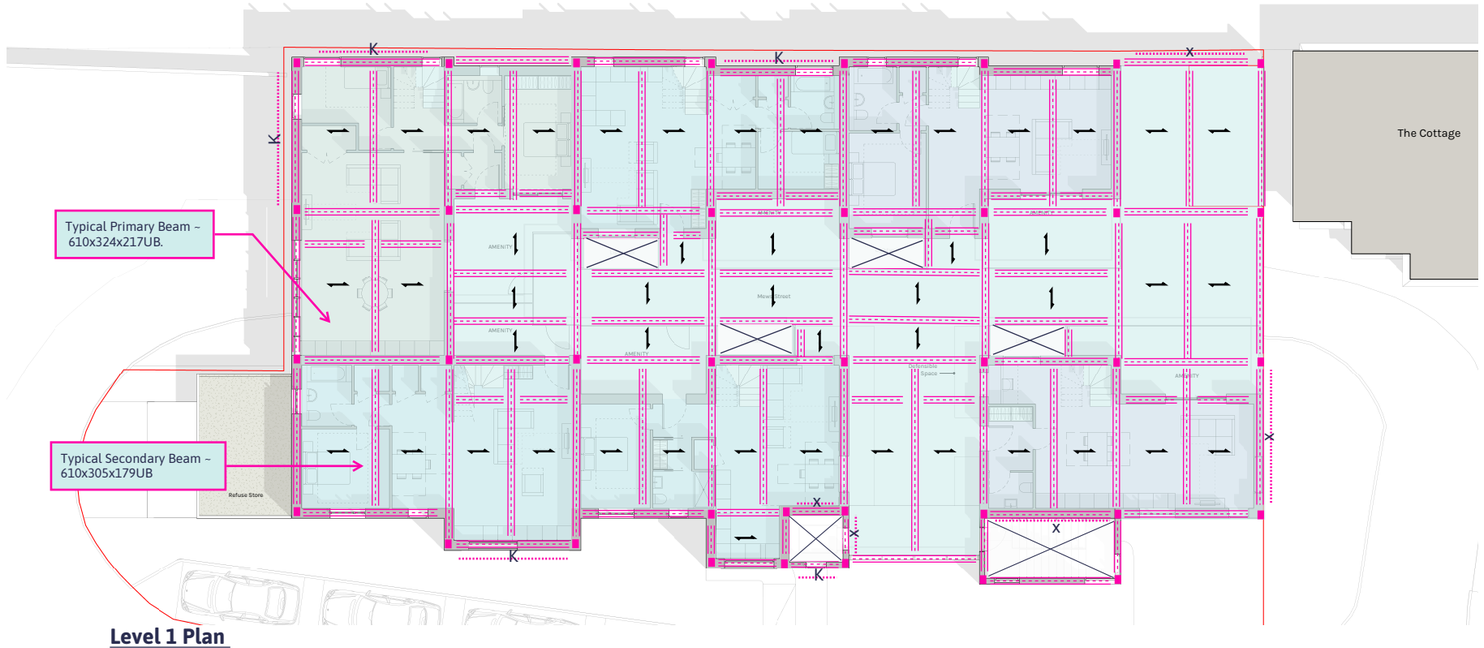
The steel beam arrangement and approximate section sizes are noted on the adjacent plan. These section sizes are preliminary and subject to detailed design checks and coordination.

There are several feasible options for the slabs spanning between the steel beams:

Slab construction options:

- CLT Planks ~ 200mm thick (5m Span) There is potentially a requirement for in plan bracing or topping slab to provide diaphragm action.
- Pre-cast concrete planks ~ 200mm thick (5m span) w/ 75mm thick screed topping.
- Composite Concrete Metal deck ~ 150mm Thick (3.35m span) i.e. with additional secondary beams.

Insitu reinforced concrete has been discounted at this stage, to help reduce the weight of the new structure and minimise the use of wet trades above the retained garages and the associated complexity of building and striking formwork.



Level 1 Plan
NTS (approx. 1:400)

EVOLVE

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TITLE 3635-EVE-00-XX-SK-S-0001 - Initial Comments on Scheme (P1 of 2)	**REVISION** B	**CHECKED BY** JT

Structural Commentary

Super-Structure

The Level 1 transfer slab allows the residential units above to be formed from a pre-fabricated structure (either SFS, SIPS or CLT framing). For these options to be viable, the internal and external supporting walls will need to line up at all levels.

Prefabricated specialist superstructure options:

- Steel Framing System (SFS) - light gauge steel stud floors and walls with cement board. Partial pre-fabrication and simplicity of erections means that time on site is quick. Lightweight construction. Perimeter and external walls need to stack well to avoid requirement for additional hot rolled steel to transfer. Potential vibration / acoustic treatment required depending on maximum span lengths.

- Structural Insulated Panels (SIPS) - As per SFS but formed from timber studs and plywood. Lower load bearing capacity than SFS and more stringent fire checks required. Better embodied carbon credentials than SFS.

- Cross Laminated Timber (CLT) - Mass timber product formed from several layers of solid wood bonded together with a structural adhesive. Good load bearing capacity and embodied carbon credentials. Stringent fire design / compliance checks required.

Alternatively, the adjacent sketches show a baseline option for the braced steel frame to continue up to roof level to form the residential units, with lightweight timber joists supported from the steel beams. Pre-cast concrete planks, CLT planks or concrete & metal decking would also be feasible to form the slabs at the upper levels, but timber joists are recommended to keep the structure lightweight and minimise transfer structure and foundation sizes.

The columns stack where possible, but the structural beams will be smaller than the Level 1 transfer slab. The depth of structure will depend on the chosen slab construction.

Traditional load bearing masonry construction should be avoided to minimise the loads on the transfer structure at L1 and on the foundations. This also applies to the proposed cladding to the residential units, with a lightweight solution to be coordinated with the architect.

Lateral Stability

In plan stability will be provided by diaphragm action of the slabs at all levels. The slabs will need to be detailed to ensure the lateral loads are transferred to the vertical bracing elements. Vertical cross (or K) bracing will be provided to transfer horizontal loads to foundations.

Due to the differing layout of the residential units and existing garages below, the L1 structure will need to transfer the horizontal forces to the bracing elements. It is expected that a reinforced concrete topping slab will need to be provided to CLT or PCC planks to transfer the horizontal loads from the residential units above at this level.

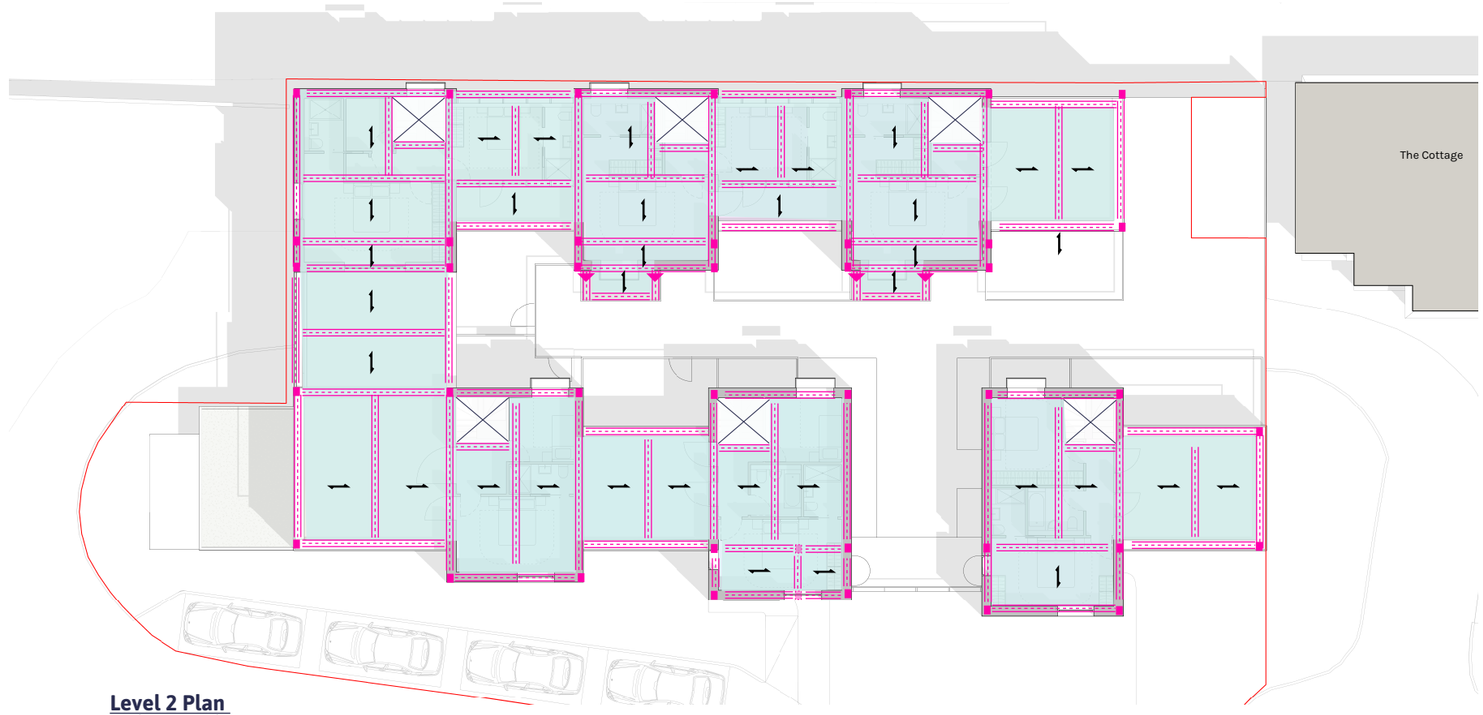
To the upper levels, the stability system will be dependent on the selected form of construction. The base scheme would rely on vertical cross and K braces located in external walls, however the pre-fabricated options could be detailed so that all walls contribute to the lateral stability of the building. This is subject to further design checks and may not be viable for all construction methods noted above.

Notes

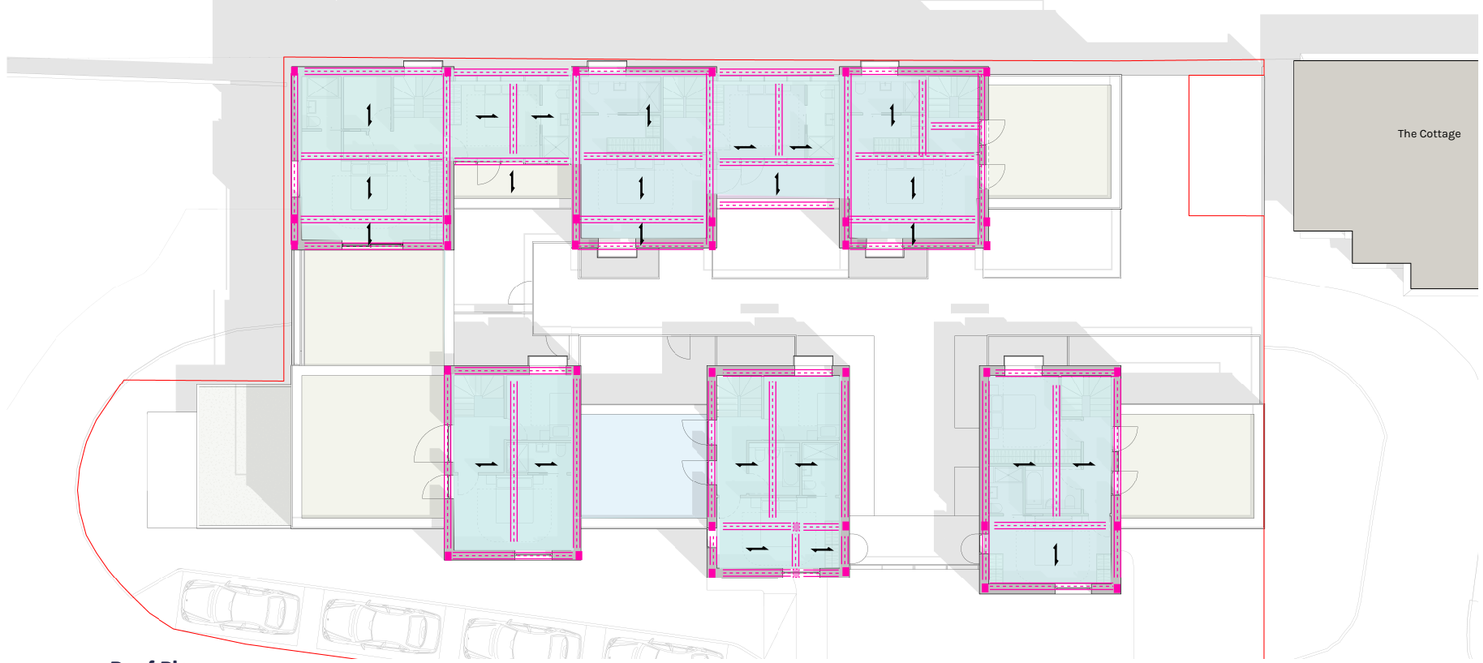
Final structural solution will be subject to coordination with design team, further design development and specialist subcontractor input.

Ground investigation required to confirm foundation type and design.

Construction methodology and sequencing of works to minimise impact on existing garages to be developed in conjunction with the chosen Contractor. This may affect the chose structural solution. Early engagement with a Contractor is recommended, to ensure that the most logistically suitable structural scheme is chosen.



Level 2 Plan
NTS (approx. 1:400)



Roof Plan
NTS (approx. 1:400)

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