8.3.1 Existing Steps at the Rear - Options Assessment

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Project No: **Merthyr Synagogue**

Project: **9684**

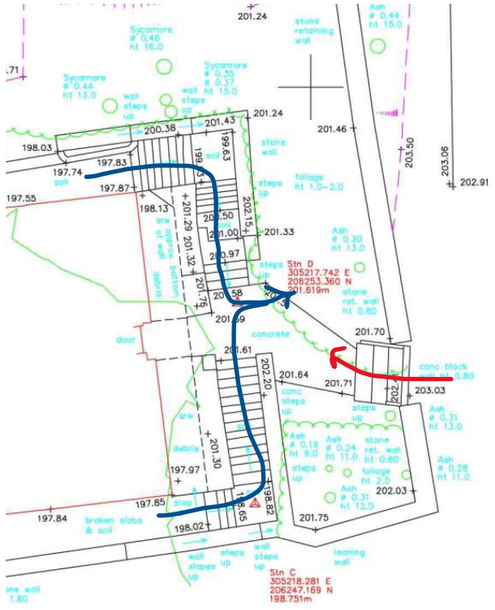
Report No: 9684_DN_01

2.6 Accessibility to the rear of the site

2.6.1 General access to the rear of the site is very poor. The existing steps along the north (1m wide) and south (1.4m wide) of the Synagogue are extremely steep and in poor condition, with the north steps in significantly worst condition.

2.6.2 Neither staircase is suitable for transport of significant materials, elements of temporary propping or plant equipment due to their condition and steep pitch. Concrete pumping may also be difficult due to the level difference from the front to the rear of the site and assuming concrete is to be pumped from trucks on the road outside the front of the synagogue.

2.6.3 The steps up to the upper garden are also in very poor condition with most of the original treads missing or significantly deteriorated making access onto the top difficult also.



2.6.4 There is a rear access point which would be ideal for plant / materials access however this currently opens onto a neighbours driveway and no permission has been granted to make use of this access point. The client is to consider negotiations regarding access with the neighbour.

2.6.5 Details of the access from the public road to the lane above the site are not currently known but may also restrict plant access. This requires further investigation on site.

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3.0 Proposed Options

3.1 Following further discussions and coordination with the Architect and Client, Mann Williams have been requested to consider 4No. options which are described further below. For each of these options, commentary has been provided on how these works could be undertaken including notes on requirements for further investigations or temporary works. Pros and Cons of the options have also been provided which consider buildability, impact on the historic fabric, general observations on possible impacts on programmes and costs, health & safety etc.

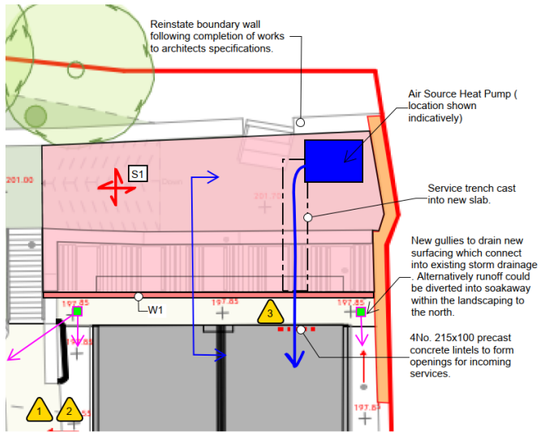
3.2 Option 1

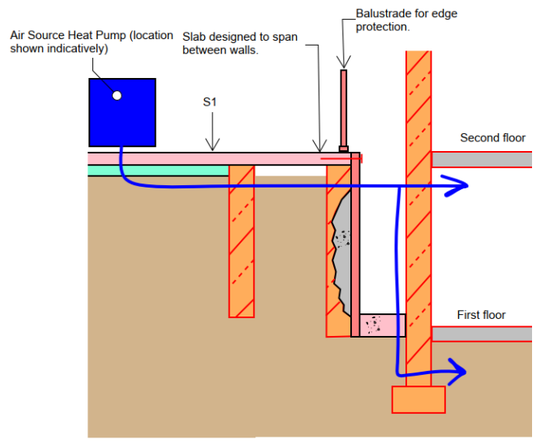
3.2.1 Do Nothing. This option considers leaving the rear of the site in its current condition with no proposed works undertaken.

- × Makes the rear of the site generally unusable in the proposed regeneration scheme and limits options for fire escapes which could also restrict occupancy and functionality of the building.
- × The rear of the site would remain generally unsafe to access and the condition is likely to deteriorate further as the surfacing continues to deteriorate, or as further steps and masonry fabric are stolen from site.
- × The temporary timber propping to the front wall is likely to deteriorate in the longer term therefore has the potential for the wall collapsing further which may cause issues with the gable wall of the building.

3.2.2 This option is generally considered not acceptable.

3.3 Option 2





Plan View *Section*

3.3.1 This option which has been detailed further in Mann Williams drawing 9684-MWC-XX-XX-SK-S-90.0010 comprises the construction of a new sheet piled retaining wall in front of the existing masonry wall and a new insitu concrete ground bearing and partially suspended slab at the upper level. This option would encase the existing steps and walls and loads from the slab are proposed to be taken by the sheet pile wall and the ground (where ground bearing) only, and not taken by the existing walls.

8.3.1 Existing Steps at the Rear - Options Assessment

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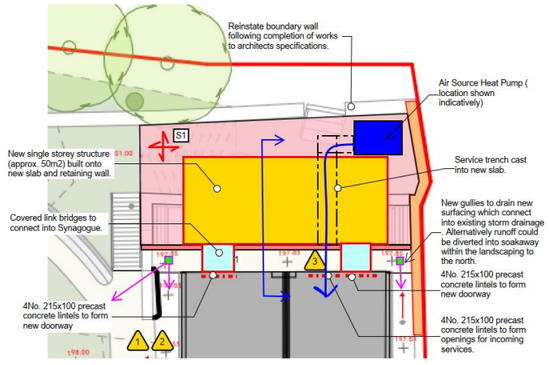
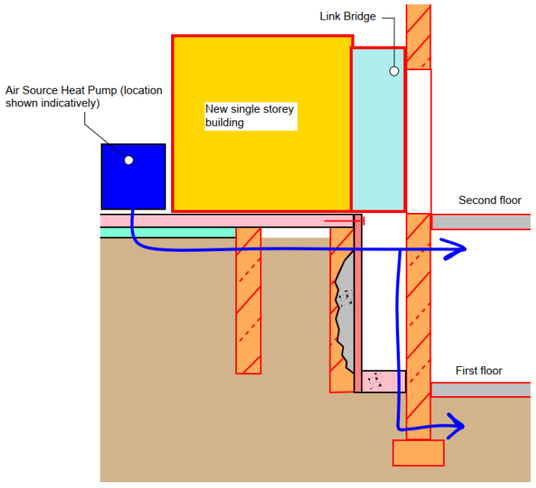
3.3.2 The upper level could be utilised to support a new Air Source Heat Pump sited in an enclosure, be utilised as external circulation or seating for visitors. The upper level would be accessed via a new staircase located on the west of the slab.

- ✓ Minimal impact to the existing structural fabric as the existing steps and walls will be encased within the new structure.
- ✓ Forms a large usable area at the rear of the site with several potential uses, with space for MEP plant areas as required.
- ✓ Minimal requirement for excavations and removal of debris from site.
- ✓ Likely the cheaper of the options apart from Option 1.
- × Potentially complex sequence of works including elements of temporary propping to the sheet pile wall. Associated health and safety concerns for operatives working in the gap between the front wall and the synagogue wall.
- × Access for lifting equipment and concrete pumps likely difficult as noted in previous sections.
- - Will require mechanical lifting equipment however this equipment may only be required to lift in the sheet piles, reinforcement cages, and potential temporary works.

3.4 Option 3



Plan View



Section

3.4.1 Option 3 comprises is the same as Option 2 described previously however with an additional consideration for adding a single storey structure on the upper level with link bridges back into the Synagogue.

3.4.2 The new single storey building could comprise a timber or steel superstructure with a lightweight roof construction and cladding to the Architect's details and specifications. The link bridges could comprise cantilevering steel beams connected to the existing gable wall of the synagogue which support the walls and roof structure. The link bridges are proposed to not load the retaining wall.

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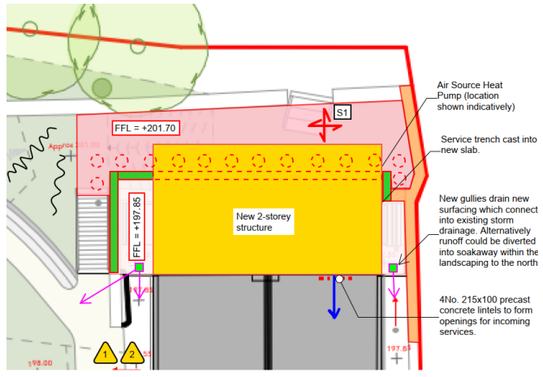
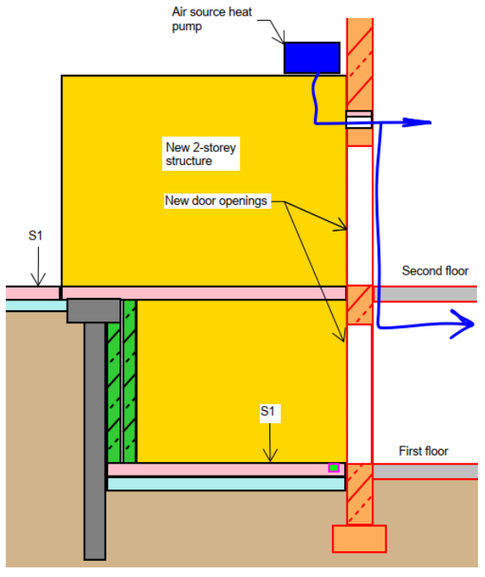
- ✓ Minimal impact to the existing structural fabric as the existing steps and walls will be encased within the new structure.
- ✓ Forms a large usable area at the rear of the site with several potential uses, with space for MEP plant areas as required.
- ✓ Provides additional internal space which could be utilised as office space, increased exhibition areas etc and may generally considered more desirable by the client than external space.
- ✓ Minimal requirement for excavations and removal of debris from site.
- × Potentially complex sequence of works including elements of temporary propping to the sheet pile wall. Associated health and safety concerns for operatives working in the gap between the front wall and the synagogue wall.
- × Access for lifting equipment and concrete pumps likely difficult as noted in previous sections.
- × Potential for differential settlement between new extension and existing building. Footings of the front wall are unknown and likely difficult / impossible to investigate therefore sufficiently to prove capacity.
- - Will require mechanical lifting equipment which will need to be located on the constrained site however this equipment may only be required to lift in the sheet piles, and reinforcement cages.
- - Residual risks of unknown ground conditions, particularly as the new slab will now support a habitable structure.

3.5 Option 4



Plan View



Section

3.5.1 This option consists of a contiguous piled wall constructed behind the rear wall which forms a new retaining structure that supports a new 2 storey extension which extends the usable space building space. The existing steps and retaining walls will be fully demolished. An insitu RC slab is to be constructed at first and second floor levels to form a moderately sized space at the rear to facilitate some benching and the proposed Air Source Heat Pump. The new structure would likely be of steel or timber construction built up off the second-floor slab and the capping beam at the head of the piled wall.

8.3.1 Existing Steps at the Rear - Options Assessment

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- ✓ Provides 2 floors of additional internal space which could be utilised as office space, increased exhibition areas etc and likely to be generally considered more desirable by the client than external space.
- ✓ Potentially safer to construct than the other options as this option limits time operatives have to spend in proximity to the failed retaining wall and on the existing steps in poor condition.

- × Limits the usability of the surrounding landscaping. The upper level will likely be unusable except for access.
- × Requires significant amount of excavation to remove existing steps and retaining walls
- × Significant temporary works will be required to permit geotechnical inspections and piling during construction to avoid surcharging the existing walls during the works.
- × Access restrictions are likely to make rig access difficult during the works.
- \- Will require a full geotechnical investigation including boreholes, trial pits etc to confirm the ground buildup at depth and to inform design parameters for the piles.

4.0 Discussions

4.1 When considering the options discussed in this report, all have various elements of complexity which makes selecting the “correct” option difficult. The prevailing issues of access make all of the options challenging for the potential contractors in particular when considering space for plant and large elements of temporary works.

4.2 It is strongly recommended that negotiations with the neighbour are had to establish whether access from the rear can be provided, however even if this is granted the site is still constrained and challenging to work within, and a significant amount of coordination and planning will be required to facilitate ground works, concrete pours, lifting of temporary works, materials and structural elements etc. Even if access through the rear is permitted by the neighbour, the access route to the rear is understood to be constrained therefore considerations need to be made for what plant equipment can utilise the existing route.

4.3 It is worth noting that the works to the synagogue building are typical of those required as part of any refurbishment of a historic building, and therefore will attract a certain type of building contractor suited to and experienced in that type of work. The works at the rear, whether option 2, 3 or 4, have at their heart significant civil engineering and groundworks. This requires quite a different approach and a different type of contractor. Procurement of the combined works will therefore require careful thought, as it is unlikely that a single contractor will be equally comfortable and/or experienced in both types of work. This is likely to lead to the subcontracting of a large element of the works, potentially by a main contractor not wholly familiar with managing such works.

4.4 Primrose Hill

4.4.1 We understand the client is currently considering purchasing the neighbouring property Primrose Hill which would form part of the overall redevelopment scheme. Theoretically if this site was purchased it may provide an alternative access route to the rear of the Synagogue however there is still a significant slope (Approx 35º pitch) from the bottom of the site through the woods to the rear. We assume this is likely to require temporary scaffold platforms and ramps to permit suitable access for operatives, plant equipment and materials deliveries, this may require alterations or temporary dismantling of parts of the existing retaining wall.

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5.0 Conclusions & Recommendations

5.1 As stated previously in the report, a ‘Do nothing’ approach is not an option due to the condition of the steps and masonry walls. However, all options include significant temporary works and/or civil engineering interventions to a very constrained and inaccessible site.

5.2 At this stage there is still a substantial number of unknowns with regards to each of the options proposed above. The prevailing issues regarding access and the risks associated with working around the degraded steps and retaining walls need considerable thought and planning for any of the options to work.

5.3 In the more immediate case, we propose further investigation works are undertaken by David Siggery Ltd who undertook the previous phase of investigations. These works would aim to establish a general idea of the ground conditions at shallow depth at the rear of the site and items such as the footing of the ‘front’ wall which may be required to justify some of the options. Investigations to establish the existing arrangement and condition of the boundary wall to the steps up the sides of the building and their foundations could also be undertaken, in addition to further investigations of the existing buried RWPs and gullies in the north and south alleys.

5.4 We recommend that Mann Williams approach several Geotechnical specialist companies to obtain quotes for proposed ground investigations including boreholes, required to further develop the design of potential piled foundations. We will recommend as part of the tendering process that the specialists attend a site visit with Mann Williams to discuss the works and site constraints, in particular the available access for the investigations.

5.4.1 We also recommend beginning discussions with a specialist piling contractor to understand the viability of Option 4. Mann Williams can undertake these discussions if instructed.

8.3.2 Existing Steps at the Rear - Agreed Approach

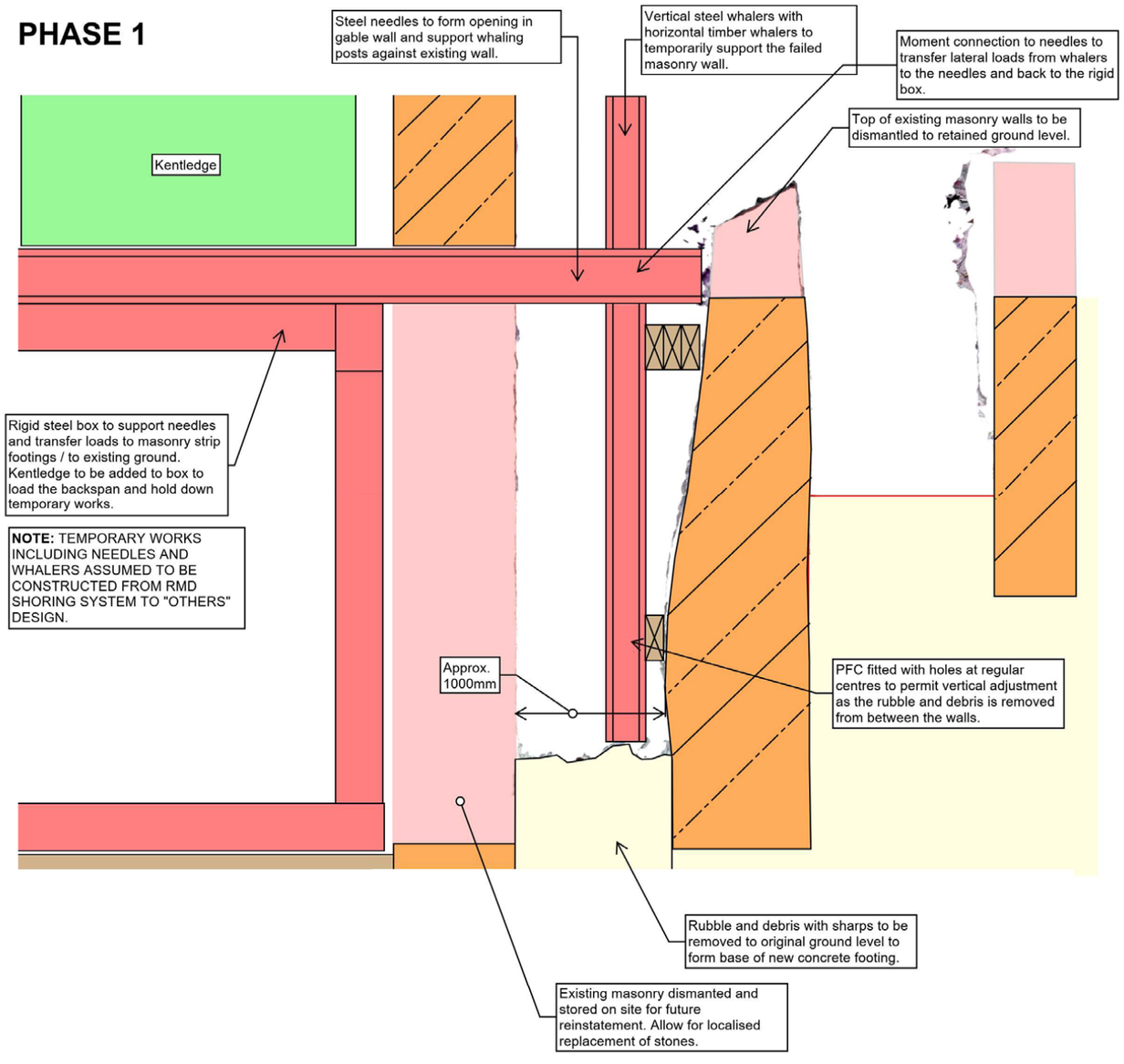
Of the approaches described over previous pages, Option 3 was preferred. This involves keeping the steps and retaining walls as they are (with the top courses of stone already removed) and encapsulating them with a new retaining structure in front and a new slab on top. This would allow for a lightweight structure to the built at the equivalent to second floor level. It would preserve the walls and steps as they are, and avoid further loss of fabric. It would also allow the voids between the steps and the slab over the top to be used as a compensatory bat hibernation roost to account for the loss of the lower ground floor as a potential hibernation roost. Access for bats would be provided (through louvres, letter box style opening or hopper) along with an access 'locked door' for a bat worker to carry out maintenance, and features for crevice-dwelling bat species, as enhancements, as well as fly-in access for brown long-eared bats.

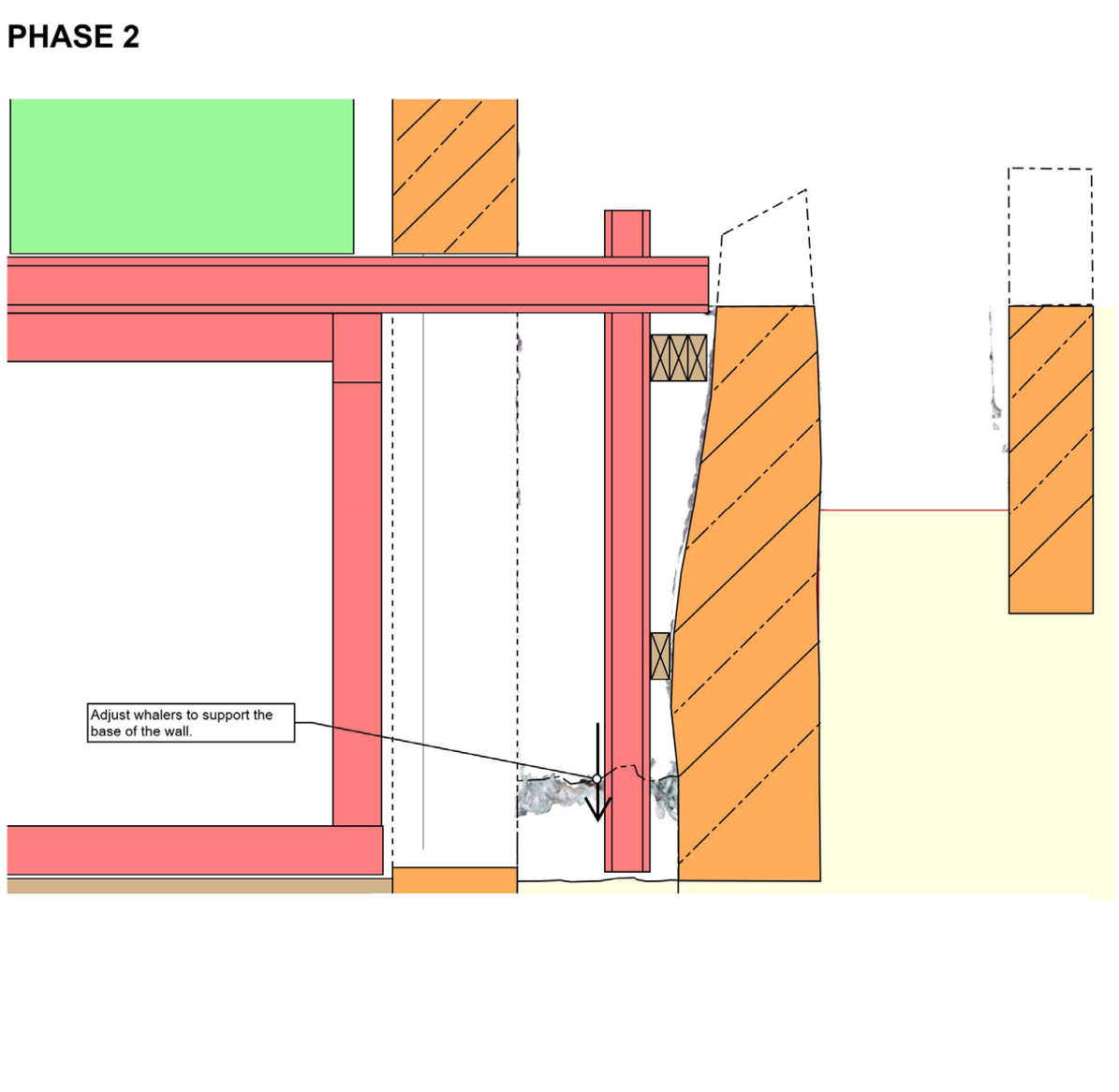
Whilst less difficult, less expensive, safer and more considerate of the historic fabric, this option is still difficult to achieve. Working access from above is significantly restricted by the constraints of the site and the private lane, whilst the steep slope of the site to the north makes working access from the site almost impossible. It would also be very difficult, and potentially unsafe, to install a retaining structure from above the structure being retained. The only viable solution is to install the new retaining structure from the front; however, the Synagogue building sits only one metre in front of the existing retaining wall, and that is not a suitable working area.

With these constraints in mind, and the absolute necessity for addressing the risk of collapse and newly retaining the structure, the Structural Engineers came up with the approach presented on this page, and the next, which now forms part of the final proposals.

Phase 1 would involve the careful dismantling of two sections of the external stone gable wall of the Synagogue at first floor level, to form openings in order to access and work on the rear wall and steps. Each section would be approximately 1.2m wide x 2.2m high. The stones are to be numbered before dismantling and set aside for later reinstatement. The masonry above is to be steel needled for temporary support. A series of vertical steel whalers are to be installed in front of the existing failed retaining wall, with timber whalers set between the steels and the wall. The tops of the masonry retaining wall and the partly retaining wall behind would be taken down to the level which will be the underside of the new slab over. The rubble and debris within the 1 metre gap between the building and retaining walls will be removed to the original level of this gap.

Phase 2 would involve the vertical steel whalers being dropped and adjusted to support the base of the retaining wall.





8.3.2 Existing Steps at the Rear - Agreed Approach

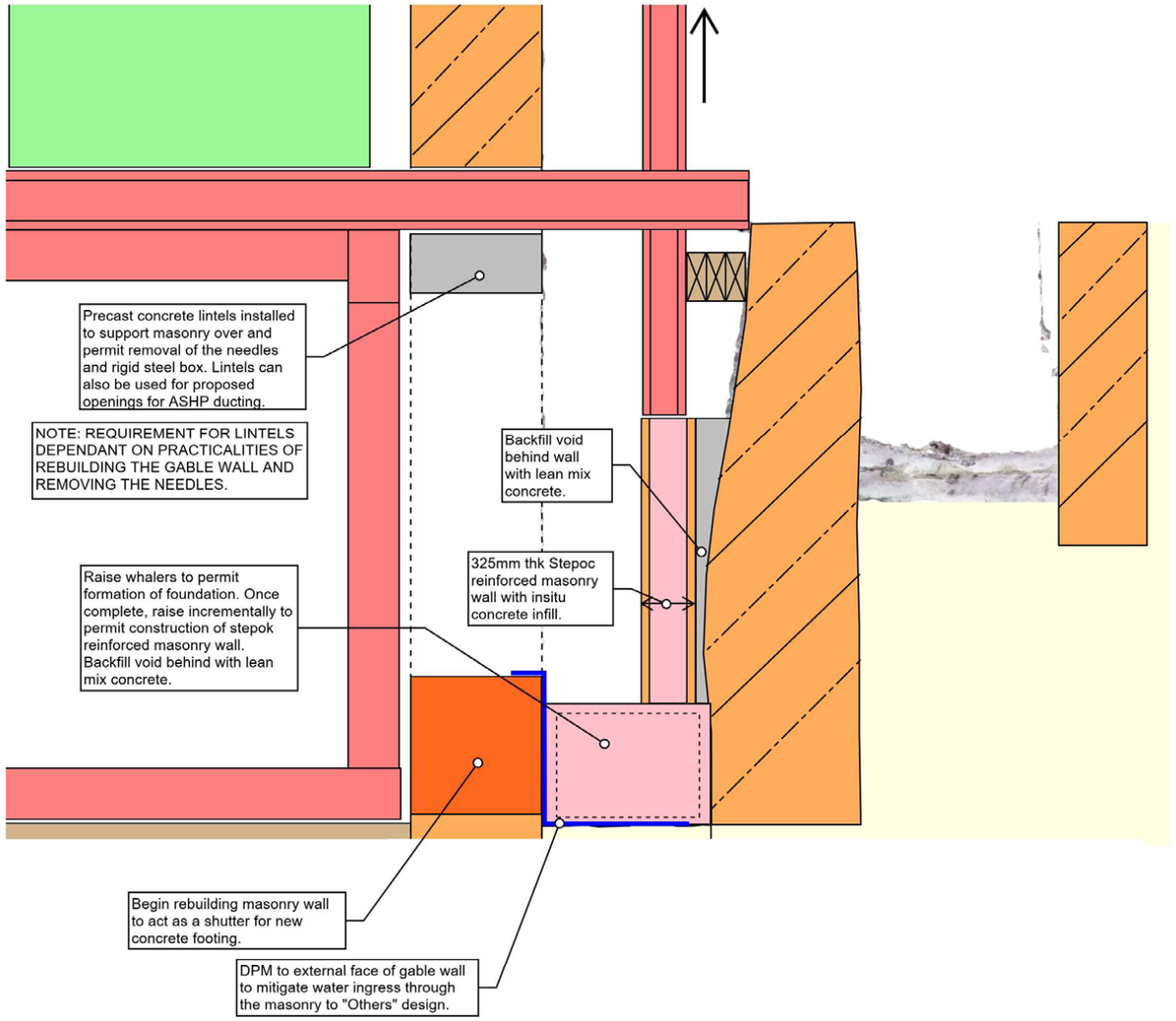
Phase 3 would involve the vertical steel whalers being raised as a concrete foundation strip is formed at the base of the retaining wall. The bottom of the two temporary openings in the gable wall would be laid with the retained stones to act as shuttering for this foundation strip. A damp proof membrane would be laid between the two partly to control water ingress to the building fabric, and partly to avoid the concrete 'sticking' to the stone, thereby making the installation potentially reversible. Off this strip, a 325mm thick reinforced masonry wall would be constructed with insitu concrete infill. As this happens, the space behind would be backfilled with a lean mix concrete.

To the two newly formed openings in the building's gable wall, precast concrete lintols would be installed, so that the steel needles can be removed. Then, the masonry to these openings is to be reinstated, as original with matching / suitable lime bedding mortar and pointing. In the case of one of the southernmost opening, a much smaller opening would be left under the lintol for the ducting from the external Air Source Heat Pump to pass through into the building.

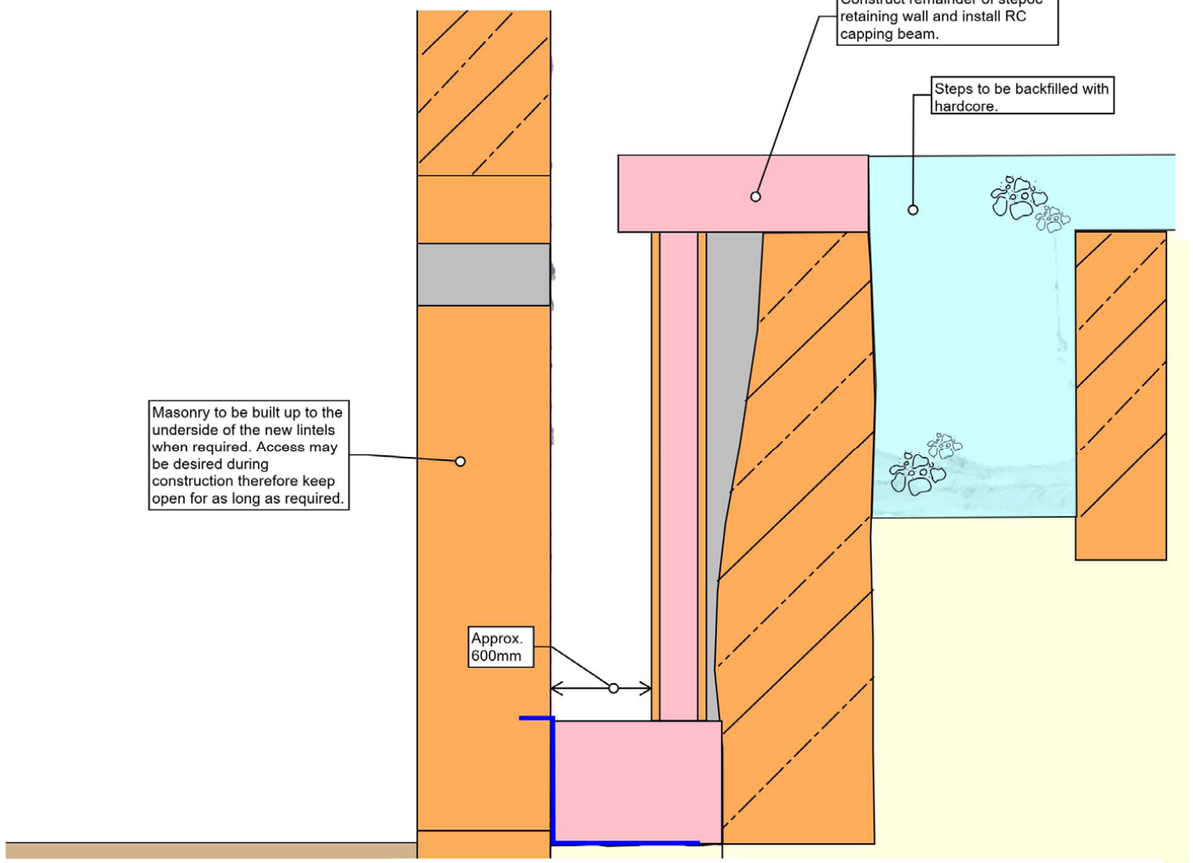
Phase 4 would involve the construction of the remainder of the new Stepoc and reinforced concrete retaining wall, and then a concrete capping beam would be cast over the top of both the new and original retaining walls. The resultant gap between the new retaining structure and the existing gable wall would be approximately 600mm (and so, just about accessible). There would be a drainage channel cast into this surface to drain away rainwater from the building.

As stated, the zone between the existing steps and the underside of the new slab is to be offered as a compensatory bat hibernation roost. This would mean that, whilst not shown on the drawing below, the reinforced concrete capping beam would extend over the steps and sit on the outer original masonry wall, thereby forming a void.

PHASE 3



PHASE 4 - COMPLETE



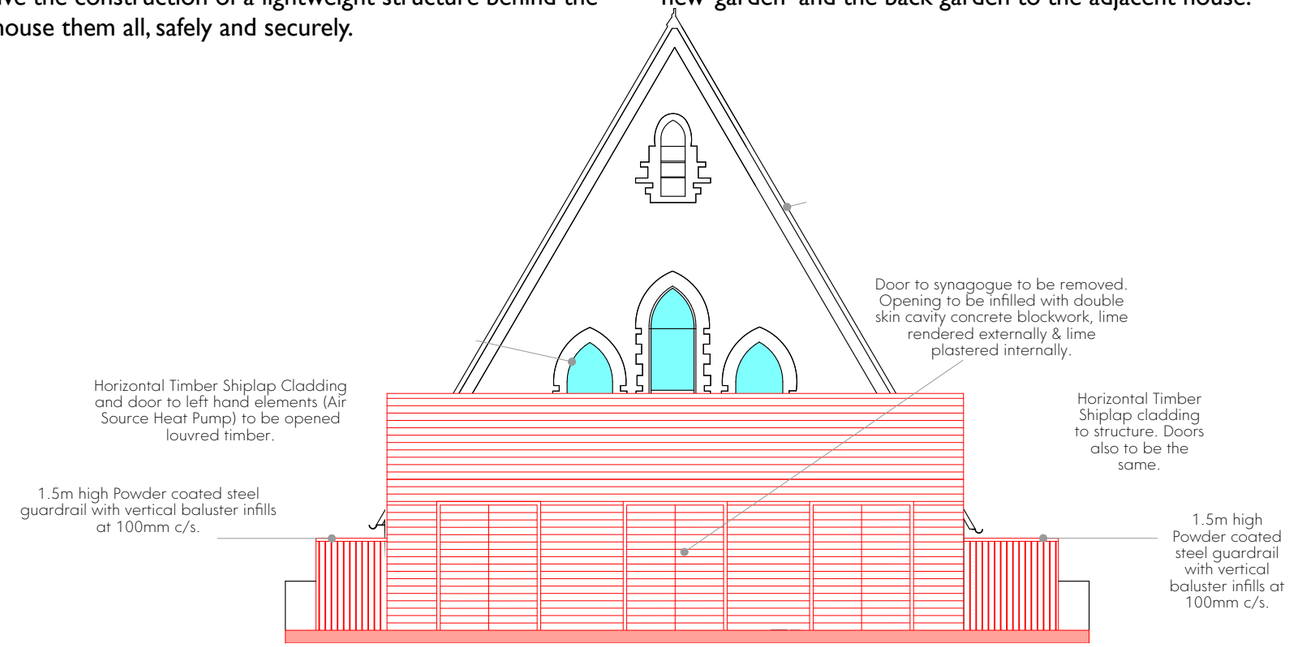
8.4 Proposed New Structure to Rear

With the decision to recreate the 1st floor double-height space within the Synagogue (with a 2nd floor balcony and void), and the subsequent omission of varies spaces / facilities within the proposals, an option was discussed to build a new-build extension out the back (to the east), to accommodate these facilities, at least in part. This would involve the removal of the rear external steps and front retaining wall, with a new retaining structure inserted behind the current rear wall to the steps. This option had been reviewed in the 'Options Assessment' on the previous pages, and dismissed.

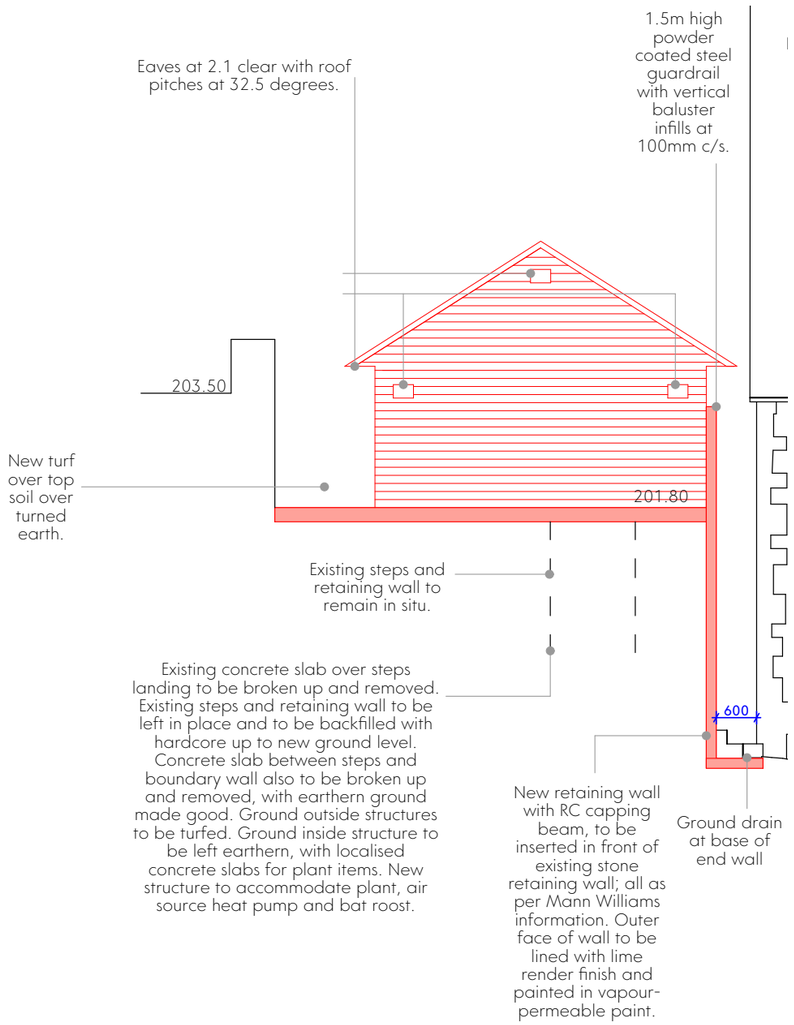
However, with the agreed approach to retain the steps and walls and build a new retaining wall in front and a slab over (with the space below acting as a bat hibernation space); this provided a level external area (at second floor level), incorporating the area above the steps and the narrow strip of derelict land beyond the steps.

With the rear of the site being the only suitable location for the external Air Source Heat Pump, this provides the obvious location for it, and its enclosure. Given the lack of space inside the building, and the desire to restore the original 'Prayer Hall' back to its original volume, there is nowhere to locate the necessary Plant provision, apart from out the back. This also needs to be enclosed. On top of this, the large 'garden' area will require equipment to be safely stored. With these three requirements, the proposals involve the construction of a lightweight structure behind the Synagogue to house them all, safely and securely.

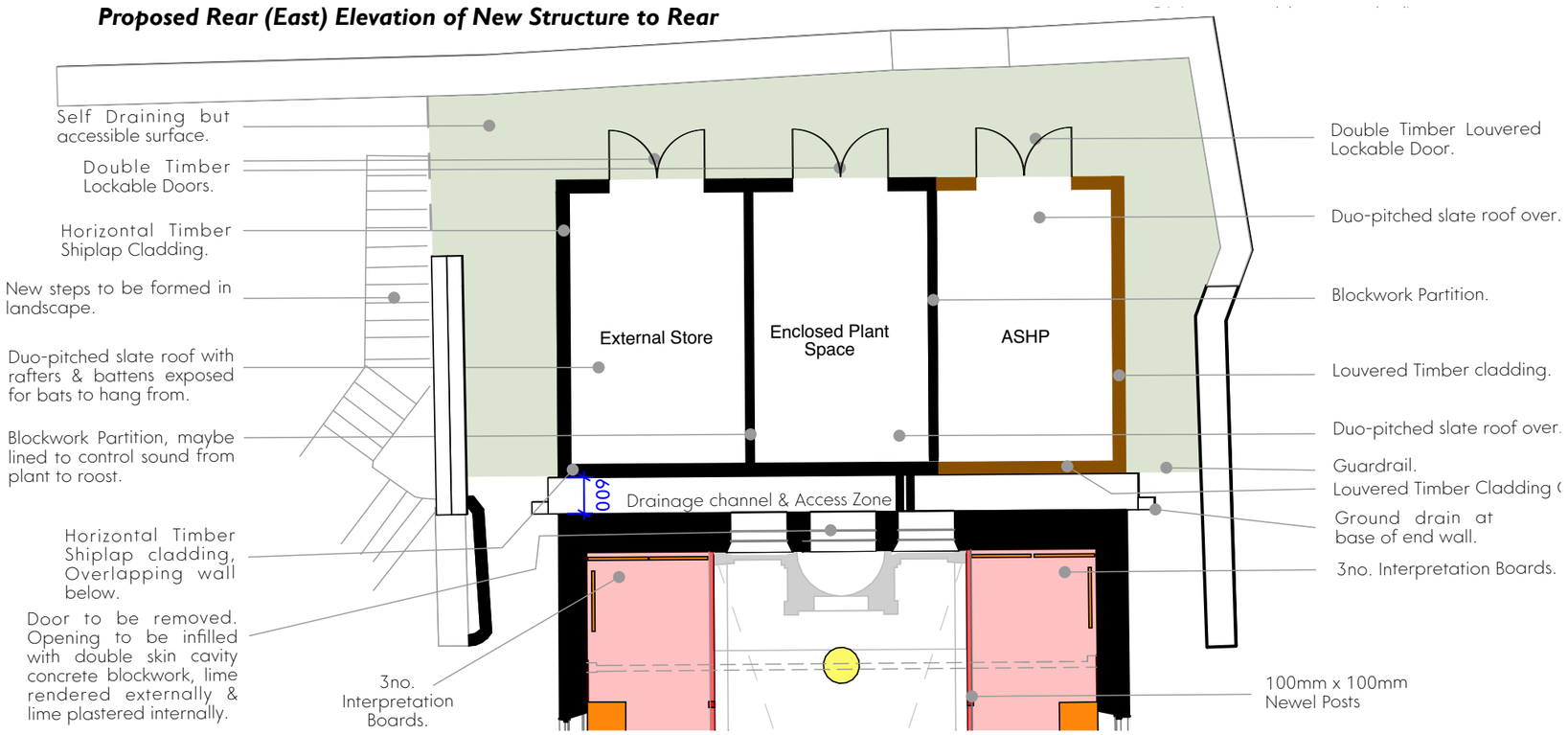
On this page are the proposed plan and elevations for this structure, which would be a lightweight structure clad in horizontal timber shiplap cladding, which will sit well within the wooded environment here. The form would be simple, with a duo-pitched roof with a natural slate covering, as the Synagogue. The roof pitch would be shallower, to minimise visual impact. Given its location, this structure would not be visible from the public road; only visible from the private road behind, the new 'garden' and the back garden to the adjacent house.



Proposed Rear (East) Elevation of New Structure to Rear



Proposed Side (North) Elevation of New Structure to Rear



Proposed Plan showing New Structure to Rear

8.5 Derelict Land to North of Synagogue / New Garden

An Arboricultural Report was produced by Aboricultural Technician Services Ltd (Tree Consultancy) to assess the nature and condition of the trees within the derelict land to the rear (east) and side (north) of the Synagogue. The results of this assessment would guide any thoughts on how the existing wooden area could be best approached, i.e.:

1. Retain the trees, improve their condition and manage them;
2. Thin out the trees (focussing on those in worst condition) and landscape parts of the 'garden';
3. Remove most (if not all) of the trees and landscape the whole area to suit.

In the case of 2. and 3. this might offer an opportunity to prepare an area for the planting, and considered presentation, of a cutting from the Anne Frank Horse Chestnut tree.

Below are the Tree Survey Assessment and Tree Constraints Plan from Arboricultural Technician Services Ltd; forming a graphic representations of option 2. and 3., as set out to the left.

They are:

(Left) The part removal of the internal trees and boundary ash trees to allow for the landscaping of a large part of the overgrown garden area /renovation of the building - trees highlighted for removal as red transparency trees below.

(Right) The more ambitious longer-term landscape/arboricultural solution is the additional removal of the large three western sycamore trees to allow for a complete redesign of the garden area.

One matter of potential concern is that the Arboriculturalist advises that Sycamore species (of which many of the trees on site are) are believed to suppress other trees from developing under or near their canopy. Retaining a large number of the sycamore trees on this site may prevent the Anne Frank Horse Chestnut cutting from developing. Further to this, if the sycamore/s are removed, then some soil remediation will be required to improve the success of the landscape scheme.

TREE CONSTRAINTS PLANS below

- Trees with Blue trunks in 'Moderate' Condition
- Trees with Grey trunks in 'Low' Condition
- Trees within Red shape in 'Poor' Condition