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Cleator Moor Innovation Quarter

Unit 1 Leconfield – Pre-Demolition Inspection Survey

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Client Name: Morgan Sindall Construction

Client Address: North East & Cumbria, Robinson House, Westlakes Science Park, Moor Row, Cumbria, CA24 3HY

Site Address: Leconfield Industrial Estate, Cleator Moor, CA25 5QB

S2 - INFORMATION

LUF Cleator Moor Innovation Quarter

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Control Sheet

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LUF Cleator Moor Innovation Quarter

Unit 1 Leconfield – Pre-Demolition Inspection Survey

Curtins

Contents

Appendices

LUF Cleator Moor Innovation Quarter

Unit 1 Leconfield – Pre-Demolition Inspection Survey

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1.0 Introduction

1.1 Project Background

1.1.1 Curtins were instructed by Morgan Sindall to undertake a Stage 1, pre-demolition survey at Leconfield Industrial Estate, Cleator Moor, Cumbria, CA25 5QB. The site is approximately centred on National Grid Reference 54°31′30″N, 003°31′27″W and covers an area of approximately 0.4 Ha.

1.1.2 It is understood that the development proposals comprise of demolition of a former industrial structure and pertaining ancillary buildings.

1.1.3 There is no archive information relating to the existing structures identified for demolition available to Curtins, however a point cloud survey was completed, and has been used to benefit this report.

1.1.4 Previously, the land was used by Hematite Iron and Steel Works during the 20th century. An overlay of the current footprint with a map from 1888–1915 below illustrates potential ground risks.

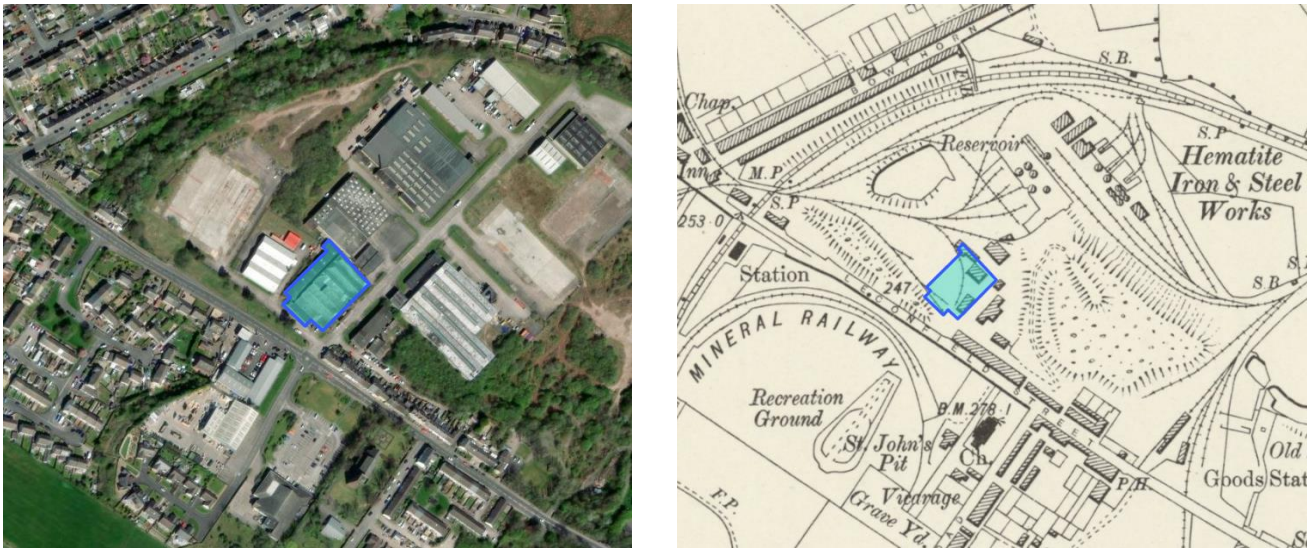

Figure 1.1 and Figure 1.2 – Former Iron Works site with overlay of current footprint

1.1.5 This report is to read in conjunction with Curtins Demolition Specification *085788-CUR-XX-XX-T-S-00002.*

1.1.6 The site survey was undertaken by Curtins on 14th November 2024. The purpose of the site visit was to undertake a visual structural survey of buildings at the site with a view to inform a Demolition Contractor of structural considerations to be included within their demolition proposals.

1.1.7 This report describes the indicative structural arrangement of the existing industrial frame and ancillary buildings scheduled for demolition.

1.2 Limitations

1.2.1 Curtins Limitations of the survey are as follows:

- No historic drawings were made available.
- The survey was entirely visual (no intrusive works were undertaken).
- Areas of the site, particularly the roofs were inaccessible and could not be inspected

1.2.2 The onsite visual survey and subsequent works excluded the following:

- External highways.
- External drainage.
- A Party Wall Surveyor may be required to enact agreements in line with the Party Wall Act (1996) for all works associated with party walls.
- Any existing foundations.

1.3 Asbestos

1.3.1 The Client has procured an asbestos demolition survey of the buildings at the site. The Demolition Contractor should observe the findings of this report and take all appropriate measures to protect site operatives and members of the public from exposure to harmful asbestos containing material

1.4 Scope of Services

1.4.1 This pre-demolition investigation and report aims to characterise the structural principles of the buildings, within the currently accessible areas. Specifically, the Stage 1 report is intended to determine:

a) Structural form of roof and supporting elements below
b) The methods by which the structural form maintains stability
c) Key load-bearing pathways, identifying essential components within the demolition zone.
d) The condition of the structural form, highlighting any areas that may be considered unsafe and may require additional measures during demolition.

2.0 Demolition Zone

2.1.1 The below outlines the areas of the structure which have been marked for demolition.

2.1.2 The Contractor has proposed to demolish the building down to top of slab level. Foundations and existing concrete slab are to remain.

2.1.3 It is proposed to retain a number of masonry walls which form part of the existing plant room for Brannan Thermometers.

2.1.4 The chimney is proposed to remain, which the adjacent tank storage and relating walls and plinths potentially to remain, subject to the council agreement.

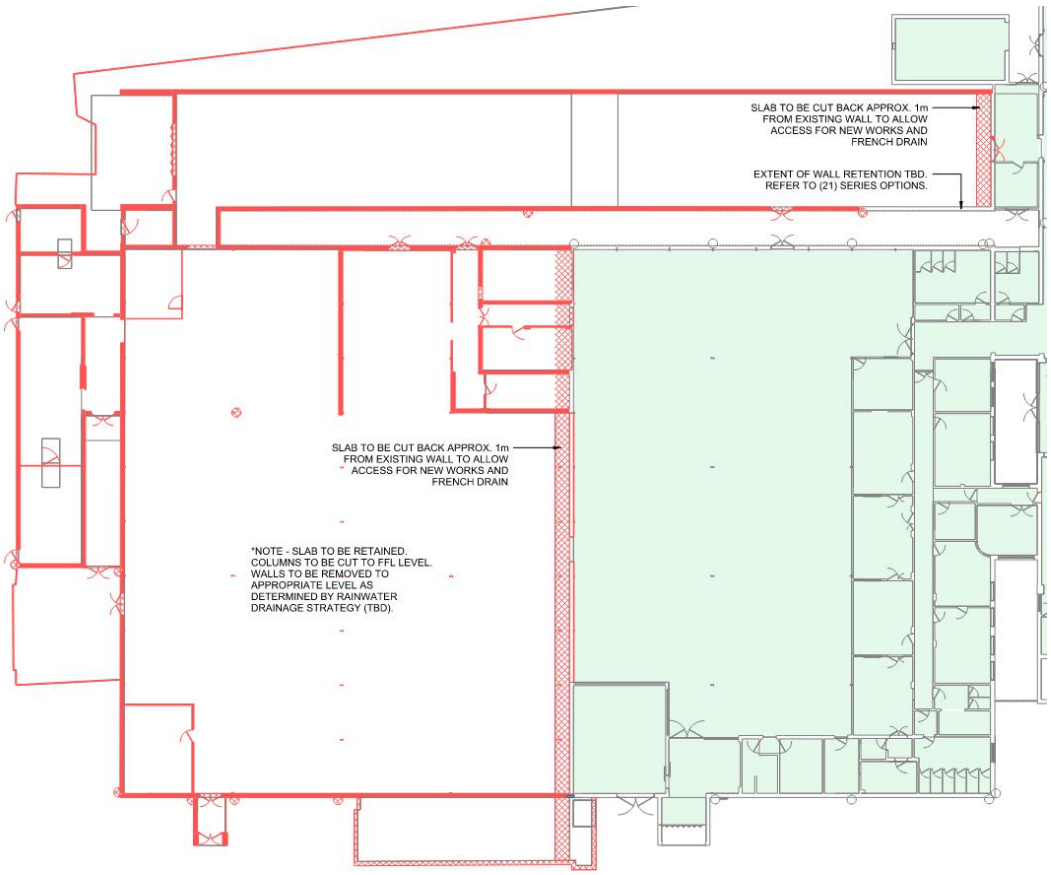

Figure 1.1 – Demolition Plan taken from LUF-NOR-01-00-D-A-00013-P01

3.0 Roof System

3.1.1 The below outlines the areas of the structure which have been marked for demolition. For the purposes of this report, each area has been split into Zones. Zone ‘A’ is being retained.

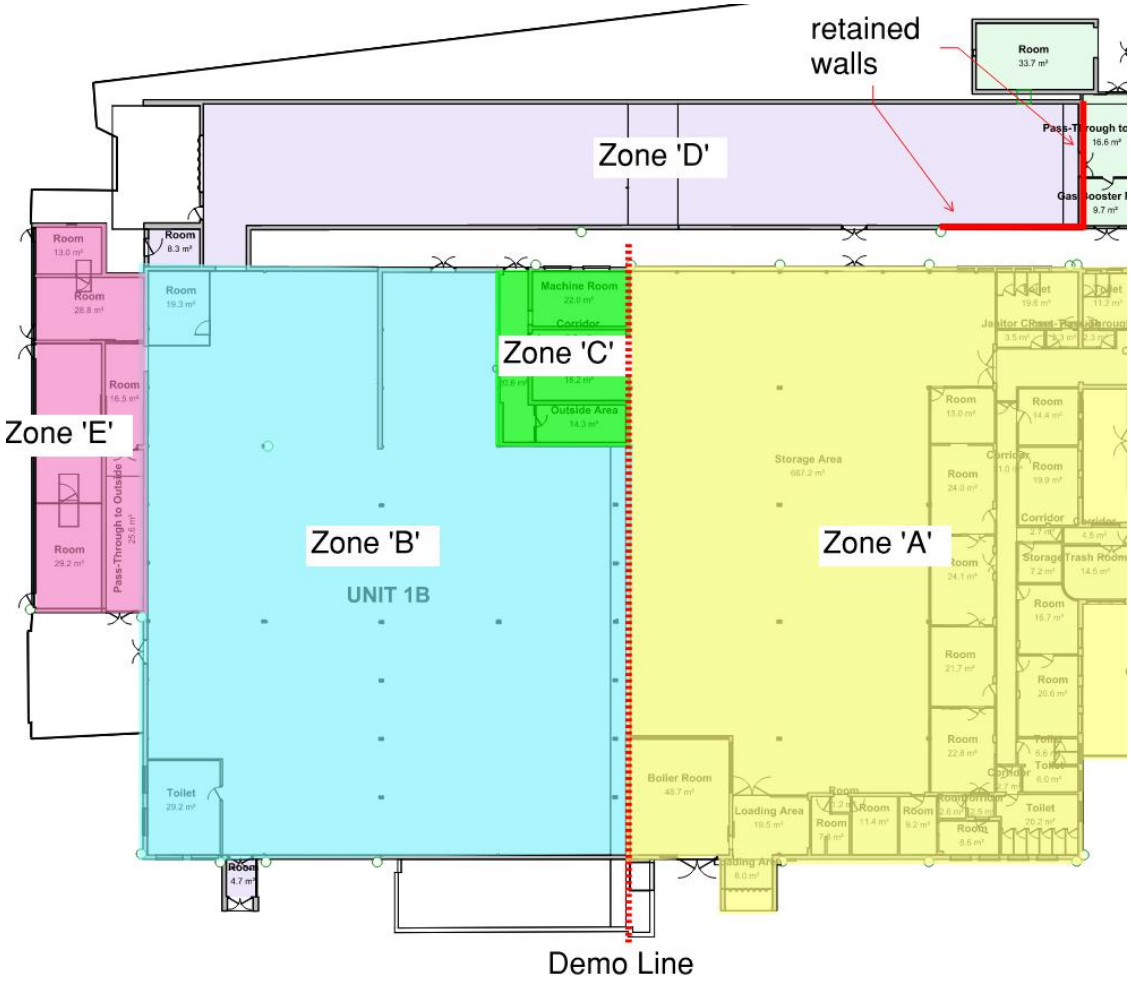

Figure 1.2 – Demolition Zones Plan

4.0 Overall Structural Composition

4.1 Zone A – Structural Form (*retained*)

4.1.1 Zone 'A' consists of four bays of duo-pitch trussed frames. Primary columns at regular centres form the principal vertical load-carrying elements. The outer columns are built into the masonry walls.

Figure 1.3 & Figure 1.4 – Zone 'A' retained, Duo-pitched truss and valley beam, roof construction

4.1.2 The roof structure is of multi-span duo-pitch form, early mild steel trusses at regular centres (ca. 3.8m crs) spanning bay widths of (ca. 10m CRS) onto either internal columns or a valley beam. The trusses are of angle section, a combination of single and double (back-to-back) angles. Connections are via rivetted plates.

4.1.3 A single RSA angle forms an eaves tie between perimeter columns and a hot-rolled UB forms a valley beam to pick up the roof trusses internally.

4.1.4 Flanking walls form hipped roofs via hot-rolled jack rafters supported by primary columns and by the end bay steel truss.

4.1.5 Purlins traverse the trusses, carrying the roof cladding (composition comprises of asbestos-cement corrugated sheeting). Bearing onto intermediate trusses via angle cleats butted to purlin and rotated to slope.

4.1.6 The roof trusses are not braced on plan at rafter level, nor at the bottom chord level. It is unclear to what extent the roof sheet cladding can serve as this bracing function. The columns supporting the roof trusses show no sign of being vertically braced. Lateral loads are resisted by the masonry flanking walls.

Figure 1.5 & Figure 1.6 – Zone 'A', half height flanking wall, and internal spine wall (right) to be retained

4.1.7 Ground floor construction comprises a ground-bearing concrete floor slab. Movement / construction joints at regular layouts.

4.1.8 All visible structural steel elements in Zone 'A' have a painted corrosion protection finish with exception to the hot-rolled purlins.

4.2 Zone B – Structural Form (*planned demolition*)

4.2.1 Zone 'B' consists of ***four bays of multi-span asymmetric trussed frames***. Primary columns at regular centres form the principal vertical load-carrying element. The outer columns are built into the masonry walls.

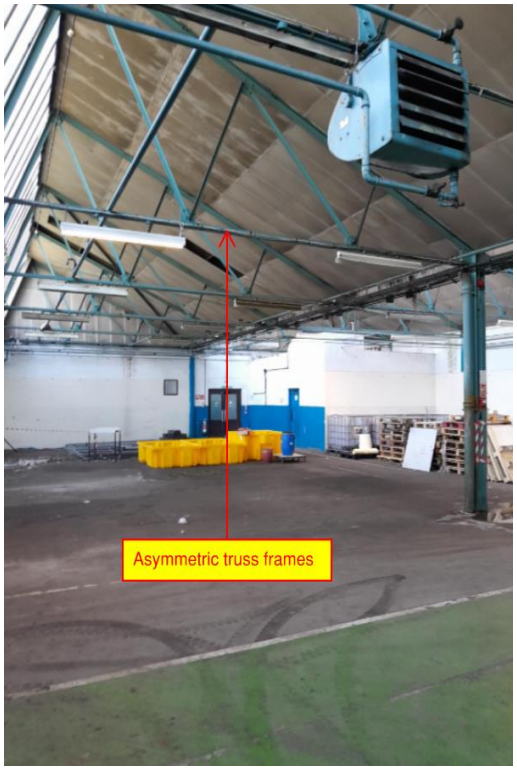

Figure 1.7 & Figure 1.8 – Zone 'B', principal truss rafter and asymmetric truss, roof construction

4.2.2 The roof structure is of multi-span asymmetric form, early mild steel trusses at regular centres (ca. 3.8m crs) spanning bay widths of (ca. 7.5m CRS) onto intermediate columns. The trusses are of angle section, a combination of single and double (back-to-back) angles. Connection are via rivetted plates.

4.2.3 Two grid lines (blue lines shown on Figure 2.5) consist of an inclined wind girder truss that spans the width of Zone 'B,' supported by a single internal column that divides the span and shares the vertical load. Intermediate asymmetric trusses connect to the girder trusses and act as primary beams between the columns, supporting the ends of the trusses. ***Due to the inclination of the truss, the destabilising load is supported by a combination of roof bracing and secondary trusses.***

4.2.4 A single RSA angle forms an eaves tie between perimeter columns and intermediate columns where principal truss rafters do not occur.

4.2.5 Flanking walls consist of half height masonry to eaves, followed by a cladding system to form the asymmetric section above. Principal columns are embedded into the wall system.

4.2.6 The roof trusses have plan bracing at rafter level, however not at the bottom chord level. Plan bracing occurs parallel to both flanking walls to the north-west elevation and south-east elevation.

4.2.7 Two secondary bracing systems run parallel to the retained demo line. The braces connect into the heads of the column and centrally to the roof purlin, forming k-braces on each 3.8m truss bay.

Figure 1.9 & Figure 2.0 – Zone 'B', main X-Angle bracing (left) and secondary K bracing (right)

4.2.8 Ground floor construction comprises a ground-bearing concrete floor slab. Movement / construction joints at regular layouts. Service trenches with ductile iron plate covering throughout and ad-hoc concrete plinths can be found.

4.2.9 All visible structural steel elements in Zone 'B' have a painted corrosion protection finish with exception to the hot-rolled purlins.

4.2.10 Columns comprise of a UB section positioned within its strong axis in plane with the secondary truss spans. Connections are rivetted plate. The valley beam consists of a single angle nominally pinned.

4.2.11 Two small enclosures have been added to the internal space. The toilet block is made up of half height masonry walls, whilst the other consists of light gauge stud partition. Both of these structures are deemed to be of little structural significance to the overall stability of the Zone 'B'.

4.2.12 Purlins are single hot rolled angle. Partial view can be seen through a missing soffit panel seen on Figure 2.0 above.

4.3 Zone C – Structural Form (*planned demolition*)

4.3.1 Zone ‘B’ comprises a single-story ancillary building featuring a flat concrete roof, specific type currently unknown.

4.3.2 The flat concrete roof is supported by a combination of load bearing masonry walls and downstand steel beams.

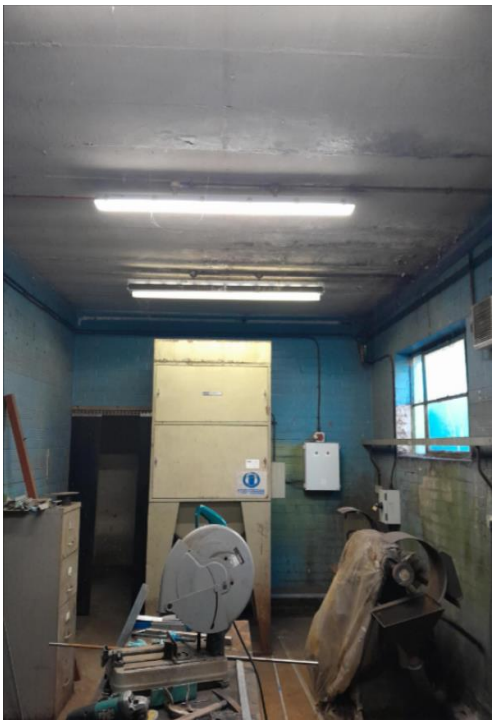

Figure 2.1 & Figure 2.2 – Zone ‘C’, single storey concrete slab soffit roof, load bearing masonry internal and external

4.3.3 Internal walls forming the perimeter of the ancillary building connect into the retained demo line. The walls act perpendicular, forming returns and are toothed in. Columns supporting roof trusses break the masonry panels either side, it is unclear if the wall is tied/fixed to the columns. See section 6.0, demolition interfaces for further information.

4.3.4 Ground floor construction comprises of a ground-bearing concrete floor slab.

4.4 Zone D – Structural Form (*planned demolition*)

4.4.1 Zone ‘D’ consists of a single-story ancillary building with a flat roof made up by a fragile woodwall system, therefore no roof access is permitted. The roof is supported by a combination of lattice steel joists, which rest on load-bearing masonry walls. The lattice joists are fitted with timber plates on both the top and bottom flanges to facilitate roof and ceiling fixings. The lattice joists were typically used during the post-war period (1945-55) on Airey Houses.

4.4.2 Zone ‘D’ walls abut the planned to be retained plantroom. It has been highlighted on the Architects plan drawings for a portion of this wall to remain, for further details see section 6 for demolition interfaces.

4.4.3 The load bearing walls are two brick thick, solid wall with no cavity. Regular vertical cracks along the length of the flank walls suggests no movement joints have been allowed for. See figure 61 of Curtins photograph log.

Figure 2.3 & Figure 2.4 – Zone ‘C’, single storey concrete slab soffit roof, load bearing masonry internal and external

4.5 Zone E – Structural Form (*planned demolition*)

4.5.1 Zone ‘E,’ one of the later extensions, consists of load-bearing masonry walls supporting a flat roof constructed with timber joists and finished with plywood.

5.0 Critical Load Paths

5.1 Roof Stability System

5.1.1 Green indicates main roof bracing comprising of a single angle connected into the top chord. Red shows the secondary K-bracing connecting into columns and purlin. **Blue, the main wind girder trusses**, and purple shows secondary trusses:

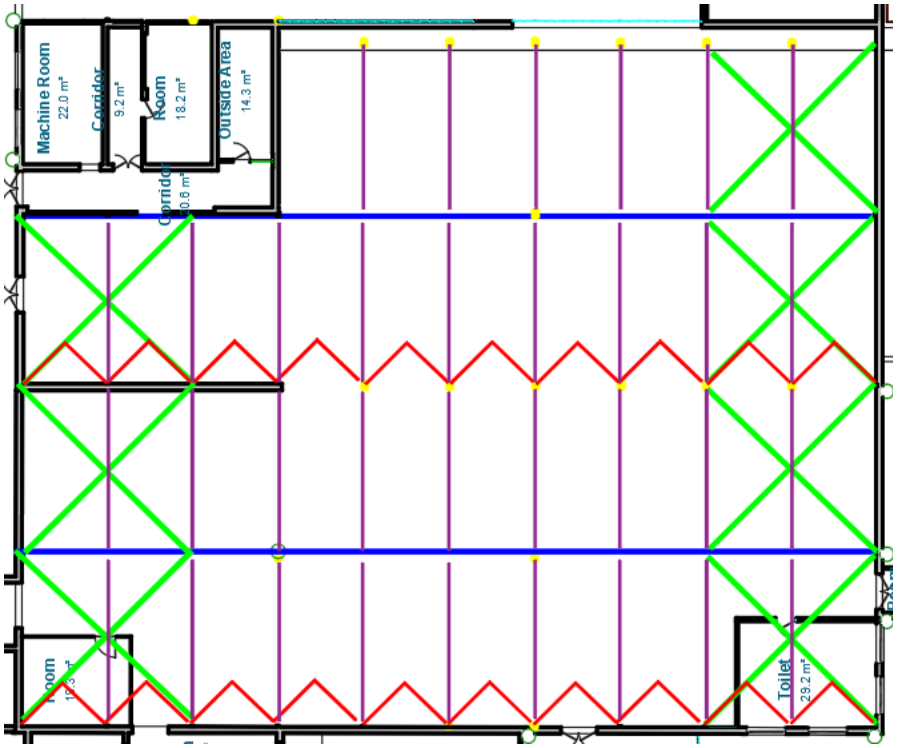

Figure 2.5 – Zone 'B' Roof Stability Systems

5.2 Vertical Loads

5.2.1 Principal columns take vertical load from the roof system within Zones 'A' and 'B'. All other ancillary buildings support vertical load via load bearing masonry / lintels and downstand beams.

5.2.2 The truss chords transfer vertical loads through compression and tension within the individual elements.

5.3 Horizontal Loads

5.3.1 ***Zone 'A' Horizontal Stability. Whilst not highlighted for demolition care should be taken not to damage the existing roof cladding and side walls.*** This is due to lack of roof bracing (and the majority of the connections appear as pinned elements) stiffness within the roof is likely gained through a combination of the roof cladding and purlins working together to transfer the load. The structure clad

with the corrugated sheeting will be stiffened to some extent by the stressed skin action of the cladding. For this to occur adequate/robust fixings is needed. The main issue is the condition of the building itself, deteriorated panels can be seen throughout the building and additional roof penetrations will have likely affected original design and the claddings ability to resist horizontal forces. The cladding fixings also plays a major part in the design and are subject to reversal of load. This load reversal may have led to leaks due to elongation of the holes around the fixings. It should be acknowledged that further deterioration of the roof cladding will likely lead to deformation of the structure in the form of sway and racking of trusses.

5.3.2 ***Zone 'B' Horizontal Stability.*** The half-height masonry perimeter walls are the primary elements responsible for transferring horizontal loads into the foundations. No moment / portal frames have been utilised since the columns are oriented in the strong axis and the head beam is not of significant size, see point 4.2.10. Roof bracing, highlighted as green and red above, resist wind load in both directions. ***Careful consideration of the demolition of the roof should be carried out due to the inclined nature of the wind girder trusses, highlighted blue above, also see point 4.2.3.***

5.4 Main Demo Line

5.4.1 The primary boundary aligns with the valley gutter line, in line with the external chimney. It appears that the proposed demolition of Zone 'B' was an extension to the existing industrial frame. At this interface, two column lines are visible, with no connecting steelwork, indicating that the extension is structurally independent from the original unit.

5.5 Plant Room Zone

5.5.1 The client plans to retain a portion of Zone 'D' to preserve the plant room function. An internal wall, running perpendicular to the flank walls, will remain. Due to ceiling finishes, the roof support structure within the plant zone is unclear. As mentioned in section 3.4, Zone 'D' is constructed with lattice joists, but there is a possibility that the joists may span in the opposite direction to take advantage of the internal wall, due to the shorter span. **It is therefore recommended to carry out intrusive investigations in this area to better understand the roof interface and minimise potential damage during demolition, as the joists may not align with the internal wall.**

5.5.2 A length of Zone 'D' wall which is to remain will need support since post demolition the wall will act as freestanding, with only one return. A form of shoring, of buttress would need be implemented as indicatively shown on Architectural drawings. ***Foundations for buttresses/shoring will be required, therefore intrusive ground investigations for this area will be required.***

5.6 Loading Bay Retaining Walls

5.6.1 The masonry retaining walls on the south elevation create a loading bay. The capacity of these walls to support demolition equipment is uncertain due to the unknown wall construction and foundation type. It is recommended to implement a no-loading zone extending a distance of twice the height of the wall to avoid placing additional surcharge on the structure.

5.7 Chimney Interface

5.7.1 The external chimney consists of a masonry construction, stabilised via steel straps at regular 600mm centres.

5.7.2 The chimneys superstructure acts independently from the proposed to be demolished building. Figure 17 within the photograph survey log demonstrates the chimney is not built into the flanking walls.

6.0 Summary

6.1.1 Careful demolition phasing is required for the removal of the roof truss system due to the inclined nature of the principal trusses, which inherently introduce destabilizing forces within the structure.

6.1.2 Careful demolition phasing is required for the removal of the flanking walls which provide horizontal stability to the frame.

6.1.3 Along the main demolition line, the two frames of Zones ‘A’ and ‘B’ can be seen to act structurally independent from one another.

6.1.4 The masonry walls to remain within Zone ‘D’ to form the existing Plant Room will lose stability due to the main demolition, intrusive investigations are advised within this area. Temporary works also advised. See points 5.5.1 and 5.5.2.

6.1.5 The roof structures in Zones ‘A’ display a notable lack of significant horizontal and vertical bracing. Lateral stability is provided by the roof cladding and purlin system, which acts as a rigid diaphragm. This allows horizontal loads to be transferred from the roof into the columns, which are then resisted by the mass of the masonry panels, functioning as shear walls. **Damage to the Zone ‘A’s cladding and masonry walls should therefore be negated.**

7.0 Demolition Requirements

7.1 Overview

7.1.1 The Demolition of the building should be planned and implemented in accordance with BS 6187:2011.

7.1.2 This Report forms part of a wider suite of pre-demolition information including asbestos reports, underground utility information, GPR drawings and ground investigations.

7.1.3 In general terms a traditional top-down removal of weight is the anticipated solution.

7.1.4 All elements which are supported by the roof trusses are to be dismantled, these include roof sheets, battens, felt, plasterboard, roof guttering and flashings.

7.1.5 Once the roof finishes and cladding have been removed, the roof trusses and purlins can be systematically dismantled or demolished. It is recommended to begin with the removal of the secondary trusses, ensuring that a sufficient number remain to provide support for the two main wind girder trusses. Alternatively, consideration could also be given to the temporary propping of the wind girder trusses during the removal of the secondary trusses. Several masonry flank walls (which may have hidden X-flat bracing) in Zone ‘B’ must remain in place to maintain stability during demolition and should only be removed after the roof has been fully dismantled.

7.1.6 The sequenced removal of the flank walls with the trusses must be in accordance with the temporary works engineer’s proposals.

7.1.7 It is to be assumed that Finished Floor Level (FFL) is to be taken as the existing ground floor slab level. This will be used as a datum to ensure no demolition stockpiles are left on site.

7.1.8 For further requirements, see Curtins Demolition specification survey 085788-CUR-XX-XX-T-S-00002.