

## Technical Note

<b>Project title</b>	University Hospital Kerry (UHK) - Flue Chimney Condition Assessment & Recommendations
<b>Job number</b>	306730-00
<b>File reference</b>	306730-ARUP-ZZ-XX-TN-S-0001
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<b>Date</b>	12 February 2026
<b>Subject</b>	Flue Chimney Condition Assessment & Recommendations Based on Drone Photographic Survey

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### 1 Executive Summary

This technical note presents the findings of a structural condition survey of an existing reinforced concrete chimney flue structure believed to be constructed in the late 1970s on the University Hospital Kerry campus. The assessment is based on a review of photographs obtained from a drone survey conducted by Vision Contracting Ltd. on 13 January 2026 for the HSE. This drone survey enabled visual inspection of otherwise inaccessible areas of the structure. This report also builds upon the findings of a previous condition survey carried out by Arup in September 2022.

The drone survey photographs identified multiple areas of concrete spalling and exposed reinforcement, with visible signs of reinforcement corrosion. The corrosion is either attributable to insufficient concrete cover in certain locations, or age-related deterioration associated with long-term environmental exposure, or a combination of both. Given the age of the structure and the extent of deterioration observed, these defects indicate that the chimney flue has reached, or is approaching, the end of its original design service life.

Based on the observable condition, it is recommended that demolition of the chimney flue be considered as the preferred option. In the alternative, extensive concrete repair works together with appropriate corrosion mitigation measures would be required in order to extend the remaining service life of the structure. In this scenario, a programme of ongoing inspection and monitoring at regular intervals would also be necessary to manage the risk of further deterioration. Further investigation and stakeholder consideration are required to determine the most appropriate course of action.

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## 2 Introduction

Arup was requested by the Health Service Executive (HSE) to assess the condition of an existing reinforced concrete chimney flue structure located on the University Hospital Kerry campus in Tralee and to provide recommendations based on the findings for either demolition or remedial works. The assessment is based on a review of photographs obtained from a drone survey by Vision Contracting Ltd. on 13 January 2026 for the HSE, allowing visual inspection of elevated and otherwise inaccessible areas of the structure. This inspection follows upon the findings and recommendations of an initial condition survey carried out by Arup in September 2022, which was limited in scope due to safety considerations.

### 2.1 Exclusions

Notable exclusions or limitations of this technical note and the drone survey assessment are as follows:

- Review of secondary steelwork and associated connections to the main concrete structure. These elements were not captured in the drone survey photographs so no assessment could be made of their condition.
- Structural analysis of the chimney structure and its foundations. No structural analysis has been conducted to assess the structural capacity of the structure.
- Assessment of elements or surfaces hidden from view and not captured by the drone photographs.

## 3 Survey Findings

### 3.1 Structure

The chimney structure is believed to have been constructed as part of the original hospital build in the late-1970s / early 1980s. It is used to support exhaust flue stacks from the boiler house located at its base. The structure comprises two reinforced concrete (RC) wall panels connected by RC beams at six levels. The chimney is approximately 31m high, with a base footprint of approximately 6m × 6m, reducing to approximately 6m × 3m close to the second platform level, approximately 10m above ground level. Refer to Figure 1 below.

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**Figure 1 - Exhaust Flue Chimney**

The drone survey photographs indicate that the concrete structure is exhibiting significant deterioration, with multiple areas of damage and disrepair identified. The primary defect observed throughout the structure is concrete spalling caused by corroding reinforcement. Figure 2 presents a particularly severe example of this deterioration near the base of the structure, where a large area of concrete has spalled away with the concrete debris visible on the platform grating below. Similarly, Figure 3 shows comparable deterioration at high-level on the structure, where reinforcement is exposed at numerous locations within the rebates of the decorative fluting in the outer concrete face. The recurring presence of exposed reinforcement within these rebates suggests that the original concrete cover may have been insufficient at these locations. The reinforcement has corroded and expanded over time causing the concrete cover to spall and fall off, as observed in Figure 3.

Appendix A provides a detailed list of the main structural defects identified in the reinforced concrete structure from the drone survey photographs.

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Figure 2 - Spalling concrete and exposed, corroding reinforcement at first platform level

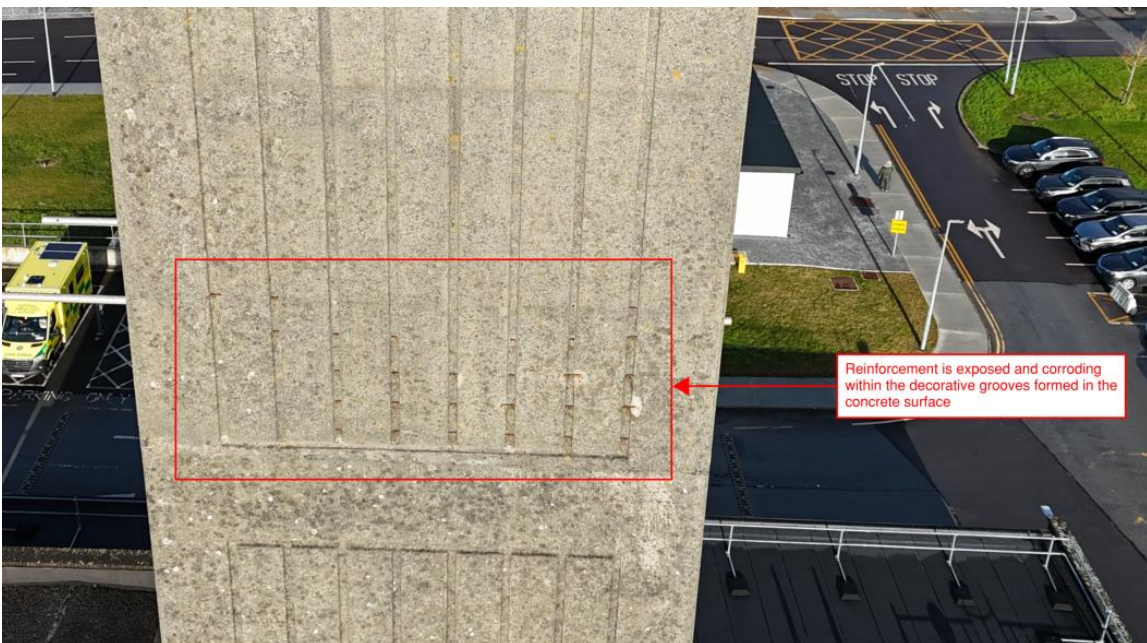


Figure 3 - Exposed corroding rebar visible in grooves in concrete wall on southern elevation

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### 3.2 Access Ladder & Handrails

The condition of the access ladder and handrails was assessed insofar as possible from the drone survey photographs. In general, these elements appear to be in poor condition, with most of the steelwork showing signs of corrosion, particularly at high level. The condition of the fixings to the reinforced concrete (rc) structure could not be assessed in detail from the drone photographs. However, in several images the anchor bolts appear discoloured, indicating that corrosion is likely present.

The design of the access ladder does not appear to comply with EN ISO 14122-4, which sets out contemporary requirements for vertical access ladders. Based on the available drone imagery, aspects of the existing ladder arrangement appear inconsistent with these requirements. In particular, the continuous straight vertical ladder arrangement may exceed the recommended climb heights between rest platforms, and the gap between the bottom hoop of the cage and the top of the handrail may be greater than that permitted by the standard. While the ladder arrangement may have been compliant when originally installed, any repairs or modifications to the existing ladders, or their replacement with new ladders should account for the current standards.

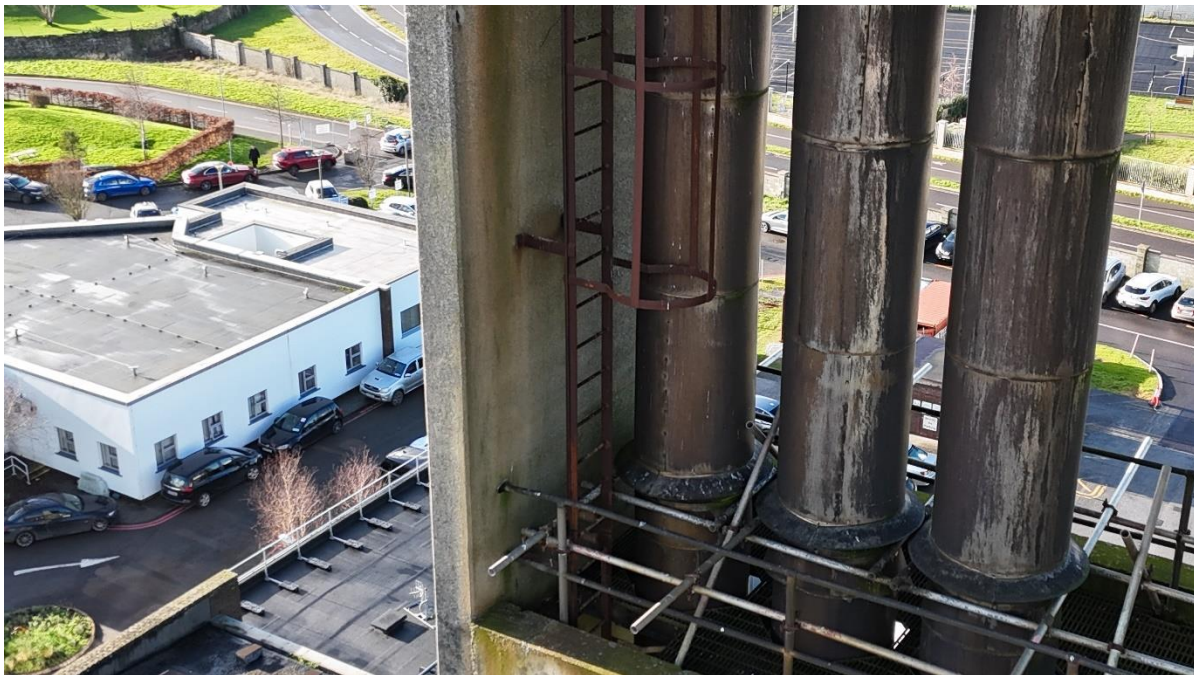


Figure 4 - Access ladder & handrail

### 3.3 Mechanical & Electrical Services

The reinforced concrete chimney structure supports four vertical flue stacks. Based on the 2022 Arup survey report, each flue stack has a diameter of approximately 500–600mm and comprise flanged steel pipework. Each flue appears to be wrapped in fibre rockwool-type insulation and externally clad with stainless steel sheeting.

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The flue stacks are understood to be redundant and have not been maintained for several years. Consequently, they are in a poor state of repair. As shown in Figure 5, sections of the external cladding are missing, exposing the underlying steel pipework, which is severely corroded. The remaining cladding was observed to be loose and partially detached in several areas.

This loose cladding poses a risk of becoming dislodged during high winds and could strike a roof, vehicle, or person in the immediate vicinity of the structure. Temporary scaffolding was observed to be fitted to the upper three platform levels of the structure. Although not known for certain, it appeared that the scaffolding was installed in an attempt to provide additional restraint to the flue stacks and cladding, to reduce the risks of elements getting dislodged by high winds.

A lightning protection system was observed to be fixed to both walls of the chimney structure. While no significant defects were identified from the available photographs, the issues noted in relation to the ladder access and the presence of the scaffolding installed at upper levels indicate that safe access for inspection, repair, and ongoing maintenance of this system is not currently provided.



**Figure 5 - Flue stacks supported within chimney. Extensive rust visible on central flue where cladding is missing.**

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## 4 Health & Safety Concerns

The findings from the drone survey indicate that the main RC structure, access ladders, handrails, and vertical boiler flue stacks are in a poor state of repair and present a significant safety hazard to hospital users and nearby assets. The identified hazards include the following:

- **Falling concrete:** Widespread concrete spalling was observed throughout the structure. Detached concrete fragments could potentially strike persons in the vicinity below or cause damage to adjacent building roofs and parked vehicles.
- **Falling mechanical components:** The vertical flue stacks were observed to be in poor condition. Deteriorated elements of the flue stacks could become dislodged and fall to ground level, posing a risk to people, roofs, and vehicles below.
- **Unsafe access:** The vertical access ladder and handrails are in poor condition, with corrosion evident throughout. Of particular concern is the potential failure of corroded anchor fixings. The ladders were deemed unsafe for use to access the upper levels for the 2022 Arup inspection. In addition, the existing access ladders does not appear to comply with current design standards.
- **Asbestos risk:** The internal lining of one of the flue stacks appears to consist of a cementitious coating, which should be sampled in advance of any further works for the presence of asbestos. The gaskets between flanged joints of the flues should also be inspected for potential asbestos-containing materials.

## 5 Recommendations

Following review of the drone survey photographs and previous Arup survey report, two options are proposed. Either the structure is demolished to remove the risks highlighted in Section 4 of this report, or remedial works are carried out to the RC structure, flue stacks, handrails and access ladders.

### 5.1 Demolition

The recommended option would be a full demolition of the chimney structure which would remove all associated risks with its current poor condition. The 2022 Arup report described two possible options for demolition of the structure – using a steel hopper and crushing machine or using a crane to cut and lift off segments of the structure. If it is decided to demolish the structure, a specialist demolition company would need to be engaged to determine the safest, most appropriate demolition methodology. In addition, an asbestos survey would need to be carried out to determine what, if any, asbestos materials are present in the exhaust flue stacks.

### 5.2 Retention

If it is decided that the chimney structure is to be retained, the following remedial works (which will have significant costs and ultimately may require further remedial works in the future) are recommended to be carried out:

- **Concrete Repairs:** Extensive concrete repair works are recommended to address the ongoing issues of reinforcement corrosion and resultant concrete spalling. To determine the full extent of the required repairs, a detailed close-up inspection of the structure should be

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undertaken (e.g. via cherry picker or scaffold access). Subsequent consultation with specialist concrete repair contractors would establish appropriate repair products, methodologies and order of magnitude costs.

- **Removal of Redundant Flue Stacks:** The exhaust flue stacks supported by the structure are understood to be redundant. It is therefore not considered appropriate to undertake remedial works to the flues. Instead, it is recommended that the flue stacks are fully removed to eliminate the risk of loose or deteriorated components detaching and falling onto roofs, vehicles, or personnel below.
- **Access Ladder Upgrade:** The existing access ladders present several safety concerns, including corroded fixings, corroded surfaces, and potential non-compliance with current access ladder standards. It is therefore recommended that should the chimney structure be retained that the ladders are upgraded or replaced to provide safe access for personnel for future inspections and maintenance of the structure and lighting protection system etc.
- **Monitoring and Ongoing Inspection:** While the above remedial and upgrade works would extend the service life of the structure, they will not prevent future deterioration. It is therefore recommended that the condition of the structure is inspected at regular intervals to monitor ongoing deterioration and to identify any further maintenance requirements.

### 5.3 Interim Measures

Irrespective of what option is chosen, it is recommended that the following actions are taken to mitigate the current significant health and safety risks to both personnel and property associated with falling objects:

- An exclusion zone is set up around the base of the chimney
- Crash decks to be constructed above the roofs of the surrounding buildings

# Appendix A Concrete Defects

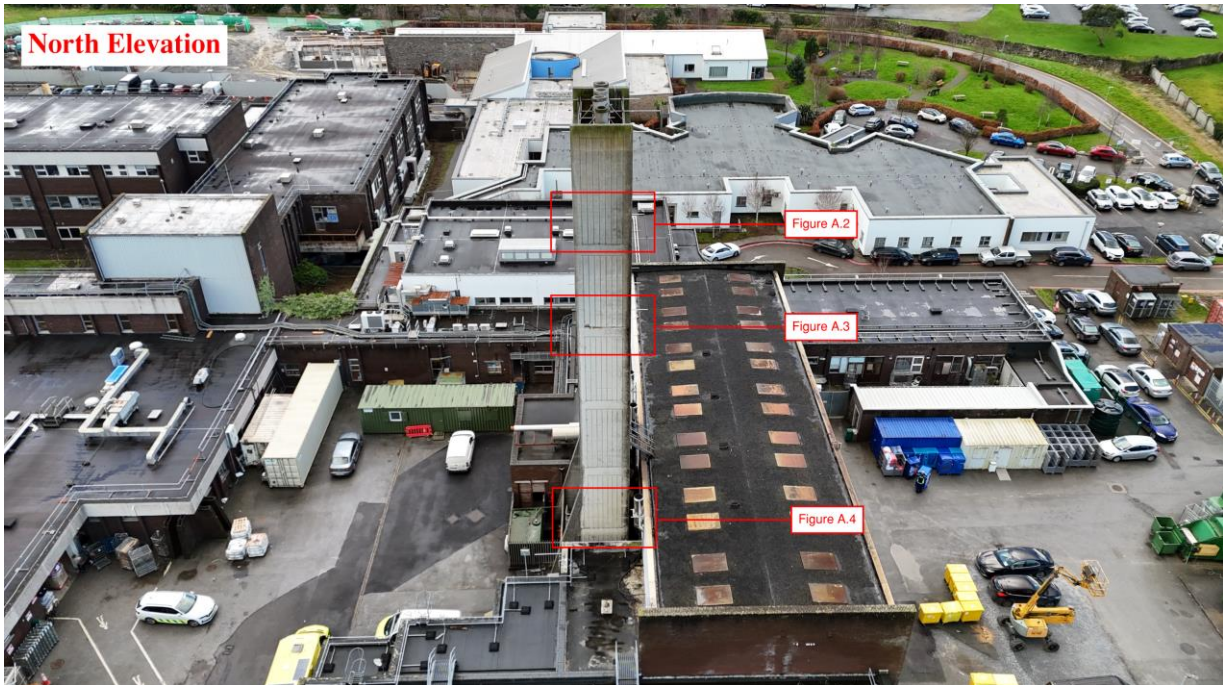


Figure A. 1 – North elevation of existing chimney

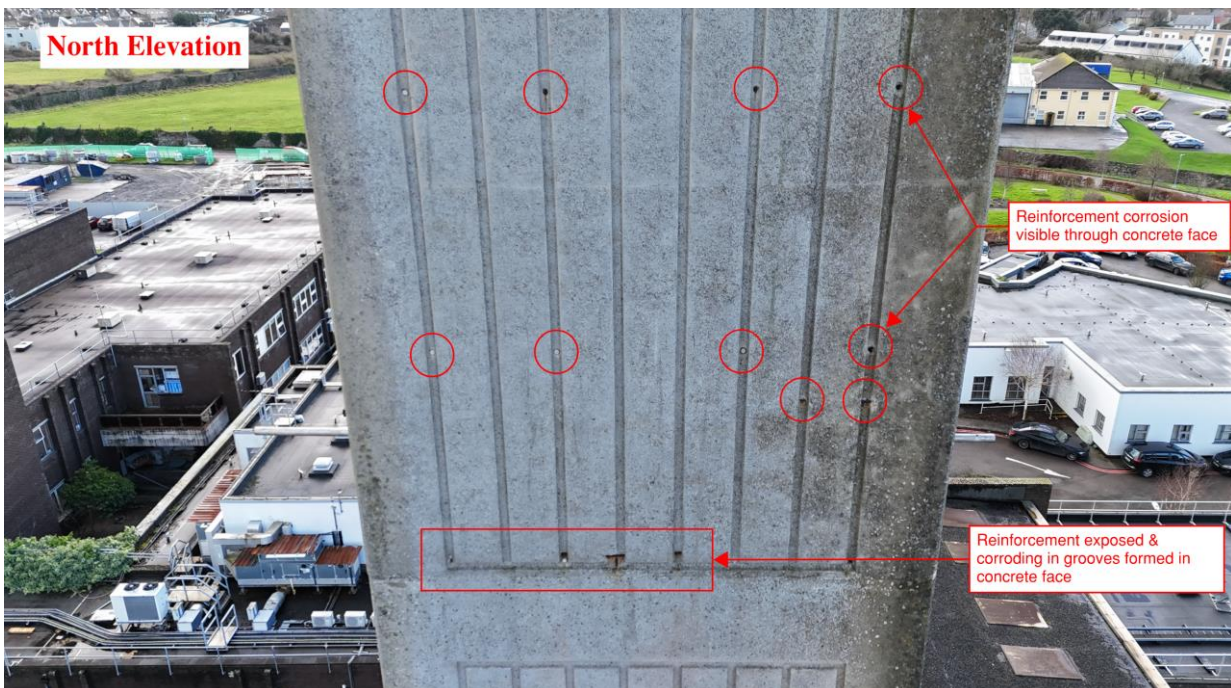


Figure A. 2 - Concrete defects on north wall of chimney

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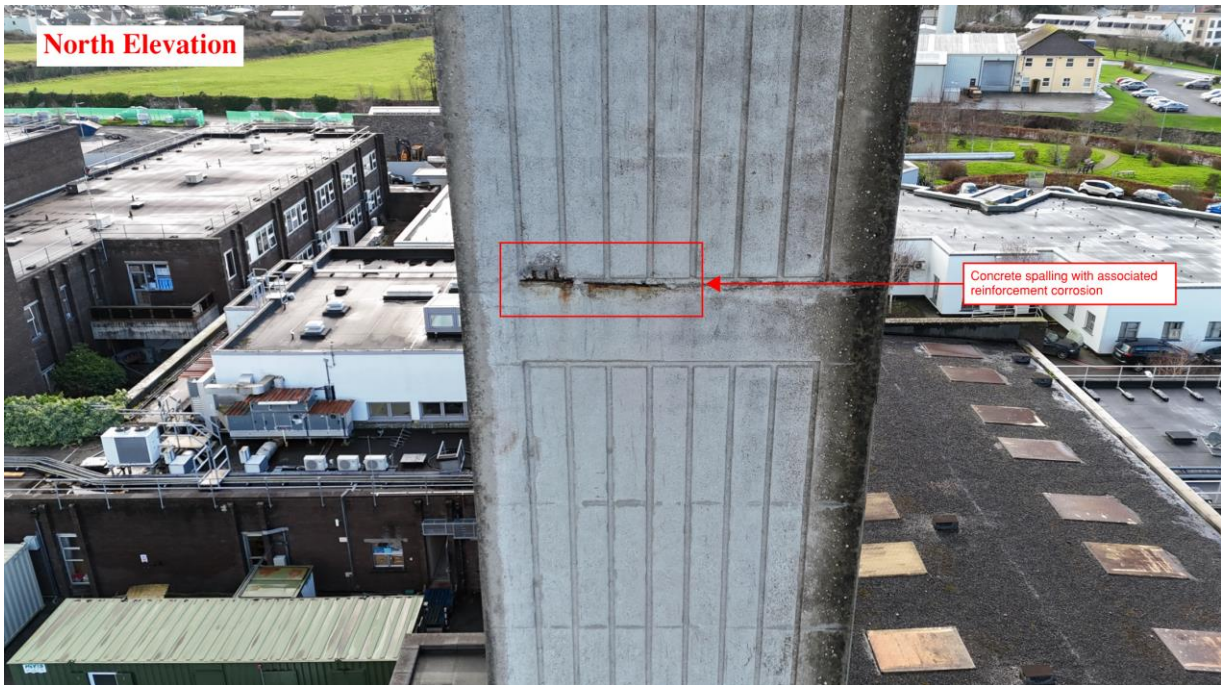


Figure A. 3 - Concrete defects on north wall of chimney

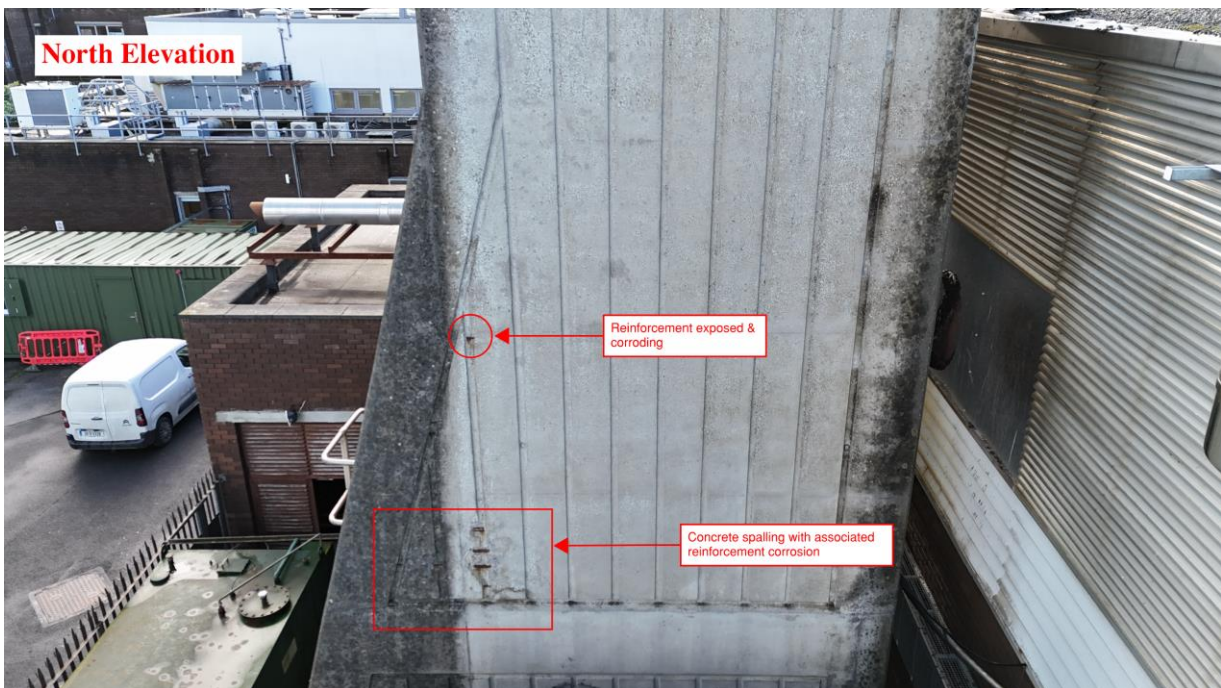


Figure A. 4 - Concrete defects on north wall of chimney

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Figure A. 5 - Chimney south elevation

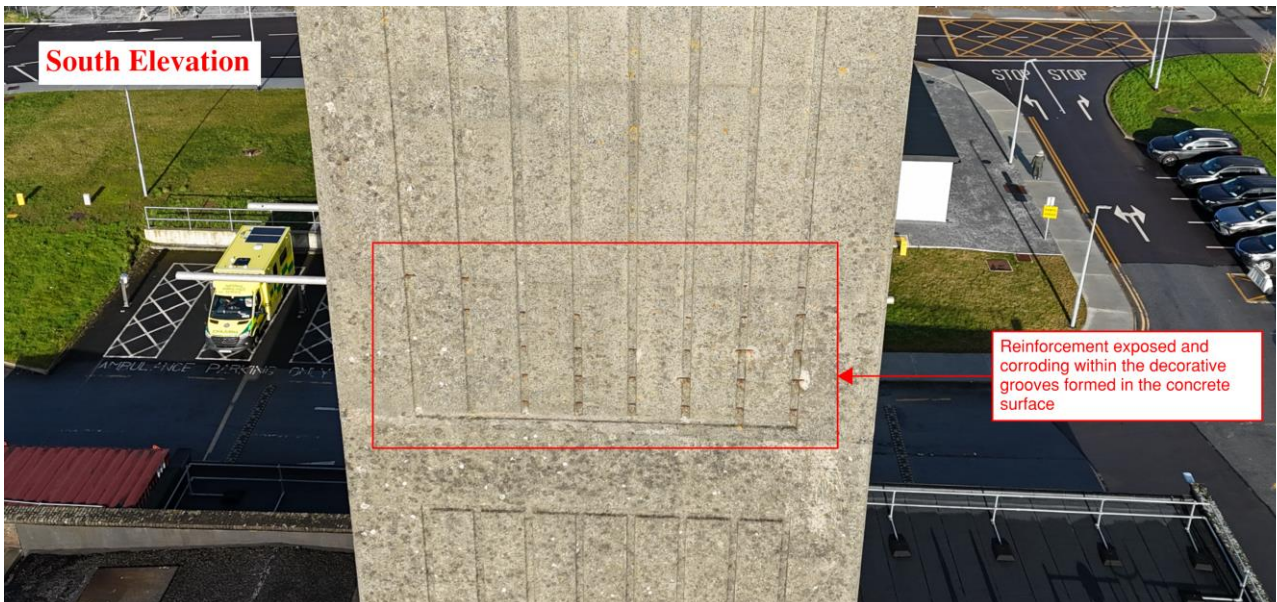


Figure A. 6 - Concrete defects on south wall

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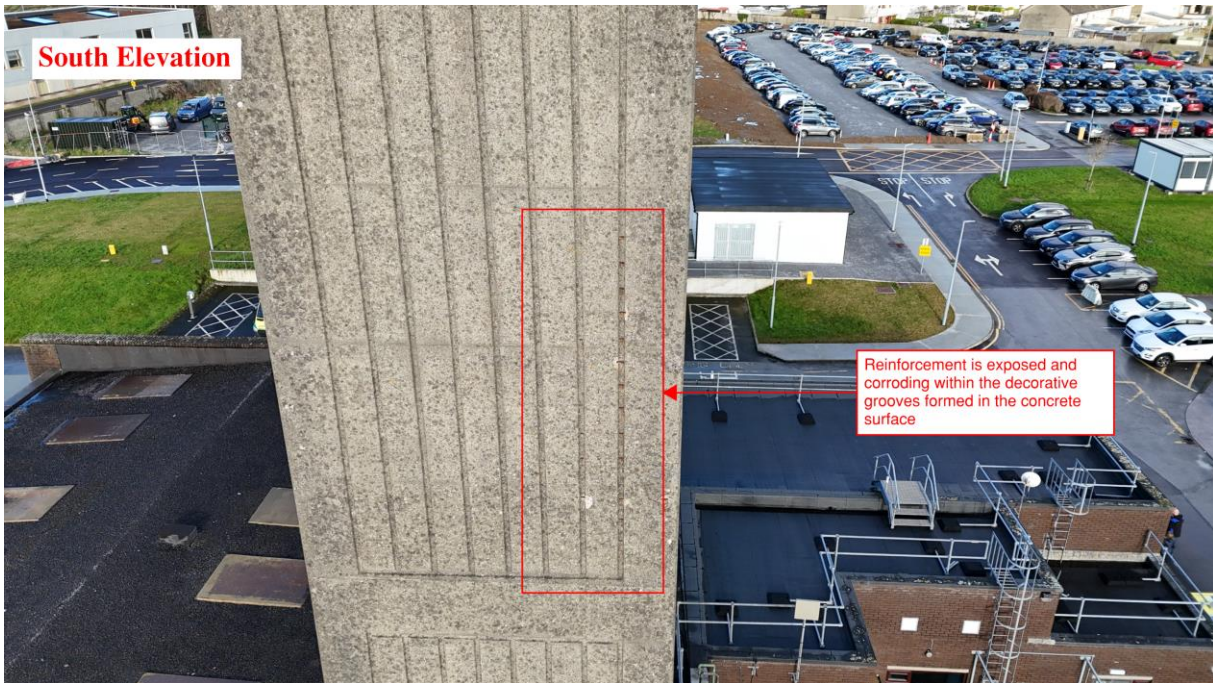


Figure A. 7 - Concrete defects on south wall



Figure A. 8 - Chimney west elevation

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Figure A. 9 - - Concrete defects on west elevation

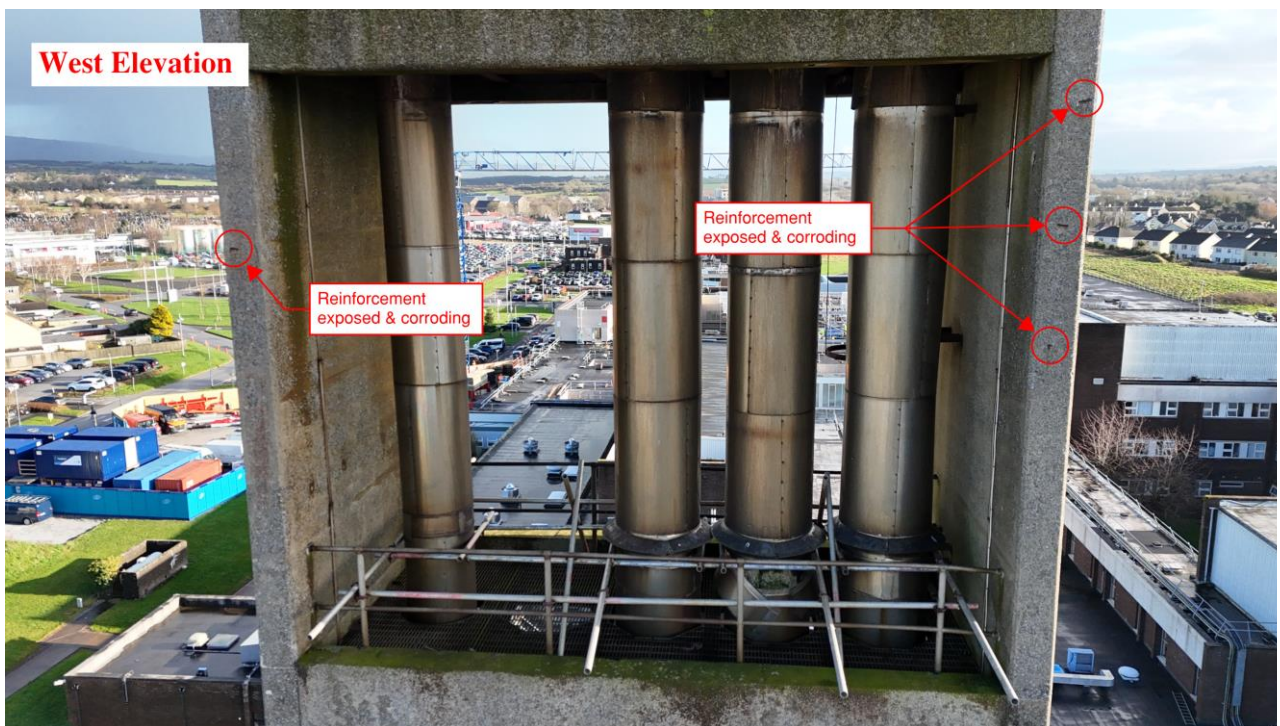


Figure A. 10 - Concrete defects on west elevation

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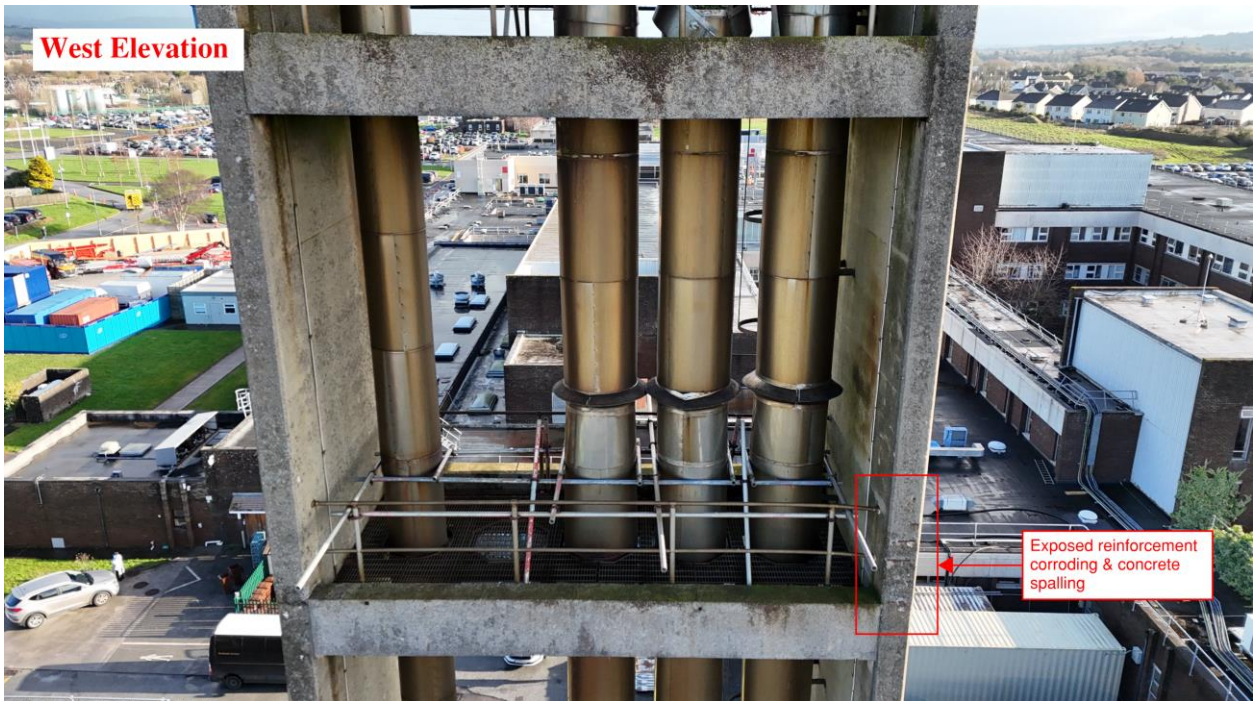


Figure A. 11 - Concrete defects on west elevation



Figure A. 12 - Concrete defects on west elevation

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Figure A. 13 - East chimney elevation

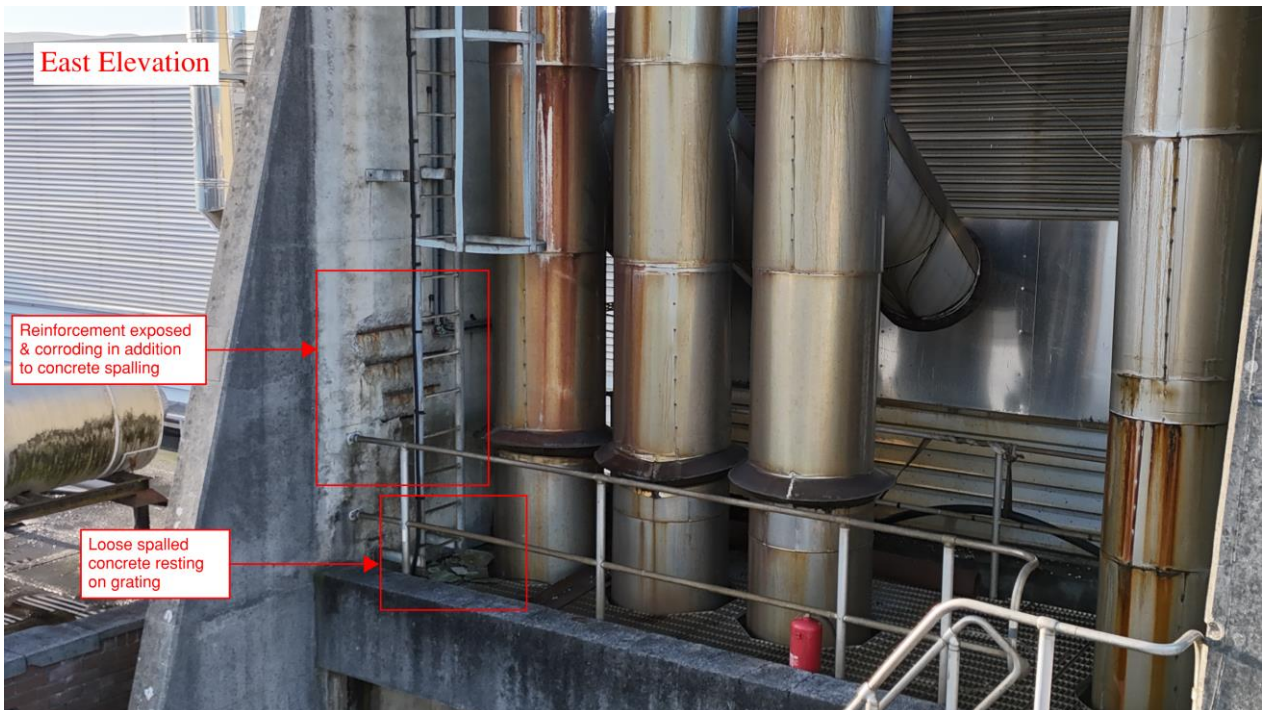


Figure A. 14 - Concrete defects on east elevation

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Figure A. 15 - Concrete defects on east elevation

## DOCUMENT CHECKING

	Prepared by	Checked by	Approved by
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Signature	