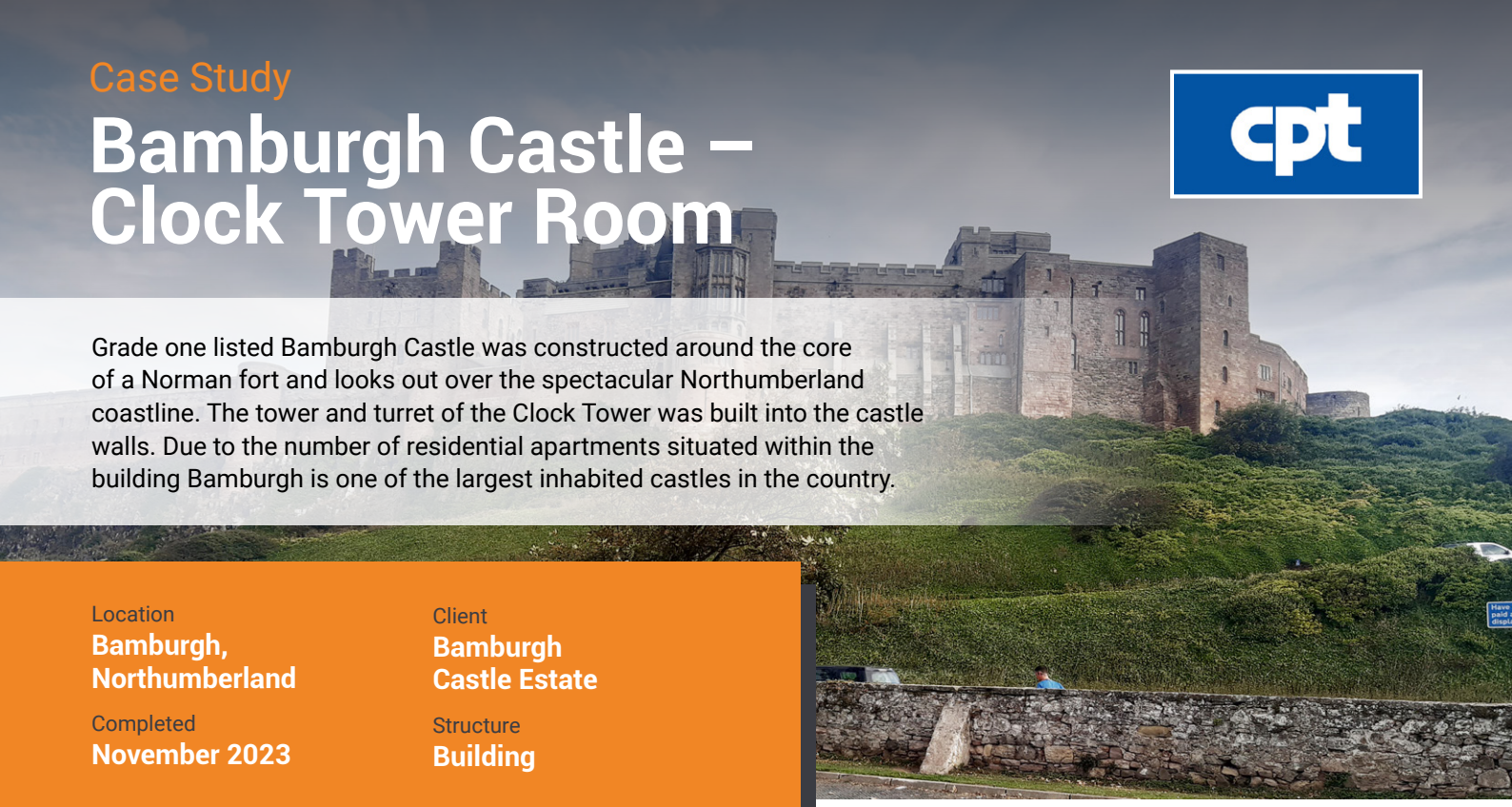
Case Study

Bamburgh Castle – Clock Tower Room



Grade one listed Bamburgh Castle was constructed around the core of a Norman fort and looks out over the spectacular Northumberland coastline. The tower and turret of the Clock Tower was built into the castle walls. Due to the number of residential apartments situated within the building Bamburgh is one of the largest inhabited castles in the country.

Location
Bamburgh, Northumberland

Completed
November 2023

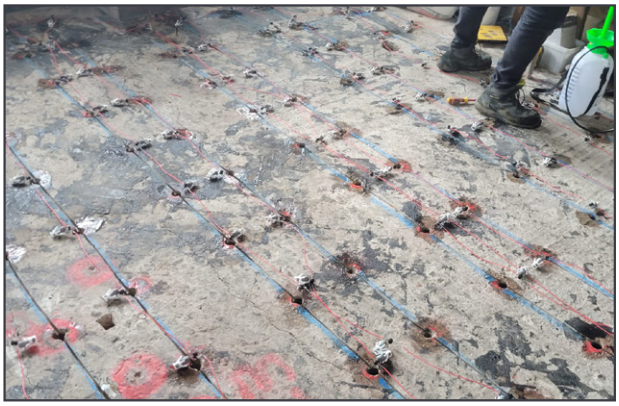
Client
Bamburgh Castle Estate

Structure
Building

The Problem Identified

The early 20th century replacement floor and ceilings of the Clock Tower comprise I sections encased within a clay pot and concrete slab. Corrosion had taken hold within the I sections, shifting the masonry brickwork externally & disrupting the render internally. Heavier corrosion was presenting on the external sections.

CPT were commissioned by Savills, on behalf of Bamburgh Castle Estate, to test a range of corrosion protection methods and, following analysis of the results, to design a comprehensive corrosion control system providing long term protection to the beams.

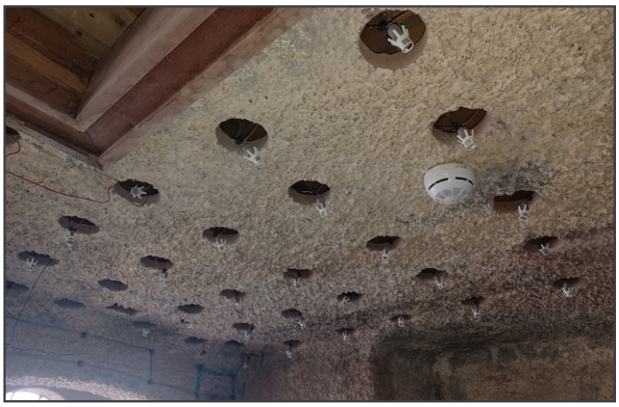


DuoGuard™ installation in floors

The Solution Developed

A DuoGuard™ hybrid anode system was installed to protect the tops, sides and bottoms of the I beams. Specifically angled DuoGuard™ anodes were buried within the concrete on either side of the beams, at staggered centres, with titanium feeder wire connecting the anodes to a monitoring enclosure. As an additional measure, DuoGuard™ Strip anodes were used in a couple of areas around the clock due to a lack of cover.

Using an external power source, an impressed current was applied to stop active corrosion and render the steel passive. The anodes were then disconnected from the power source to self-generate a galvanic current, sufficient to maintain steel passivity and control corrosion.



Angled anodes to ceiling

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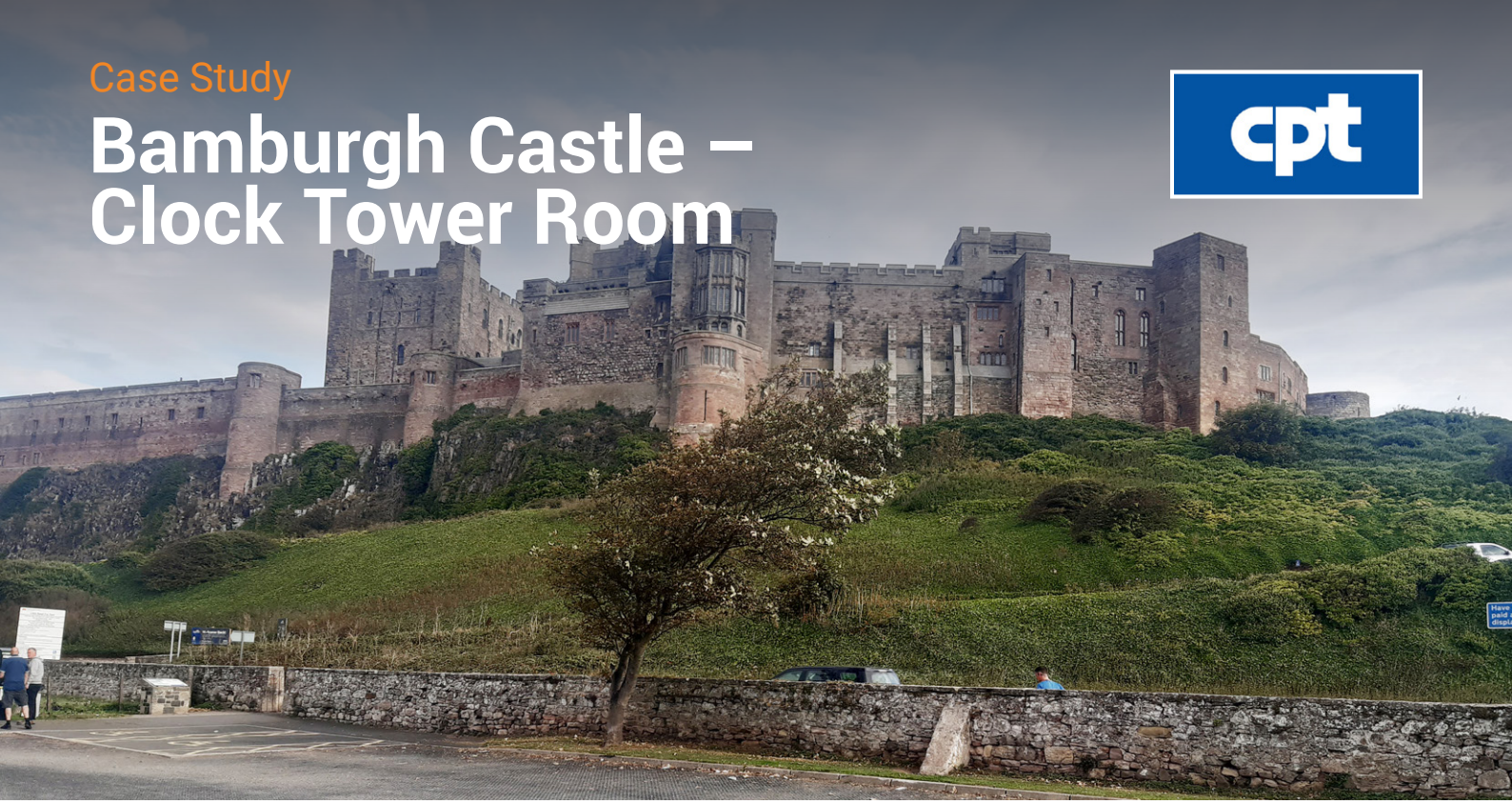

The system was installed throughout the Clock Tower room, including the deck, soffit and beams, where steel framework was located. The works included the measurement of polarised and de-polarised steel potentials, and anode zone currents to assess the functioning of the system. Manganese dioxide reference electrodes (MN15) were installed within anode zones across the structure to facilitate system monitoring.

The Benefits Provided

The CPT designed DuoGuard™ and DuoGuard™ Strip hybrid anode system at Bamburgh Castle has halted corrosion preventing further damage to the structure. The bespoke monitoring allows the performance of the corrosion control technology to be checked and supervised. Seven months after installation, monitoring confirmed that the hybrid cathodic protection system was working as per the design requirements.

DuoGuard™ hybrid anodes will provide cost effective corrosion control throughout the design life.

CPT are proud to have been involved in the refurbishment project at Bamburgh, one of the finest castles in the UK.

CPT Products Used

DuoGuard™ Anodes

DuoGuard™ Strip Anodes

Certificate Number 10159
ISO 9001, ISO 14001

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