SKANSKA COSTAIN STRABAG Working on behalf of HS2

1MC03 Main Works – Contract Lot S1

HERITAGE AGREEMENT METHOD STATEMENT (HAMS)-MONITORING AND CONSERVATION MANAGEMENT OF GROUND MOVEMENTS DUE TO BELOW GROUND CONSTRUCTION AT 16 PARK VILLAGE EAST - APD-ESCT-01

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1 Introduction

1.1 Project Context - Schedule 18: Listed Buildings

1.1.1 High Speed Two (HS2) is a network of new high speed lines across Britain: Phase One connects London with Birmingham and the West Midlands. Powers to construct and operate the railway have been secured through the High Speed Rail (London – West Midlands) Act 2017 (the Act), which received Royal Assent on 23 February 2017.

1.1.2 The Secretary of State has appointed High Speed Two (HS2) Ltd as the nominated undertaker responsible for delivering Phase One of HS2. HS2 Ltd is an executive non-departmental public body, sponsored by the Department for Transport.

1.1.3 Skanska Costain Strabag Joint Venture (SCSjv) is the Main Works Contractor constructing thirteen miles of twin-bore tunnels on the HS2 route to its southern terminus at Euston.

1.1.4 Schedule 18 'Listed Buildings' to the Act concerns how legislation in respect of listed buildings under the Planning (Listed Buildings and Conservation Areas) Act 1990 ("the 1990 Act") applies to the Phase One works. Paragraph 1 of Schedule 18 disapplies aspects of this legislation from the Phase One works. There is no requirement for listed building consent for the purpose of:

- demolition, alteration or extension in respect of the listed buildings set out in Schedule 18 Table 1, or which are listed on or after 30 September 2013
- heritage or monitoring works in respect of the listed buildings set out in Schedule 18 Table 2, or which are listed on or after 30 September 2013.

1.1.5 Following Royal Assent, HS2 Ltd entered into Heritage Agreements with London Borough of Camden and with Historic England (dated 20th February 2017) concerning the Schedule 18 listed buildings within the London Borough of Camden.

1.1.6 Clause 2.1 of the Heritage Agreement permits HS2 to undertake works to Schedule 18 listed buildings, subject to a Heritage Agreement Method Statement (HAMS). This details the proposed works and is submitted to the local authority for their approval, in consultation with Historic England where required.

1.2 Purpose

1.2.1 This HAMS:

- addresses the requirement of Clause 2.1 of the Heritage Agreement to submit a method statement describing heritage and monitoring work designed to protect heritage significance and avoid or minimise harm to the historic fabric and setting of 16 Park Village East during below ground construction work (tunnelling). It outlines an

asset protection management strategy, design rationale and technical method statement for:

- installing monitoring devices
- for undertaking generic remedial repairs to historic fabric
- arranging urgent temporary works if building damage predictions are exceeded and present additional risk to building structure/serviceability.

- is the subject of a Schedule 18 application requesting approval for the monitoring and conservation management of ground movements due to below ground construction at 16 Park Village East. This Schedule 18 application is prepared according to procedures set out in HS2 Phase One Heritage Consents Strategy (HS2-HS2-EV-STR-000-000008).

1.2.2 The HAMS informs:

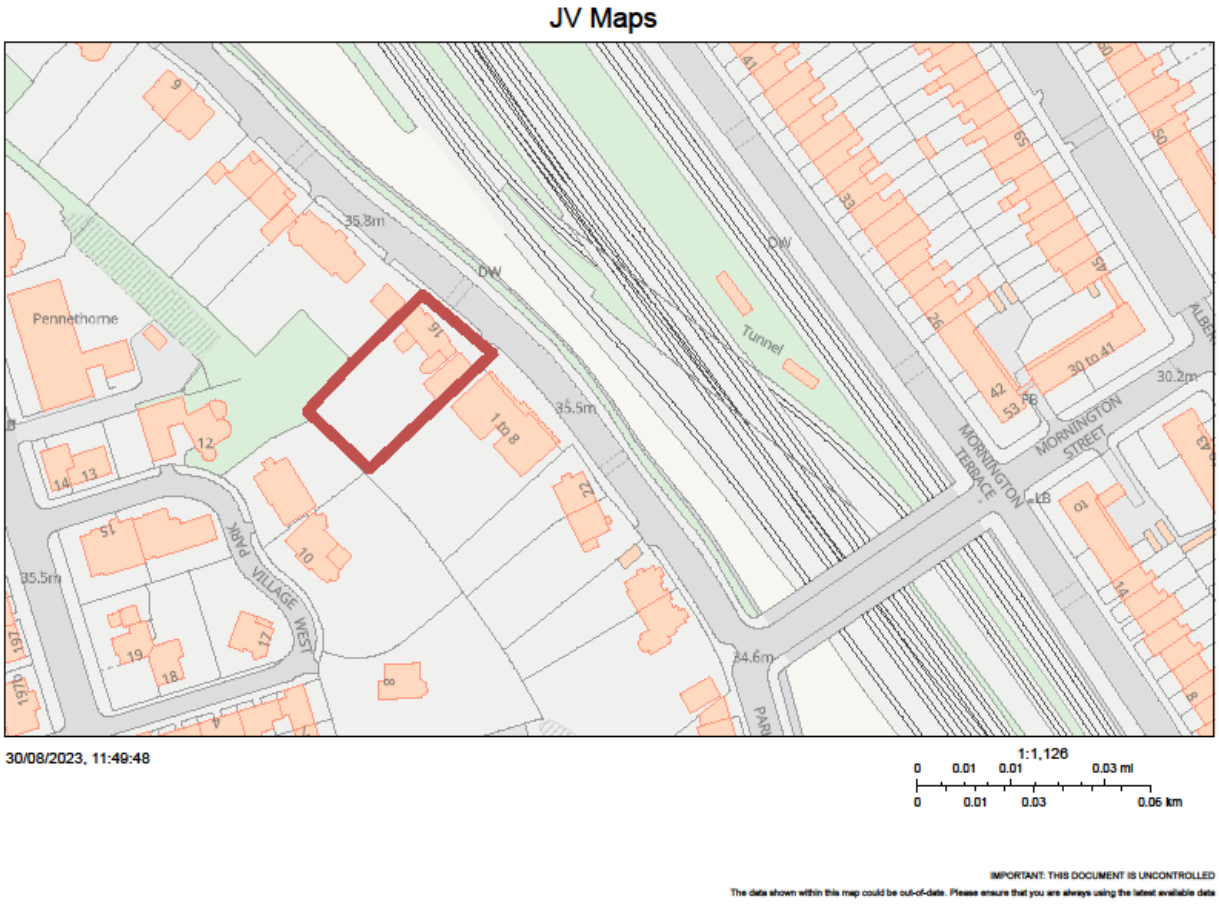
- stakeholders, including the consenting authority - it explains how SCSjv will:
  - avoid or minimise harm to heritage significance during tunnel construction through the careful installation and operation of building movement monitors at 16 Park Village East
  - use monitoring information to manage timely responses to building movement and undertake conservation repair works at 16 Park Village East.
- Asset Protection Team - describe heritage conservation measures to be incorporated in sub-contractors' Risk Assessment and Method Statements (RAMS) when undertaking works for heritage and monitoring purposes at 16 Park Village East.

1.2.3 This HAMS contains the following information:

- an up-to-date location plan (figure 1)
- statement describing the heritage significance of the listed building (section 4 Building Information)
- a description of the relevant HS2 below ground construction works and predicted building damage (section 5. Asset Protection – Design Rationale)
- a specification for the proposed monitoring instrumentation and a method statement for installation, maintenance, removal and conservation repairs (sections 7 Monitoring)
- drawings at a suitable scale showing the specified instrumentation locations (Appendix A).

1.2.4 This HAMS also describes a mitigation strategy (section 6 Mitigation) and conservation management plan (section 8 Conservation Management). It further defines arrangements for undertaking predicted remedial repair to avoid or minimise the potential risk of harm or loss of heritage significance at the listed building.

Figure 1 Site location (not to scale)



1.3 Scope

1.3.1 16 Park Village East is a detached 3-storey masonry building (with lower ground floor plus a second floor/ roof conversion) on the west side of the Network Rail (NR) cutting approach to Euston Station (figure 1 (based on 1:560 OS)).

1.3.2 16 Park Village East grade II* listed building (list entry 1322056) is included in Schedule 18 (Table 2: Buildings authorised to be altered or extended for heritage or monitoring purposes).

1.3.3 The property is situated on the west side of Park Village East, facings the Network Rail (NR) cutting approach to Euston Station (figure 1 shows property boundary on a 1:1250 scale OS map base). It is a one of 16 villas (12 semi-detached and 4 detached) surviving within the historic Park Village East suburb.

1.3.4 This method statement covers temporary arrangements, during and following HS2 permanent construction works. It is a precautionary procedure to ensure appropriate measures to protect the asset can be deployed and engaged to prevent harm to heritage significance.

1.3.5 Procedures are described that will identify ground movements and consequent building structural responses so that appropriate protective measures can be deployed and engaged to prevent harm to heritage significance.

1.3.6 Specifically, monitoring instruments will provide data to inform remedial measures that are further outlined in this method statement as dynamic components of a conservation management plan designed as a response to HS2 tunnel construction.

1.4 Engagement

1.4.1 HS2 Phase One Heritage Consents Strategy (Document no.: HS2-HS2-EV-STR-000-000008) require pre-submission discussion with the relevant local authority and Historic England (where applicable) on works affecting Schedule 18 listed buildings. The purpose of this discussion is to agree action to protect the significance of Schedule 18 Listed Buildings.

1.4.2 Pre-submission consultation with London Borough of Camden and Historic England on proposals for temporary installation of monitoring devices by fixing to the listed building occurred during a regular monthly meeting held on 1 February 2023.

1.4.3 In response the London Borough of Camden Senior Planner (Conservation) advised SCS Railways that a HAMS for 16 Park Village East monitoring and conservation management should be submitted for Schedule 18 consent.

1.4.4 The Camden conservation team have further advised on the proposals detailed in this HAMS. The monitoring and conservation management design set out in the HAMS benefits from the technical advice received.

The Crown Estate

1.4.5 HS2 asset protection monitoring, and remedial repair works to 16 Park Village East detailed in this method statement are incorporated in a Global Agreement covering arrangements at The Crown Estate Park Village East freehold properties.

1.5 Assumptions & Limitations

1.5.1 This method statement uses information generated by SCSjv/Design House, SCSjv sub-consultants and sub-contractors and from online resources available at the time of writing.

1.5.2 The SCS Asset Protection, Engagement and Monitoring Teams visited the site to undertake internal measured survey, external inspection and a CCTV drainage survey. Further sources of information include historical building plans & sections obtained from the London Borough of

Camden. Information and images presented in this method statement include the result of these site observations and surveys.

1.5.3 Relevant technical guidance and analysis that informed the preparation of this HAMS includes:

- HS2-HS2-CV-STD-000-000004 P04 Technical Standard - Civil Engineering Instrumentation and Monitoring ·
- HS2-HS2-TN-STD-000-000005 P06 Technical Standard - Ground movement and assessment from underground construction
- HS2 Specification for Civil Engineering Works' Series 4500 – Instrumentation and Monitoring' (HS2-HS2-CV-SPE-000-014500)
- HS2-H S2-EN-STD-000-000009Technical Standard – Sound, Noise and Vibration Instrumentation and Monitoring · High Speed Rail London-West Midlands)
- HS2 Environmental Minimum Requirements Annex 1: Code of Construction Practice Para 13.2.18 to 13.2.31 https://www.gov.uk/government/publications/environmental-minimum-requirements
- SCSjv Designers Monitoring Plan - Euston Throat West Building Assets - Asset Protection Area East - S1. Document no.: 1MC03-SCJ_SDH-GT-PLN-SS01-000002
- The Crown Estate Guidelines and Standard Specification to Architects for the Regent's Park, Kensington Palace Gardens, St. James's, Pall Mall South, Haymarket and Lower Regent Street Residential and Commercial Estates, Seventh Edition January 2014

2 Definitions and abbreviations

Table 1 – List of abbreviations and definitions used in this document

Abbreviation	Definition
APES	Additional Provision Environmental Statement
CARE	Conservation Accreditation Register of Engineers)
DC	(Building) Damage Category
DH	Design House
EMR	Environmental Minimum Requirements
ES	Environmental Statement
GIS	Geographical Information Systems

Abbreviation	Definition
GMA	Ground Movement Assessment
HAMS	Heritage Agreed Method Statement
HS2	High Speed 2 Ltd
ICE	Institute of Civil Engineers
I&M	Instrumentation and Monitoring
OS	Ordnance Survey
PDF	Portable Document Format
NR	Network Rail
RAMS	Risk Assessment Method Statement
CSjv	Skanska Costain Joint Venture
SCL	Sprayed Concrete Lining
SCSjv	Skanska Costain Strabag Joint Venture
SES	Supplementary Environmental Statement
TBM	Tunnel Boring Machine

3 Responsibilities

3.1 Management and design

3.1.1 HS2 is responsible for meeting commitments described in HS2 Information Paper C3: Ground Settlement. Following the processes set out in C3, SCSjv has considered how harm to third party property assets can be avoided or minimised in advance of tunnel construction and has planned appropriate remedial works during or following construction.

3.1.2 Asset Protection activities within each SCS contract area are the responsibility of the SCSjv Area Technical Lead, supported by the Asset Protection core team, including the SCSjv Heritage Technical Lead.

3.1.3 Technical design specialists provide additional support:

- Watts (2021) SW1-100 WP166 Pre-construction Condition Surveys 16 Park Village East, London, NW1 7PX, Document No: 1MC03-SCJ_WGL-PM-REP-S000-000378
- Byrne Looby (2021) Surveys for Design Assessment [Heritage] 16 Park Village East, London, NW1 7PX, Document no.: 1MC03-SCJ_OTB-PM-REP-S000-000289
- Design House (DH):

- (2024) Phase 3 Ground Movement Assessment S1 (1MC03-SCJ_SDH-GT-REP-SS01_SL03-000018 - C04) provided by, using baseline data simulating the phased construction of the excavation and tunnelling works obtained from the 'North' and 'Central' ETW LS-DYNA models
- (2024) Detailed Mitigation Design Report - 16 Park Village East - Asset Protection Area East - Section 3 - S1 Document no.: 1MC03-SCJ_SDH-GT-REP-SS01-000009 – C02
- (2024) Designer Monitoring Plan - 10 12 14 16 26 28 Park Village East – Asset Protection Area East - Section 3 – S1 Document no: 1MC03-SCJ_SDH-GT-REP-SS01-000012 – C02
- (2024) Phase 1 Geotechnical Desk Study (Doc. No. 1MC03-SCJ_SDH-GTNOT-SS01_SL03-000014).
- (2024) Technical Note - Phase 2 Geotechnical Desk Study – Park Village East Wall S1 Document no.: 1MC03-SCJ_SDH-GT-NOT-SS01_SL03-000015).

4 Building Information

4.1 Asset Identification

4.1.1 16 Park Village East is one of the 3-storey detached residential villas laid out between 1824 and 1832 to John Nash's Regent's Park village suburb design (figure 2). All twelve surviving residential properties are jointly grade II* listed.

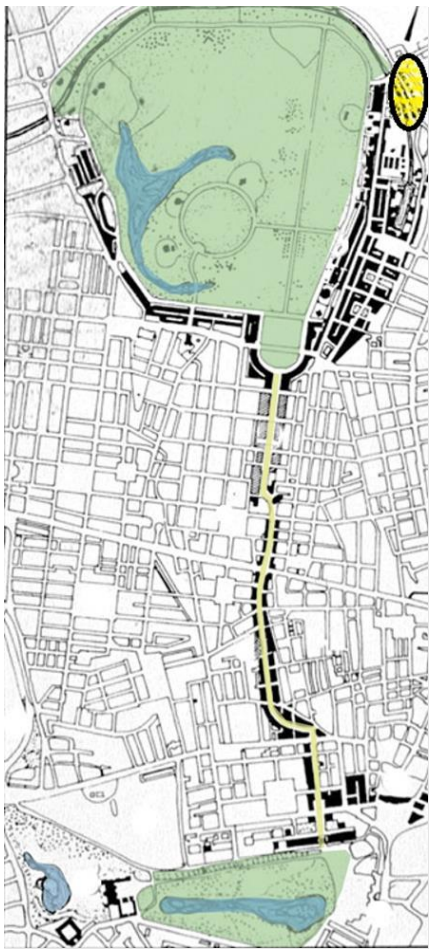
4.1.2 Originally the street also included villas on the east side. These directly overlooked fields that shortly later became a corridor for the London to Birmingham Railway. These villas were subsequently removed to accommodate expansion of the rail cutting at the beginning of the 20th century. As a result, 16 Park Village East, like the other surviving Nash villas, faces the parapet wall of the expanded railway cutting rather than the intended semi-rural setting.

Figure 2 16 Park Village East front and rear elevations

4.2 Extent & Context

4.2.1 Nash's Regent's Park masterplan envisioned a place of leisure for London's social, political and aristocratic elite. It provided ornamental parkland for the exclusive use of residents of villas and grand terraces bordering the Park to the east, south and west (figure 3). The parkland comprised a huge circle and central lake. Intended to contain a Royal summer palace, it was linked by a processional boulevard (Broad Walk/Portland Place/Regent's Street) to the Prince Regent's London residence at Carlton House.

Figure 3 Plan based on Regent's Park masterplan (Park Village East highlighted)



4.2.2 The palatial neoclassical Gloucester Terrace, Cumberland Terrace and Chester Terrace occupy the eastern edge. The neighbouring Park Villages (East and West), located to the north east, are designed as suburbs of Italianate and Tudor-Gothic villas.

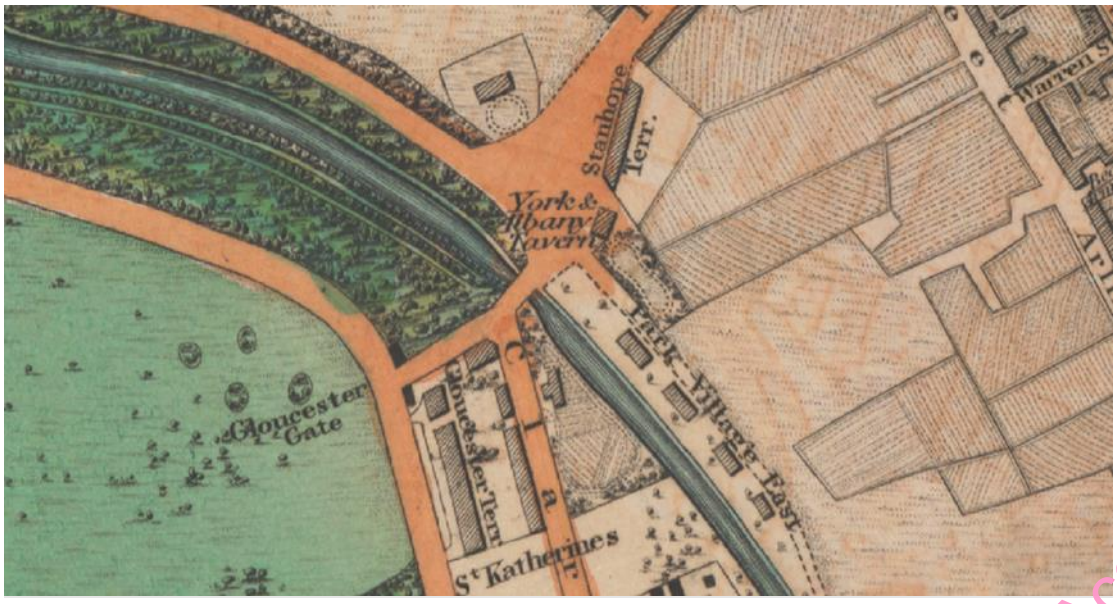
4.2.3 Both Park Village villa suburbs were developed as Nash's own personal speculative private venture, with individual properties built progressively to match demand. He infilled two small building leases of otherwise limited commercial interest, to create London's first architect

designed villa suburb. On his death the suburbs were completed by his protégé and successor James Pennethorne.

4.2.4 At Park Village East, semi-detached cottages designed to look like mansions and detached villas, each in spacious gardens, originally lined both sides of a serpentine street. 16 Park Village East is on the surviving even numbered side. The architecture of each principal façade was intended to respond to the contrasting character of a dual aspect provided by:

- the Collateral Cut, a branch of the Regent's Canal which terminated to the south at Cumberland Basin and Cumberland Market (figure 4). Nash referred to this as a 'wooded valley', providing a treelined waterfront setting to the west and dividing Park Village East from is sister suburb at Park Village West;
- streetscape and the former greenfield land beyond, overlooking the Southampton Estate which separated Park Village East villas from the nascent Camden Town and provided a semi-rural aspect to the east (figure 4).

Figure 4 Greenwood Map of London 1828 (detail showing York & Albany Tavern, Stanhope Terrace (Parkway) and 6-16 Park Village East)

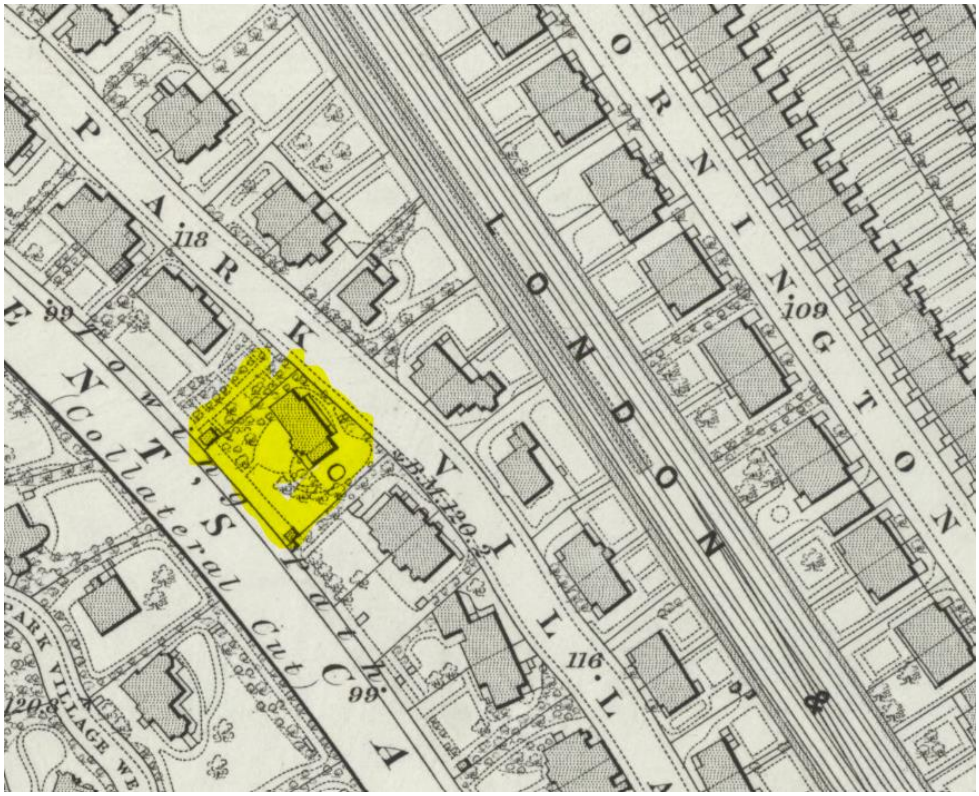


4.2.5 The 1838 opening of the London to Birmingham Railway dramatically changed the Park Village East setting (figure 5). The railway emerged from a tunnel into a cutting that followed the rear garden boundary to the villas on the east side of Park Village East. Railway construction coincided with start of development of residential streets on the Southampton Estate immediately to the east.

4.2.6 Housing development continued concurrent with railway construction until the Southampton Estate fields were completely infilled. At Mornington Terrace semi-detached villas bordered

the east side of the cutting applied a similar design code to that used by Nash, in effect mirroring Park Village East (figure 5). Together with Albert Street, Arlington Road and Delancey Street a new pattern of contiguous residential streets linked Regents Park and Camden High Street via numerous railway crossings.

Figure 5 1870 Ordnance Survey



4.2.7 Expansion of the London & North Western Railway (LNWR) railway cutting occurred between 1900 and 1905. Thirteen semi-detached villas on Mornington Terrace and the adjoining railway retaining wall were demolished to widen the cutting. A further twenty detached and semi-detached Park Village East villas, along with Stephenson's railway cutting retaining wall, were demolished on the west side (figure 6). Mornington Street Railway Bridge, a steel bridge with brick vaulting supporting an asphalt deck with brick parapets, provided a new Camden Town gateway to Park Village East. It replaced the Serpentine Road Bridge connecting Park Village East to Mornington Crescent and also Stanhope Road Bridge connecting Mornington Terrace through to the New Road (Euston Road), via Stanhope Road which formed the Southampton Estate boundary along the east side of Nash's Cumberland Market, Clarence Gardens and Munster Square.

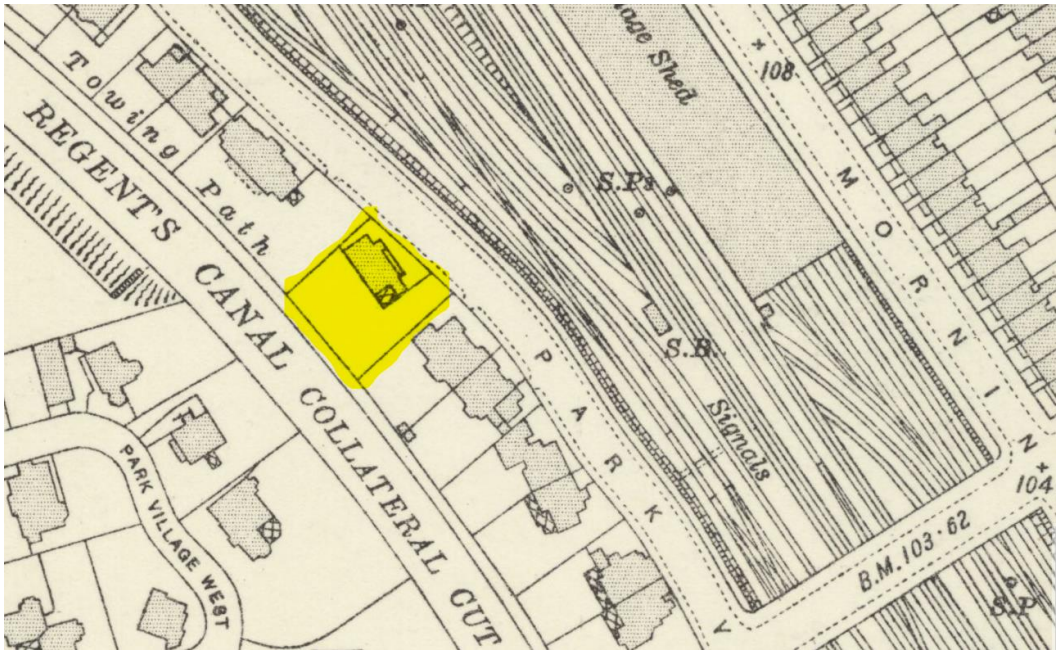


Figure 6 1915 Ordnance Survey

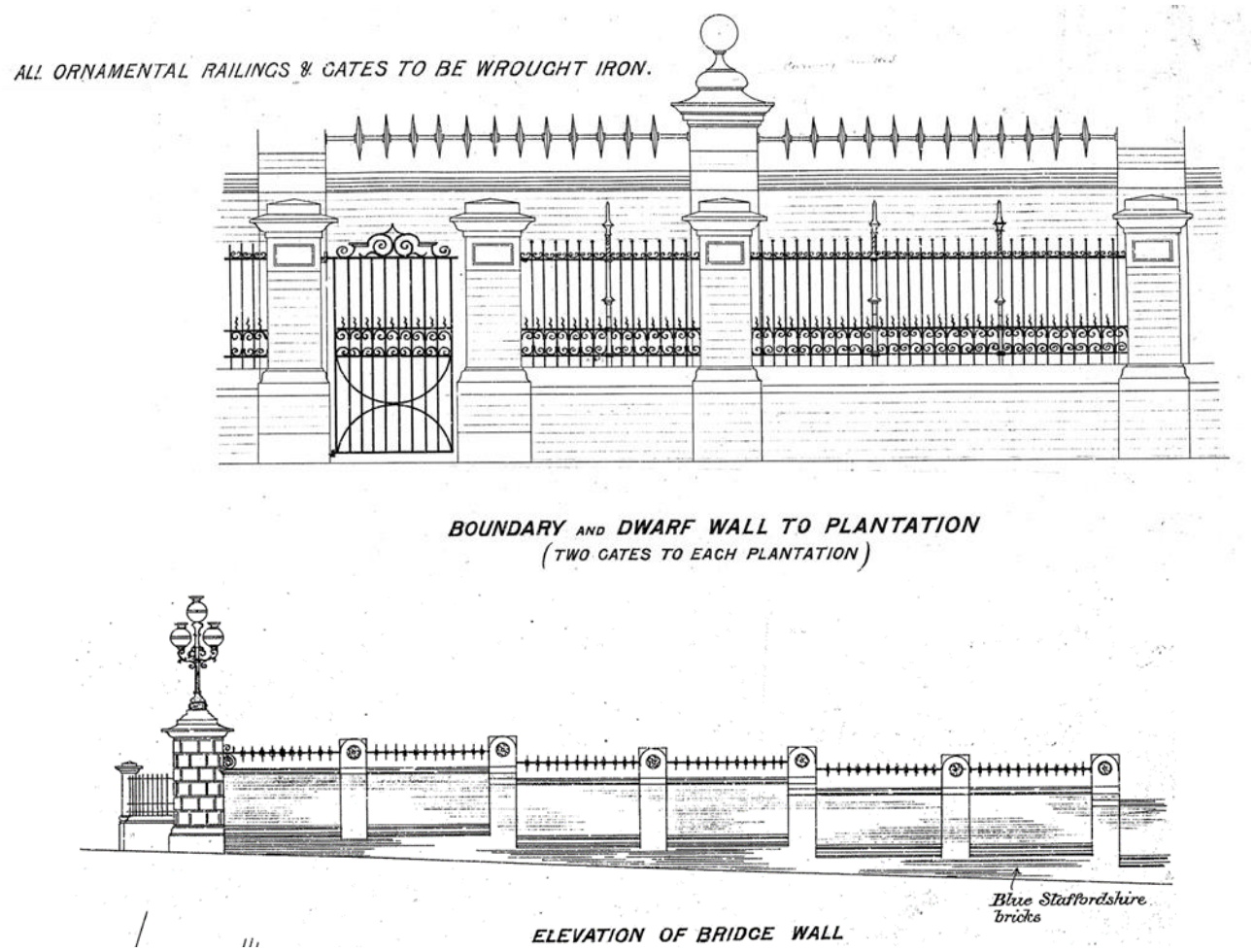
4.2.8 The new 60 m wide 17m deep cutting was supported by monumental brick retaining walls that employ closely spaced shallow buttresses, carried up to form piers with decorative ball finial stone caps at street level. Architectural design aesthetics match the quality and refinement of Stephenson's older work but use blue engineering brick instead of the earlier red stock brick; does not rely on the curved batter for structural integrity; and at street level replaces Stephenson's distinctive open decorative iron railing with brick panels. A section of the original walls retaining wall survives on the east side of the cutting in the approaches to and throughout the Upper Parkway tunnel. Sections of original railing survive along the parapets to the rear of some of the adjoining properties, including 57 Mornington Terrace.

4.2.9 Designed as a single architectural scheme, Mornington Street Bridge and the cutting retaining walls express an innovative urban design that integrated the railway into the historic, social and architectural fabric of Camden Town and Regent's Park:

- at street level the Park Village East retaining wall incorporates architectural features that complement the immediate neighbouring streetscape, using a red brick facing and dressed Portland stone coping and ball finials (figure 7). A matching dwarf wall, originally designed with brick piers to support ornate metal railings and gates, forms planting beds for shrubs and trees, intended to soften the imposing street level retaining wall and maintain Nash's 'wooded valley'
- similar architectural and landscaping refinements are omitted from the Mornington Terrace retaining wall on the Camden side of the cutting, which simply continues the

blue engineering brick materiality and detailing of the cutting through to the street level parapet, finishing with a simple stone coping.

Figure 7 'L.&.N.W.R. EUSTON WIDENING Details of Boundary walls and Ironwork', 1900. (Source: Network Rail Archives)



4.2.10 During World War II many of the nearby Regent Park terraces provided office accommodation for the UK Ministry of Works. The area suffered heavy bombing during the 1940 London Blitz, including extensive damage to a number of Park Village East properties and associated townscape (figure 8 The London County Council Bomb Damage Maps 1939- 1945, Page 49). and 2010/3675/P).

Figure 8 – London Bomb Damage 1945 (based on 1916 OS)

Key:

BLACK – Total destruction

PURPLE – Damaged beyond repair

DARK RED – Seriously damaged; doubtful if repairable

LIGHT RED – Seriously damaged; but repairable at cost

ORANGE – General blast damage; not structural

YELLOW – Blast damage; minor in nature

4.2.11 Subsequently The Crown Estate determined that:

- 16 Park Village East rated as "Seriously damaged but repairable at cost"
- 18 and 20 Park Village East were damaged beyond repair and demolished
- 22 and 24 Park Village East were rated as "Seriously damaged but repairable at cost"
- the dwarf wall forming the planter north of Mornington Street Bridge was rebuilt but without previous ornate brickwork, architectural stonework or iron railings. Railings were also removed and associated ornate brick piers reduced to the level of the planter along the sections south of Mornington Street Bridge, so only the dwarf wall was retained
- the canal was infilled in 1940. Gardens of Park Village East were extended to incorporate the towpath and canal. Viewed from Gloucester Gate Bridge the infilled canal bed now appears as a secluded and semi-wild area of mature trees and

undergrowth.

4.2.12 16 Park Village East is assumed to have been part of the post-war reconstruction undertaken by the newly created The Crown Estate. This change in governance coincided with the controversial 1950-60s reconstruction of the Nash Regent's Park Terraces and transfer of ownership of 32 acres of land to St Pancras Borough Council, which it redeveloped as social housing i.e. Cumberland Market and Regents Park Estates.

4.2.13 The property gained a detached garage by the early 1950s and there have since been further substantial modifications to the property (further detailed in 4.3.7 below).

4.3 Description

4.3.1 The Historic England list entry provides a brief architectural description:

PARK VILLAGE EAST (West side) 4 Nos.2-16, 22-34, 36A & B (Even) and attached railings

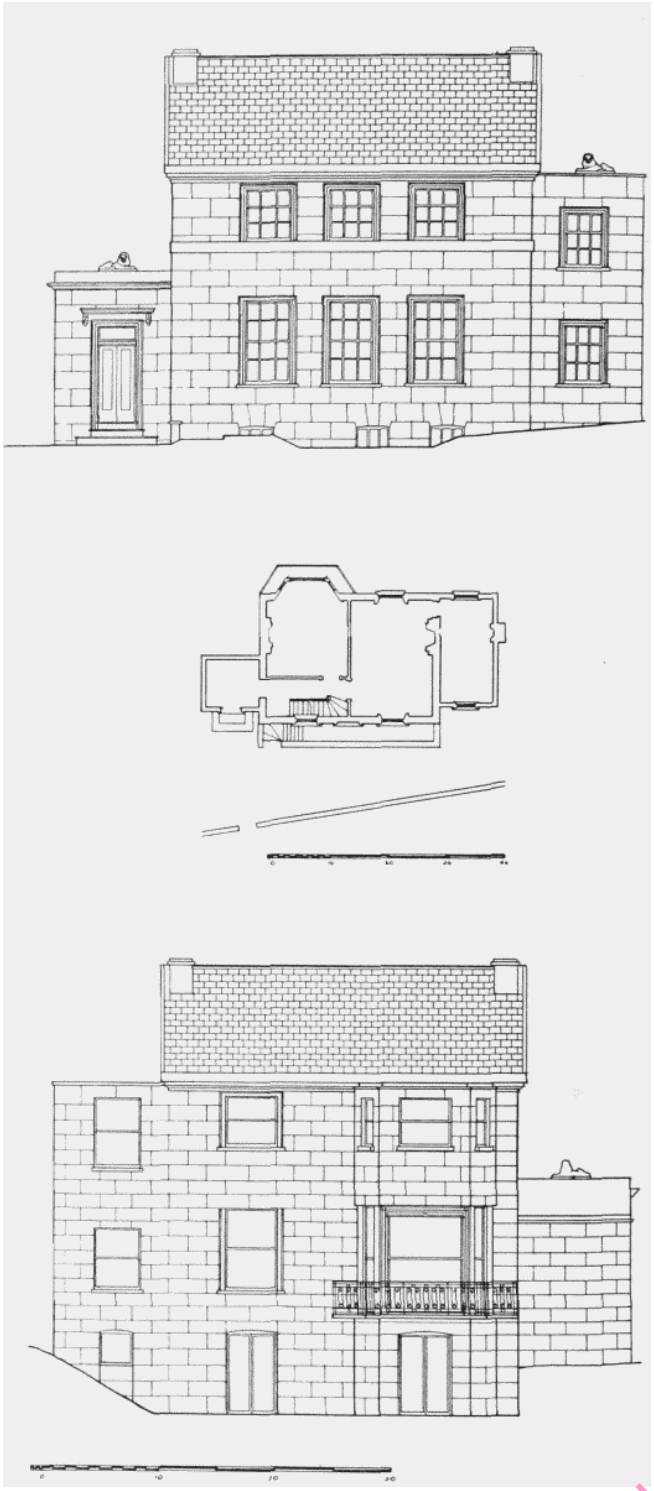
Street of 12 semi-detached and 4 detached, related villas. 1825-36. Designed and laid out by John Nash and his assistants. For the Commissioners of Woods, Forests and Land Revenues. Picturesque series of 2 and 3 storey stucco detached villas of varying styles.

No.16: detached villa. Stucco with slated pitched roof having boxed out eaves. 2 storeys 3 window centre with 1 window recessed wing to north and single storey porch extension to south. Square-headed, architraved doorway with wooden panelled door, overlight and bracketed cornice over. Cornice and blocking course to extension. Central block with plain stucco 1st floor sill band. Architraved sashes to all floors. SUBSIDIARY FEATURES: attached cast-iron railings on low brick wall.

4.3.2 The Survey of London (1949) describes the exterior architectural composition based online drawings prepared by Miss B. G. Bryan Brown for the National Buildings Record (figure 9). The National Buildings Record was created in 1941 to collate and create photographic and drawn surveys of historic or significant buildings deemed to be under threat from bombing, so that, in the event of a building's destruction, a record of it would be preserved. It was initially based at the Royal Institute of British Architect (RIBA) offices at 66 Portland Place.

No. 16 .... a detached building. Its detail is entirely classical, but apart from the symmetrical placing of the three sash windows on each of the two floors of the front elevation, it is designedly irregular. The square centre block is divided into two rooms with a staircase hall in front of the southern one approached by a large, enclosed porch which forms a low wing to the south. To the north is a two-storeyed wing with an additional room. Both wings are finished with a parapet carrying a couchant lion. The back elevation (of three storeys) has a bay window the full height with balcony to the middle floor.

Figure 9 - Survey of London (from National Building Record)



4.3.3 Much like the National Building Record collection, the Pilgrim Trust's 'Recording Britain' project was set up at the outset of war. It employed artists on the home front to capture a record of British lives and landscapes at a time of imminent change. Phyllis E Ginger's watercolour 'Park Village East, Albany Street. NW1' is part of the collection now held by the V&A Museum (figure 10). It depicts Park Village East closed, possibly due to bomb damage, with a barrage balloon in the distance. It captures both a sense of impending threat that proved to be so destructive and an appreciation of the villa setting as an elegant design relationship between the Regency picturesque and an Edwardian interpretation of architectural classicism expressed in the LNWR Mornington Street Bridge and the Park Village East cutting retaining wall and planter.

Figure 10 Phyllis E Ginger's watercolour 'Park Village East, Albany Street. NW1'

General arrangement

4.3.4 16 Park Village East is a detached brick building on a sloping site comprising three storeys; two above street level and one below. The lower level is accessible via internal and external stairs and from the rear garden. A lightwell illuminates the lower ground rooms that outlook towards the street and incorporates a retaining wall that support the road, at the level that corresponds to the property ground floor.

4.3.5 From the front gate the main entrance to the house is via a door and ground floor entrance hall located in the original south wing that now extends into a recent 2-storey side/rear extension.

4.3.6 Street front, rear garden and side façades articulate a neo-classical architectural decorative stucco and glazing scheme that came to typify fashionable late Georgian and early Victorian tastes. Later detached garage/annex and side/rear extensions are similarly rendered and glazed to match.

Garden and boundaries

4.3.7 Beyond a paved patio area, the informal garden is laid out as lawn with mature trees and shrubs, sloping to the west, with a low brick wall creating a terrace to the incorporated section of former towpath and infilled canal bed at the far end:

- the boundary with 14 Park Village East is defined by a timber panelled fence
- the boundary to Nash House is defined by a rendered masonry wall
- the front boundary is a rendered low brick wall and piers with simple stone coping supporting iron railings and gates.

Later modifications

4.3.8 Alterations include:

- 1998 - construction of a pitched roof to the northern wing
- 1993 - erection of conservatory at lower ground floor level to rear of house together with internal alterations at ground floor level
- 1992 - installation of piled underpinning (extent unknown, assumed to pile raft extending to entire building footprint)
- 1990 - erection of a single storey extension to rear of garage to provide studio/annex.
- Post-war (date unknown):
    - addition of detached garage (figure 11)
    - insertion of dormer windows to rear roof and conversion of the loft to habitable space
    - 2 storey side/rear extension

Figure 11 Ordnance Survey 1952 (published 1953)

Interior

4.3.9 Designed as a modest family home the interior originally comprised three floors of living space, each with a specific set of functions. Later conversion of the roof space now provides accommodation over 4 levels:

- lower ground floor- kitchen, utility and domestic living spaces, inc. later garden conservatory extension
- ground floor - main reception rooms - drawing room, dining room and parlour or study. Later side extension provides a large sunroom.
- 1st floor - principal bedrooms
- 2nd floor – additional bedrooms

4.3.10 Documentary evidence and visual inspection highlight numerous internal alterations to 16 Park Village East. Modifications in plan form and room function reflect late 20th century lifestyle changes. Associated with substantial mid-late 20th century extensions, including roof conversion, two storey side extension, garden conservatory and detached garage/annex.

4.4 Setting

4.4.1 The setting contributes to historic and architectural interest at 16 Park Village East, especially in terms of its group value as part of the surviving Park Village East village suburb.

4.4.2 Park Village East:

- contributes to the wider significance of Regent's Park Conservation Area and is a key element to London's single largest and most comprehensive Georgian metropolitan improvement
- comprises an architect designed street of residential villas that represent innovation in elite late Georgian suburban planning, architecture and landscape design composition
- has been modified as a consequence of social and cultural interactions associated with 19th/20th century transport planning and urban design.

4.4.3 16 Park Village East has encountered dramatic changes in setting since construction, which applies equally to the neighbouring villas. Notably the loss of the canal, the 1901-1906 widening of the Euston Approaches railway cutting and associated demolition of the villas along the eastern side of Park Village East.

4.4.4 These complex changes disrupt the intended suburban setting but reflect culturally important early and mid-20th century urban design narratives that both clash and interplay with Nash's intended illusion of 'rus in urbe':

- the gentrified character, picturesque aesthetic and the variety of classic and traditional inspired architectural design employed at the Park Village East villas contributes a lingering sense of Nash's architectural and landscape design vision within a contemporary, dynamic urban environment;
- the villas express an architectural design vocabulary that represents fashionable late Georgian tastes. This informed subsequent Victorian and Edwardian urban design evident in surrounding streets. It particularly influenced the public realm interface of historic railway infrastructure, such as the materiality and the lighter style of classicism expressed in the 1900-1906 brick railway structures, such as Mornington Street Bridge.

4.4.5 Wartime impact to the setting that contributes to the significance of the Park Village East villas is unequivocal and remains apparent today. Modifications affect the historic and architectural interest of the once stylish Park Village East townscape, especially north of Mornington Street Bridge. Portland Stone architectural flourishes to the parapet wall were removed and a utilitarian low brick planter wall built to replace the brick and Portland Stone plinth and piers supporting ornate ironwork railings. Latterly the planting has reverted to scrub.

4.5 Condition

4.5.1 The original primary east (street) façade to 16 Park Village East appears largely unaltered since construction. The west (garden) façade retains its original features including ground floor iron railed balcony and accommodates prominent side/rear/conservatory extensions.

4.5.2 16 Park Village East is in good condition internally and externally:

- evidence of repairs to minor hairline cracking to internal and external plaster finishes
- evidence for local water egress
- stucco appears to be in good condition. Historic crack repairs, including to door opening on front façade, do not show signs of subsequent movement

4.6 Significance

4.6.1 Park Village East is integral to the Regent's Park masterplan designed by the noted Regency architect John Nash in 1825-36. Notwithstanding the latter additions and modifications, 16 Park Village East and its neighbours possess intrinsic architectural and historic interests, but derive most of their significance from their place within the wider Park Village East composition

4.6.2 Nash's quirky mix of Neoclassical and Tudor-Gothic exteriors were hallmarks of his vision for a verdant and stylish residential suburb. The picturesque style "rus in urbe", playfully blending classical architectural styles and motifs, proved highly fashionable in the early first half of the 19th century.

4.6.3 Nash's quaint yet sophisticated conception of an idealised landscape composition as a setting for highly stylised domestic architecture influenced the design and layout of early Victorian villa suburbs (Tyack 1993, p74), including Decimus Burton's Calverley estate at Tunbridge Wells (1828-39), Rock Park in Birkenhead (1837-50) and the Park estate in Nottingham (1829-1918).

4.6.4 The setting retains elements of the original design alongside modifications associated with railway expansion. Taken together these design elements illustrate a pivotal moment of social and cultural change at the beginning of the 20th century. The 1900-1905 demolition of the early 19th century villas on the eastern side of Park Village East appears audacious but is perhaps in part a reflection of Nash's tarnished reputation at the time and growing public confidence and support for the expanding railway network.

4.6.5 Historic railway infrastructure introduced townscape features definitive of the railway age, such as railway bridge and cutting retaining walls (all locally listed), that represent a design aesthetic inspired by both Stephenson's engineering and Nash's Park Village East architectural style and setting. The subtle use of materials and stylistic details highlight

historic, geographical, and social distinctions embodied in the respective identities of Regent's Park and Camden Town.

4.6.6 Such bold engineering design expressed in restrained stylistic refinements is a celebration of early 20th century national transport infrastructure promoting physical and socio-economic mobility. The introduction of a refreshed classical architectural design, whilst also acknowledging the diverse character of local communities, captures the disruptive impact of the railway as an agent of modernisation.

4.6.7 Notably this juxta position with the epitome of Regency architectural design associated with elite privilege at the apex of a more rigid social hierarchy makes a positive contribution to the significance of the Park Village East listed villas.

4.6.8 The key architectural and landscape design features that contribute to the significance of Nash's 16 Park Village East include:

- a dual aspect design of stuccoed façades contributes to an experience and appreciation of Nash's vision of the 'picturesque' by responding to differences in landscape design associated with the east and west facades. The relative simplicity of the slightly asymmetric east facing street elevation contrasts with the more expressive elevation on to the gardens that originally overlooked the tow path to the former Collateral Cut, a spur off the Regent's Canal directly west of the properties. An external ground floor balcony adds character and variety to the way in which this aspect of the house and garden was/is experienced. Despite the loss of waterside setting, the former presence of the canal is still discernible as an overgrown lower garden 'terrace'.
- the property is surrounded by trees in a relatively quiet, tranquil part of London that still evokes a sense of the suburban picturesque.

4.6.9 The key features of the later setting that contribute to the significance of 16 Park Village East are shown in figure 10, including:

- matching pairs of decorative Portland stone piers and ornate iron lamp standards (grade II listed) frame the access points to Mornington Street Railway Bridge, which serves as a gateway to the Crown Estate via Park Village East
- planting beds, originally contained within ornate ironwork railing (now removed), retain shrubs and trees to soften the imposing street level parapet to the railway cutting fronting Park Village East, maintaining Nash's concept of a 'wooded valley'.
- the Park Village East parapet south of Mornington Street Bridge retains architectural features honouring late classism that formerly extended along Park Village East, which defined the streetscape, including the use of red brick, Portland stone coping and Portland stone ball and finials.

- similar architectural and landscaping refinements are omitted from the retaining wall on the east side of the cutting, reflecting historic social and cultural demarcations.

4.6.10 Post-war urban restoration following extensive bomb damage, and the infilling of the Collateral Cut resulted in the loss of the waterside aspect to the setting. In addition, loss or change to the original 1901-1906 railway expansion architecture and decorative design, and compromises in the quality of post-war design, materials and workmanship of urban realm, are all factors of the setting that detract from significance.

4.6.11 The contribution of historic interests to the significance of 16 Park Village East benefits from archival sources specifically intended to document places and property at risk of war-time destruction. These are important documents in terms of understanding the buildings but also have significance as representing conservation work undertaken by women engaged in wartime roles on the National Buildings Record and the Pilgrim Trust's 'Recording Britain' programmes.

4.6.12 Internal features of historic and architectural interest at 16 Park Village East include early or original sash windows. Also plaster cornices, ceiling rose and decorative fireplaces to ground floor. Other interests include the main staircase.

4.6.13 Externally the stucco render, whilst not ornate, is a significant feature of the building, as are the rendered chimneys, slate roof and projecting eaves. Also, the decorative timber and metal work, includingthe metal railings/ balustrades to the front boundary and the rear balcony.

5 Asset Protection - Design Rationale

5.1.1 The process for determining potential harm to property because of ground movement caused by HS2 underground construction has defined the scope of works set out in this method statement.

5.2 Technical Standard

5.2.1 HS2 Technical Standard HS2-HS2-TN-STD-000-000005 – Ground Movement and Assessment from Below Ground Construction details a three phase Ground Movement Assessment (GMA) process.

5.2.2 16 Park Village East is located within the HS2 project zone of influence, as defined by Phase 2 GMA 1mm contour and is at risk due of potential structural movements induced by HS2 construction. The asset is a Listed Building located within the 1mm contour area, a sensitivity criterion that requires a Phase 3 GMA.

5.3 Phase 3 Ground Movement Assessment

5.3.1 Phase 3 GMA (1MC03-SCJ_SDH-GT-REP-SS01_SL03-000018 C04) considered structural and heritage impact to 16 Park Village East due to permanent construction works:

- Euston Tunnel (TBM)
- Sprayed Concrete Lining (SCL) Crossover Tunnels
- Euston Cavern Shaft
- Euston Cavern
- Connections between Euston Cavern, Euston Cavern Shaft and SCL tunnels.

Building Damage Assessment

5.3.2 The Phase 3 GMA includes a Building Damage Assessment based on material properties consistent with the building typology and age. Burland et al. (1977) define six damage categories that distinguished between three principal criteria:

- Burland damage categories 0 to 2 only - affects to visual appearance
- Burland damage categories 3 & 4 – affects to serviceability or function
- Burland damage category 5 - affects to building stability.

5.3.3 The building has been assigned a Building Damage Category of 3 (Moderate) due to a combination of:

- predicted vertical and horizontal ground movements
- poor ground conditions caused by the historic movements.

5.3.4 Elements of the structure that are key to the impact assessment results include the load-bearing brick masonry facades with openings. Intrusive investigation of these elements of the building and their relationship to the later underpinning system has not been practical. Based on the observations during seperate site inspections ,the assessment assumes there are no significant existing structural defects. The findings of detailed historic research, building survey and site investigation has been considered (refer to 7.2.4).

5.3.5 Current assumptions are not expected to change the Phase 3 GMA Building Damage Assessment and Heritage Sensitivity outcome.

5.3.6 The potential risks during HS2 below ground construction works that require a mitigation response that complies with the HS2 Technical Standard - Ground Movement and Assessment from Below Ground Construction (HS2-HS2-TN-STD-000-000005) are:

- predicted vertical and horizontal strains could damage internal and external walls

perpendicular to the road, manifest as vertical or stepped diagonal cracks starting at the base of the wall

- localised deformations (hogging) in the affected walls may result in stress cracks at a single concentrated location
- external and internal surfaces of affected walls may display maximum crack widths of 3mm or less due to predicted hogging.
- cracking will also occur at the corners of the window and door frames of the asset at lower ground and ground floor
- foundation depth and construction type likely to vary between the original building and its later extension. Cracks likely to appear at the interfaces between these structures.

5.3.7 The distinction between visual or aesthetic harm and major serviceability and/or structural stability damage is an important threshold that determines the appropriate measures.

5.3.8 Risk to building serviceability and/or stability is limited (potential for disruption of rainwater goods and external utility services/drainage connections), but shear and differential cracking could occur in sensitive areas, including external stucco render finishes, especially where pre-existing cracks are hidden beneath historic repairs to rendered surfaces.

5.3.9 As the structure is covered in stucco render externally and plaster internally, both of which are sensitive to movement, very small movements will manifest in cracks to these finishes providing early indication that the building is undergoing movement.

5.3.10 In the case of 16 Park Village East superficial cracking is manageable but needs to be carefully considered where it affects heritage features that are sensitive or susceptible to harm.

5.3.11 As cracks appear, a monitoring system will be required to provide data to better understand how the building is responding to the predicted movements induced by the HS2 works.

Heritage Sensitivity and Magnitude of Effects

5.3.12 Alongside the Burland assessment, SCS Phase 3 GMA also considers the sensitivity of the listed building and the magnitude of heritage impact arising from the specific building construction type and design features that contribute to heritage significance.

5.3.13 A system of scoring, following London Underground Movement Guidelines (HS2 Technical Standard - Ground Movement and Assessment from Below Ground Construction (HS2-HS2-TN-STD-000-000005, Table 10), considers two criteria:

- sensitivity of the structure to ground movements and interaction with adjacent buildings

- sensitivity to movement of particular features within the building.

5.3.14 16 Park Village East is assigned:

- a structural sensitivity of 0.
- a feature sensitivity scoring of 0.

5.3.15 In summary, historic and existing cracks may open further. It is envisaged that additional cracking could also occur at the corners of window and door frames at lower ground and ground floor. Resulting minor changes in aperture shape could inhibit the free opening and closure of doors and windows, with a risk that glazing could break.

5.3.16 The magnitude of heritage impact is moderate (HS2 Technical Standard - Ground Movement and Assessment from Below Ground Construction (HS2-HS2-TN-STD-000-000005), Table 11).

Environmental Minimum Requirement (General Principle Compliance Assessment)

5.3.17 The HS2 scheme design and associated construction and logistics planning has continued to be developed following publication of the HS2 London-West Midlands Environmental Statement (ES) (and subsequent Supplementary Environmental Statements (SES) and Additional Provision Environmental Statements (AP ES)).

5.3.18 The controls contained in the HS2 Environmental Minimum Requirements (EMR) ensure that impacts which have been assessed in the relevant ES will not be exceeded and, if possible, reduced.

Table 2 - Environmental Impact baseline summary

Name	Designation	Value	Construction Impact		
			Nature of impact	Scale	Effect
Park Village East	Listed building, conservation area	High	The asset is located within the 10mm settlement contour associated with the construction of the Proposed Scheme portal and the revetment replacement works. Mitigation will involve the monitoring of settlement impacts and the use of tunnel construction and revetment construction techniques that reduce and stabilise settlement.	Medium	Major adverse

5.3.19 Table 2 summarises the construction impact based on the design assessed in the November 2013 ES, as amended by subsequent Additional Provision Environmental Statement (APES) documents. 16 Park Village East was assessed as part of Regent's Park Conservation Area.

5.3.20 The asset specific Phase 3 GMA for 16 Park Village East demonstrates the latest design produces a moderate magnitude heritage impact. Cracks to walls may materialise and services/drainage may also be impacted that affects serviceability. This refinement to the ES

demonstrates significant environmental effects are no greater than the predicted major adverse.

5.3.21 Furthermore revetment works, i.e. installation of ground anchors to stabilise the Park Village East cutting retaining wall, have now been completed, reducing the risk that tunnel construction will initiate movements in the cutting wall that have historically affected Park Village East residential properties (further details available - Phase 1 Geotechnical Desk Study Document no. 1MC03-SCJ_SDH-GTNOT-SS01_SL03-000014 and Technical Note - Phase 2 Geotechnical Desk Study – Park Village East Wall S1 Document no.: 1MC03-SCJ_SDH-GT-NOT-SS01_SL03-000015).

5.3.22 This HAMS outlines mitigation actions that are informed by the Phase 3 GMA and accord with the asset-specific requirements identified in the November 2013 ES, as amended by subsequent APES documents.

5.3.23 In response to the impact assessment refinement, sections 6, 7 and 8 of this HAMS detail a method statement for mitigation through monitoring and conservation management in accordance with SCS Asset Protection and Inspection & Monitoring (I&M) plans and procedures.

5.3.24 Adverse effects will be minimised by implementing the measures detailed in this HAMS, comprising a monitoring-based conservation management strategy, with arrangements for remedial repairs/temporary support as appropriate to remedy effects of ground movements due to HS2 tunnelling.

6 Mitigation

6.1.1 Information generated during asset protection processes summarised in section 5 has been used to define a mitigation response to the potential harm to 16 Park Village East set out in this method statement.

6.1.2 This mitigation design is further detailed in SCSjv Detailed Mitigation Design Report - 16 Park Village East - Asset Protection Area East – Euston Throat West Building Package 1-S1 Document no.: 1MC03-SCJ_SDH-GT-REP-SS01-000009, which has been developed with reference to the SCS Asset Protection Management Plan(1MC03-SCJ-EN-PLN-S000-000002).

6.2 SCS Asset Protection Management Plan

6.2.1 SCS Asset Protection Management Plan (1MC03-SCJ-EN-PLN-S000-000002) sets out the framework for the design and implementation of measures that respond to the Building Damage Assessment presented in the GMA report. It ensures Third Party Assets are suitably protected from ground movements arising from S1/S2 London Tunnels Contract tunnelling and excavation activities.

6.2.2 Intended measures for protecting 16 Park Village East accord with the Asset Protection Management Plan, comprising:

- Monitor and Repair Strategy (Asset Protection Mitigation Strategy Category 2a) prior, during and following tunnel construction.

6.3 Detailed Mitigation Design

6.3.1 SCSjv Detailed Mitigation Design Report - 16 Park Village East - Asset Protection Area East - Section 3 - S1 Document no.: 1MC03-SCJ_SDH-GT-REP-SS01-000009 reviews various alternative mitigation options, including at-source ground treatment measures and underpinning.

6.3.2 It confirms Monitor and Repair Strategy as most suitable, especially from a heritage conservation perspective. It concludes:

- no pre-construction preparations or interventions are required
- current monitoring systems shall be maintained (Designers Monitoring Plan - Area East Buildings Package 2 (EB2) - S1MDL Code: Document no.: 1MC03-SCJ_SDH-GT-PLN-SS01-000002)
- implementation of supplementary monitoring proposals detailed in section 7. These are based on the asset specific SCSjv Designer Monitoring Plan - 10 12 14 16 26 28 Park Village East – Asset Protection Area East - Section 3 – S1 Document no: 1MC03-SCJ_SDH-GT-REP-SS01-000012
- prior to key work stages anti-shatter film may be applied to glazing located in walls perpendicular to the tunnel drive, and overhead windows such as skylights, and all single glazing - to protect residents from any potential hazard
- a risk-based Asset Action Plan will define specific monitoring trigger values that will determine further safeguarding actions based on the timely management of mitigation interventions in response to actual movements
- all repair and remedial repair work conducted at the property will meet required quality and conservations standards. SCSjv will adopt The Crown Estate Guidelines and Standard Specification to Architects for the Regent's Park, Kensington Palace Gardens, St. James's, Pall Mall South, Haymarket and Lower Regent Street Residential and Commercial Estates, Seventh Edition January 2014
- repair of predicted cracks will follow completion of permanent construction works, as outlined in section 8 Conservation Management. Generic remedial repairs may also be aligned with freeholder maintenance schedules
- Emergency Works will be undertaken if predictions are exceeded, and the observed

rate or magnitude of ground movement pose a risk to health and safety or to the preservation of the listed building. Framework contractors are on standby to undertake any necessary interventions, i.e. damage to utility connections, or damage to waterproofing systems that compromise serviceability or inhabitability of buildings. Emergency works will be undertaken in collaboration with the London Borough of Camden and Historic England, as set out in the Heritage Agreement (5 May 2017) clause 2.7.

7 Monitoring

7.1.1 Monitoring proposals take into consideration the existing ground movement baseline (section 7.2) and apply further guidance and requirements detailed in:

- HS2 Specification for Civil Engineering Works – Series 4500: Instrumentation and Monitoring – Construction Document no.: HS2-HS2-CV-SPE-000-014500.
- SCS Instrumentation and Monitoring Statement S1 and S2 Document no.: 1MC03-SCJ-CL-STA-S001-000001.
- Designers Monitoring Plan - Area East Buildings Package 2 (EB2) - S1MDL Code: Document no.: 1MC03-SCJ_SDH-GT-PLN-SS01-000002
- SCSjv Designers Monitoring Plan - 10 12 14 16 26 28 Park Village East - Asset Protection Area East - Section 3 - S1 Buildings Package 2 (EB2) - S1MDL Code: Document no.: 1MC03-SCJ_SDH-GT-REP-SS01-000012).

7.2 Ground movement baseline

7.2.1 Comprehensive ground movement records have been collected by both the Early Works (CSjv) and Main Works (SCSjv) contractors as part of the 'Network Rail Ground Movements Mitigation Scope'. The focus has been on understanding how mitigation works to Network Rail's Park Village East Retaining Wall could influence ground movements affecting property and rail assets in the vicinity. The adopted approach is defined in Designers Monitoring Plan - Area East Buildings Package 2 (EB2) - S1MDL Code (1MC03-SCJ_SDH-GT-PLN-SS01-000002).

7.2.2 This provides a robust baseline record of seasonal movements and local spatial trends with reference to key third party assets, including 16 Park Village East. This monitoring system will be maintained as the principal baseline record for measuring movements attributable to future construction and related events.

7.2.3 Current ground movement baseline is as follows:

- horizontal movement data from routine patch scanning on the front elevation of 16 Park Village East collected since 2020 (CSjv/SCSjv) shows no significant movement Recorded measurements do not exceed technical margin of error (+/-3mm).

- levelling data has been recorded on the pavement outside 16 Park Village East since the summer 2022. The precise manual levelling shows varying seasonal movements that fluctuate by up to 6mm in vertical movement between the seasons.
- satellite monitoring data from the period 2011-2020 has also been used to gauge historic patterns of ground deformation prior to the commencement of the HS2 Park Village East Retaining Wall mitigation works. Data points include the roof near to 16 Park Village East party wall and the adjacent road (Sixense, November 2022, Atlas InSAR Ground Displacement Monitoring HS2 S1S2 East Variation of Works Historical Study). This evidence is consistent with the patch scanning data.

7.2.4 There is no historic movement data for the rear extension or within the garden. However, there is a history of landslips associated with the infilled Collateral Cut canal, most notably the collapse of the canal tow path retaining wall c 1935. In addition, there are historic records of ground movements along Park Village East associated with the railway cutting retaining wall. Historic geotechnical factors have been further explored and findings inform the monitoring and mitigation proposals set out in this method statement.

- historical information on the ground characteristics, ground movements, damage and works conducted on the Park Village East properties associated with both the infilled canal and the railway cutting has been assessed (SCS Phase 1 Geotechnical Desk Study (Doc. No. 1MC03-SCJ_SDH-GTNOT-SS01_SL03-000014).
- additional geotechnical survey and desk study has been undertaken which demonstrates a degree of deformation because of a dominant geotechnical mechanism that has resulted in the building leaning towards the infilled canal (SCS Technical Note - Phase 2 Geotechnical Desk Study – Park Village East Wall S1 Document no.: 1MC03-SCJ_SDH-GT-NOT-SS01_SL03-000015).

7.3 Additional monitoring requirements and options

7.3.1 Specific monitoring proposals for individual Damage Category 3 (DC3) residential buildings, including 16 Park Village East, supplement the continuing 'Network Rail Ground Movements Mitigation Scope' area ground movement monitoring strategy.

7.3.2 Additional instrumentation and monitoring focus on recording specific measurements to inform implementation of remedial mitigation measures to protect 16 Park Village East from the effect of below ground construction, including:

- localised ground movement data to determine:
  - tunnel ground movements and any variance against Phase 2/3 GMA predictions
  - potential association with observed deflections and cracking of DC3 listed building within the 1mm settlement contour

- asset specific deflections and cracks to:
  - verify if asset is behaving as predicted in the Phase 3 GMA, both during and after construction
  - provide early warning that initiates timely interventions required to avoid potential harm to the asset, in accordance with an established hierarchy of trigger values linked to a monitoring action plan (refer to section 8.3)
- ground movement and asset specific data to be reviewed in combination to:
  - re-calibrate trigger values if ground movement data/asset specific obversions are not consistent with Phase 2/3 GMA predictions
  - update the monitoring action plan to make appropriate adjustments for timing and type of preventative/mitigation measures and implementation in sequence with key construction trigger activities.

7.3.3 In accordance with HS2 Technical Standard - Civil Engineering Instrumentation and Monitoring (HS2-HS2-CV-STD-000-000004), monitoring will continue until the rate of settlement (or heave) is equal to or less than 2mm per annum (as determined by a minimum of four readings over a period of 4 months). The rate considered will exclude seasonal effects. For third-party assets, the cessation of monitoring will be subject to agreement with the third party.

7.4 Preferred monitoring system

7.4.1 Subject to access, baseline data gathering will be predominantly manual data logging. Manual and fully automated monitoring systems have been considered for measuring vertical settlement and horizontal displacement to the building. Instrumentation has been selected so that different options remain available should circumstances require a change in method:

- fully automated system would provide data enabling movements to be tracked hourly and daily. A secure set-up arrangement is required to ensure no loss of visual and digital connectivity over the extended timescales that monitoring is required to operate. It could also require instrumentation that has a greater visual presence.
- a manual system relies on brief regular (weekly/monthly) access to the property (including private outdoor space) to collect data using a mechanical Total Station to read measurements from reflective prisms attached to the building. It produces a less frequent record of building movements but is less constrained by connectivity and only requires discrete instrumentation attached to the property (reflective 3D prisms and laser distometer).

7.4.2 The risk of interruptions to connectivity resulting in loss of continuity in monitoring data and the level of intrusion affecting residents have been considered. High frequency automated monitoring data recording is not essential, and the predicted effect of ground movement can be effectively and safely managed through a part-manual system.

7.4.3 Primary method of data collection will be manually logging data using a mechanical Total Station to read 3D prisms and levelling studs. Additionally, data will be collected using laser distometers.

7.4.4 To manage risk of interruption in manual data collection a provisional arrangement to instal an automated logging system (hydraulic levelling cells and tiltmeters) is also shown in Appendix A Instrumentation Design Drawings:

- tiltmeters are specified on the rear façade to mitigate risk of no access to the rear gardens
- hydraulic levelling cells are specified on the rear façade to mitigate risk of no access to the rear gardens.

7.5 Monitoring Specification

7.5.1 Monitoring of the assets will include, as appropriate:

- settlement and horizontal displacement; and
- crack monitoring (relative movement between each side of the crack).

7.5.2 3 D prisms, crack monitors, laser distometers, and ground surface levelling studs will measure movements affecting the key building components and adjoining ground surfaces. The devices illustrated (figures 12-14) are typical examples, but specific instruments used may vary according to situation.

7.5.3 Table 3 details the maximum monitoring system instruments required.

7.5.4 Proposed locations are shown in Appendix A Instrumentation Design Drawings.

Table 3 Monitoring system

Asset / Item	Monitored parameters	Instrument	No.	Comments	Frequency
Buildings	Settlement Horizontal displacement	3D prisms	17	Required monitoring shown on sketches in Appendix A Targets on bottom storey of building (or as low as sight lines permit) Targets on top storey of building (as close to eave of roof as possible). Targets to align vertically. Patch scans / reflectorless targets may be suitable as alternative to prisms Displacement measurements of 3D prisms or alternative instruments shall have a measurement accuracy of +/- 2mm or better.	Typically, Monthly, Weekly during general works adjacent to property *
Buildings	Relative length	Laser Distometer	4	Required monitoring shown on sketches in Appendix A Mounted on brackets fitted to asset to gain line of sight. Instrumentation to be aligned horizontally.	Typically, Monthly, Weekly during general works adjacent to property *
Building	Tilt	Tiltmeter	3	To be installed only if manual recording devices cannot be accessed as necessary. Required monitoring shown on sketches in Appendix A Mounted on brackets fitted to asset.	Automated data collection

Asset / Item	Monitored parameters	Instrument	No.	Comments	Frequency
Buildings	Settlement Horizontal displacement	Automatic hydraulic Load cell (HLC)	4	To be installed only if manual recording devices cannot be accessed as necessary. Required monitoring shown on sketches in Appendix A Mounted on brackets fitted to asset. Instrumentation to be aligned horizontally.	Automated data collection
Buildings	Change in Crack width	Crack Monitoring Studs / Tell-tales	TBC	Crack monitoring studs shall be installed on both the pre-existing cracks and new cracks on the building façade identified during visual inspection Cracks to be monitored to be selected by Contractor and Visual Inspection engineer. Each crack to be monitored with minimum 2 stud arrangements, located at each end of the crack. Crack width monitoring equipment shall have a minimum measurement precision of +/- 0.01 mm (vernier callipers) Alternative automated crack monitoring is acceptable subject to accuracy and precision requirements.	Manual readings on crack monitoring should be monthly, and weekly where possible during the adjacent works*.

Asset / Item	Monitored parameters	Instrument	No.	Comments	Frequency
Ground surface monitoring	Vertical movement	Levelling studs	6	Levelling studs to be located within rear garden to provide ground movement data. This data and relevant Network Rail Ground Movements Monitoring data, provides contextual information for interpretation ground movement mechanisms affecting 16 Park Village East.	Manual readings should be monthly, and weekly where possible during the adjacent works*.
		* All frequencies to be adjusted according to progress of works and movement trends. Frequencies may need to be increased to daily or hourly during critical stages of the works. To be discussed/agreed during CTC meetings.			

Building

7.5.6 Monitoring of external walls with 3D prisms at the top and bottom of each façade.

7.5.7 Laser distometers are specified along the walls perpendicular to the HS2 works.

7.5.8 Crack monitoring will be conducted, as required, through tell tales or monitoring studs.

7.5.9 If colour options can be sourced and are available, instruments that best match the external building appearance will be used.

Ground surface monitoring

7.5.10 Settlement of the rear gardens within the influence zone of the HS2 works is to be monitored by means of precise levelling studs, generally at 5m centres. Indicative positions have been indicated in Appendix A Instrumentation Design Drawings.

7.5.11 This will extend to the historic rear retaining wall to the infilled canal.

Figure 12 Typical 3D prism

Figure 13 Typical crack monitors

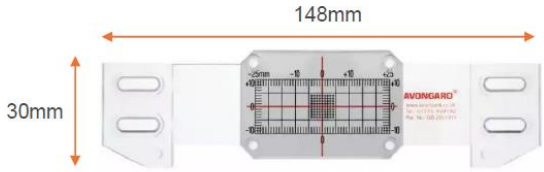
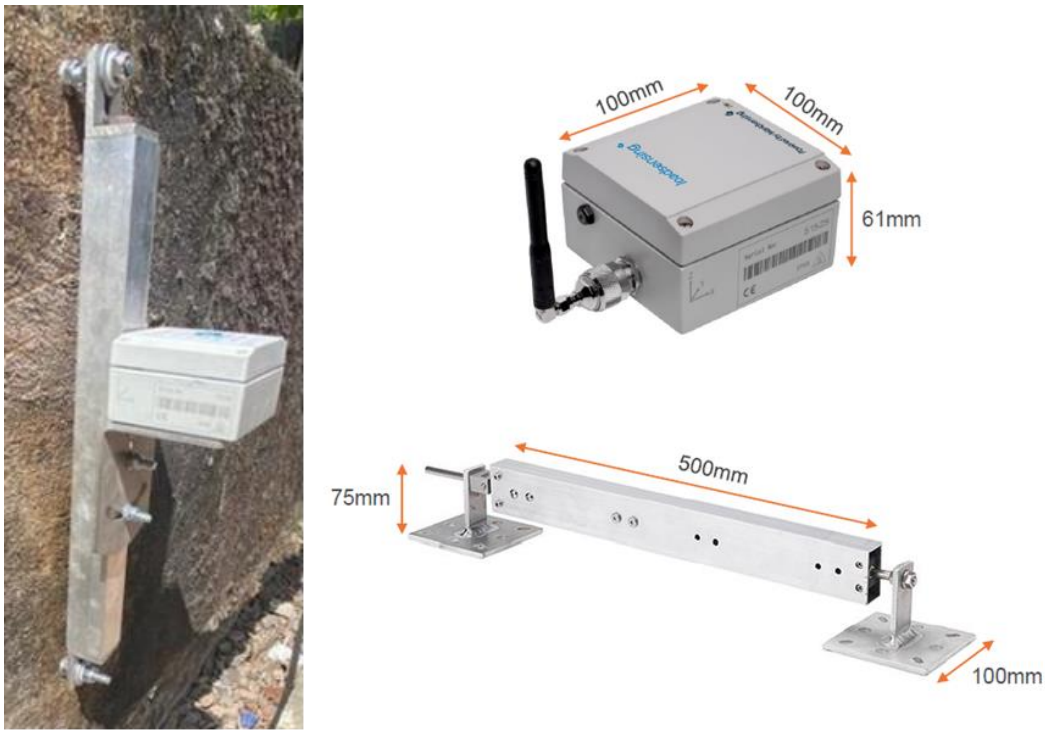


Figure 14 – Example of a tiltmeter



7.6 Installation, maintenance, removal and repair

Location

7.6.1 Instrument locations shown in Appendix A are approximate and will be adjusted as necessary by the sub-contractor, depending on the as found conditions and the owner's agreement.

7.6.2 Final locations for prisms will provide good visibility to the Total Stations.

7.6.3 Final positions will fully accord with the installation requirements, as follows.

Installation

7.6.4 All installation works will comply with hold point procedures, including 'Permits to Drill' as detailed in:

- Method Statement and Risk Assessment - Installation and Monitoring of Instrumentation and Monitoring on Parkway Third Party Assets - Document no.1MC03-SCJ_SOU-CL-MST-SS01_SL03-000006.
- additional requirements specified in any future Task Briefing Sheet - Installation and Monitoring of Instrumentation and Monitoring Equipment at 16 Park Village East.

7.6.5 Instruments attached to the building (3D prisms, laser distometers, tiltmeters and hydraulic load cells) will be firmly secured in line with the manufacturer's instructions to ensure effective monitoring and accurate measurements throughout the required period of operation. This is nominally taken as a minimum of 5 years, but total duration will be determined in line with the criteria set out in para 7.3.3 of this method statement, i.e., as required under HS2 Technical Standard - Civil Engineering Instrumentation and Monitoring (HS2-HS2-CV-STD-000-000004).

7.6.6 Instrument fixings that require bolting to the building will employ the minimum number of drilling points to comply with safety requirements and ensure effective operation of the instrument.

7.6.7 Drilling will take place into plain stucco surfaces or into exposed brickwork mortar joints. All drill locations will avoid decorative mouldings and stringcourses. Location of fixing points will avoid proximity to edges (i.e., at least 80mm from edge) or areas of fragile render which could result in surface spalling or excessive damage to surface finishes. This applies to all edges, including those created by deep stucco channels that imitate masonry joints.

7.6.8 Holes of 8-10mm diameter will be drilled at a maximum depth of 50mm and fitted with an expansion sleeve or nylon plug. Stainless steel screws and washers are to be used, to ensure durability and prevent staining.

7.6.9 The sub-contractor's Method Statement and Risk Assessment (RAMS) will include a description of the listed asset and define hold points to ensure implementation of control measures for working on and in its proximity. Prior to installation work commencing, a copy of the sub-contractor's RAMS will be provided to the London Borough of Camden Conservation team and Historic England.

7.6.10 A Toolbox Talk will be issued to all those working on the asset at the start of the shift and a SCS heritage specialist will undertake regular inspections to oversee installation work.

Removal

7.6.11 Following completion of monitoring all instrumentation and fixings will be removed and the fixing holes filled to match the surrounding surface render/mortar:

- clean surface and remove/blow out loose render/mortar
- new mortar to match the colour of existing mortar/render
- point and form mortar joints/rendered surfaces to match existing profiles
- repaint where required, to maintain a consistent colour and texture

Access

7.6.12 Careful consideration will be given to access systems for installation and removal of monitoring instruments that avoids the use of scaffolding directly tied to the listed structure. Alternatives include mobile elevated working platforms (MEWPs), cherry pickers and freestanding platforms

7.6.13 Given the constraints of the property and disruption to residents, a temporary fixed scaffold may be the only viable solution.

7.6.14 Tying in is necessary to ensure the scaffold is safe to work at from height, but also protects those at street and lower ground floor/basement level underneath.

7.6.15 Scaffold sub-contractors' RAMS will include a fully detailed design specification for the listed building:

- employ the same process for attachment and removal as described for the fixing/removal of monitoring devices (7.6.4.to 7.6.11)
- there will be minimal fixings into the fabric of the buildings. Fixings are not required at basement or ground level, so are to be used at first floor and attic levels only
- fixings will be carefully located to avoid sensitive features, including decorative plaster and/or brickwork forming cornicing, window or door architraves of pilasters.

7.6.16 Careful installation and remedial work will minimalize any permanent visual impact of the scaffolding works.

8 Conservation Management

8.1 Visual Inspection

8.1.1 A CARE structural engineer (Institute of Civil Engineers (ICE) Conservation Accreditation Register of Engineers) will inspect the property to routinely assess the building for stability and safety. The structural engineer will also recommend any temporary measures that may be immediately required, regardless of whether instrument trigger levels are met.

8.1.2 The property will be visually inspected prior to critical construction activity to review the building for damage and assess stability of building and its principal elements.

8.1.3 Inspections will occur monthly during or after critical construction activities predicted to affect the property. A report will be produced and re-issued for each inspection so that each visit is recorded in a single document.

8.1.4 This report will include high-resolution photographs supplemented by sketches as required, detailing all visual and measured changes, such as:

- new cracks or enlargement of existing cracks
- evidence of spalling of masonry or plaster
- any other new defects
- signs of new water ingress
- evidence of subsidence
- recommend temporary works/remedial if required.

8.1.5 The frequency of visual inspections may increase in response to Monitoring Trigger Levels.

8.1.6 Change in frequencies of the visual inspections are to be confirmed at regular SCSjv Monitoring Review Meetings.

8.2 Trigger Values

8.2.1 Trigger values are based on the Phase 3 GMA of HS2 permanent works only (i.e., excluding temporary works). Seasonal and daily variation due to background environmental effects will be considered when applying trigger values.

8.2.2 Trigger values for building crack widths are:

- Construction Alert – commence monitoring upon noting first emergence of crack/defect.
- Green – 5mm
- Amber – 10mm
- Red – 15mm

8.3 Monitoring Action Plan

8.3.1 The SCS Built Heritage Lead will co-ordinate technical arrangements for the preparation, review and update to a Monitoring Action Plan, to include procedures for:

- the production, assurance, interpretation, and presentation of monitoring data
- actions to be taken by specified parties in the event of monitoring trigger values being exceeded
- actions to be taken in the event of interruption to monitoring during the construction phase (e.g., due to monitoring system malfunctions).
- arrangements for regular reporting on the items detailed above to the London Borough of Camden Conservation team and Historic England.

8.3.2 The following monitoring actions will be taken at the breach of trigger levels:

- Green – review frequency of visual inspection.
- Amber – increase frequency of visual inspection, review movements of the asset and crack widths against prediction of movement and update subsequent predictions to account for movement. Cracks that reach amber trigger level should be exposed (stucco render/plaster removed in a 200mm x 200mm zone and masonry inspected). Exposed area to be retained for further observation until no further requirement to re-inspect, i.e. once crack development has stabilised
- Red – increase frequency of visual inspections. Review specific cracks and assess stability of building. Introduce temporary works if necessary.

8.3.3 Any breach of trigger levels requiring temporary works will be reported to the London Borough of Camden Conservation team and Historic England by SCS Built Heritage Lead. Temporary works designs will be issued for information prior to works proceeding.

8.4 Conservation (repair) schedules

8.4.1 All required repairs will follow the design principles, standard brief, specification, technical details and safe working practices described in The Crown Estate Guidelines and Specification to Architects for the Regent's Park, Kensington Palace Gardens, St. James's, Pall Mall South, Haymarket and Lower Regent Street Residential and Commercial Estates 7th Edition.

8.4.2 A conservation (repair) schedule will be prepared prior to installation of monitoring instruments and subsequently maintained as planned actions are updated. The conservation (repair) schedule will be routinely reviewed until monitoring requirements have been fully met, instrumentation removed, and all necessary repairs completed.

8.4.3 The conservation (repair) schedule will include:

- identification of the property
- a list of all repair items required, to be described room -by -room or by reference to external elevation, including reference to the SCS Inspecting Engineer's and other specialist reports and requirements
- an inventory of the historic items, including fixtures and fittings to be protected or repaired
- programme and timescale allowed for the repair works
- the standard specification for workmanship and materials including painting and stucco repairs
- a list of drawings that are approved by leaseholder/freeholder

- details of the monitoring procedure for the work, including the contact details of a Conservation Consultant Architect who will prepare and review the conservation (repair) schedule and confirm works have been carried and completed in accordance with The Crown Estate covenants included in the lease or building agreement.

8.5 Routine crack repair

8.5.1 Other than the drilled bolt fixing holding the monitoring instruments/temporary scaffolding in place, typical damage resulting from the tunnelling works is expected to be cracks within the masonry walls perpendicular to the street and at the corner of openings, such as windows and doors.

8.5.2 A typical repair will be undertaken as follows:

- remove surrounding render to check for propagation of crack within masonry
- cracks <5mm should be infilled/repointed
- cracks greater than 5mm will have mortar joints raked out, tie-bars installed across the crack and infilled/repointed.
- render/mortar composition/type to be determined and matching material reapplied to complete repair
- internal and external redecoration.

8.5.3 All conservation (repair) schedules and detailed design (technical drawings, specifications and RAMS) will be issued by SCS Built Heritage Lead to London Borough of Camden Conservation team and Historic England for review and comment prior to works proceeding.

9 Heritage Conservation Summary

9.1.1 Installation of monitoring instruments is a temporary arrangement to ensure accurate monitoring of the heritage asset prior to, during and following HS2 permanent construction works. It is a precautionary procedure to identify ground movements and resulting building structural responses so that appropriate measures to protect the asset can be deployed and engaged to prevent potential systemic or structural harm that may result in loss of serviceability and/or stability and impact to heritage significance.

9.1.2 Specifically, monitoring instruments will provide data to inform decisions on managing and mitigating effects on heritage assets during the planned HS2 tunnelling operations, providing a record of ground movements that will:

- observe and record changes affecting the building to:
  - check and validate modelled predictions

- calibrate mitigation responses with the sequence of construction activities
- ensure interventions required to mitigate potential harm to heritage assets are undertaken in timely accordance with an established hierarchy of trigger values and related pre-planned actions.

9.1.3 Installation of monitoring instruments does not result in loss of heritage significance and offers specific protections and benefits as part of a conservation management process.

9.1.4 To ensure there is negligible harm to historic fabric:

- monitoring instruments are to be installed with minimum fixings.
- all devices will be removed on completion of monitoring requirements and there are no permanent additions or alterations to the listed building.

9.1.5 The temporary visible presence of monitoring devices does not change the contribution of setting to the significance of the heritage asset. Instrument visibility is limited by the minimum use of devices required to meet the monitoring requirements, retaining the optional use of automated devices that will only be deployed if circumstances require additional monitoring capabilities.

9.1.6 Following completion of HS2 asset protection measures there will be no permanent change to the building, or its setting caused by potential ground movements due to below ground construction.

9.1.7 Remedial repairs will be co-ordinated in accordance with The Crown Estate covenants included in the property lease or building agreement.

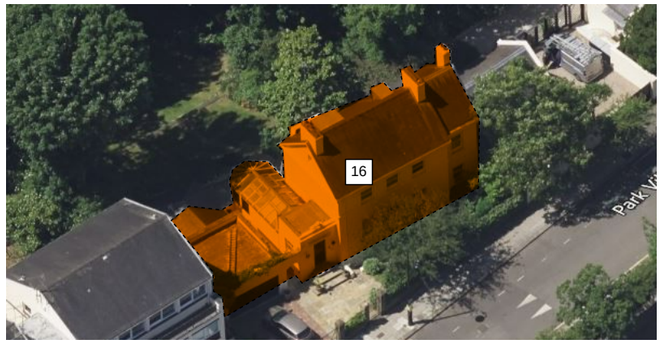
10 References

Table 4 References

Title	Reference
CSjv 2021 Report on the Heritage Setting of surrounding properties at Park Village East (in advance of noise insulation works)	1EW02-CSJ-EV-REP-S001- 000032
Guidelines and Standard Specification to Architects for the Regent's Park, Kensington Palace Gardens, St. James's, Pall Mall South, Haymarket and Lower Regent Street Residential and Commercial Estates	The Crown Estate, Seventh Edition January 2014
HS2 Technical Standard - Civil Engineering Instrumentation and Monitoring	HS2-HS2-CV-STD-000-000004 P03
HS2 Technical Standard - Ground movement and assessment from underground construction	HS2-HS2-TN-STD-000-000005 P03
HS2 Specification for Civil Engineering Works' Series 4500 – Instrumentation and Monitoring	HS2-HS2-CV-SPE-000-014500

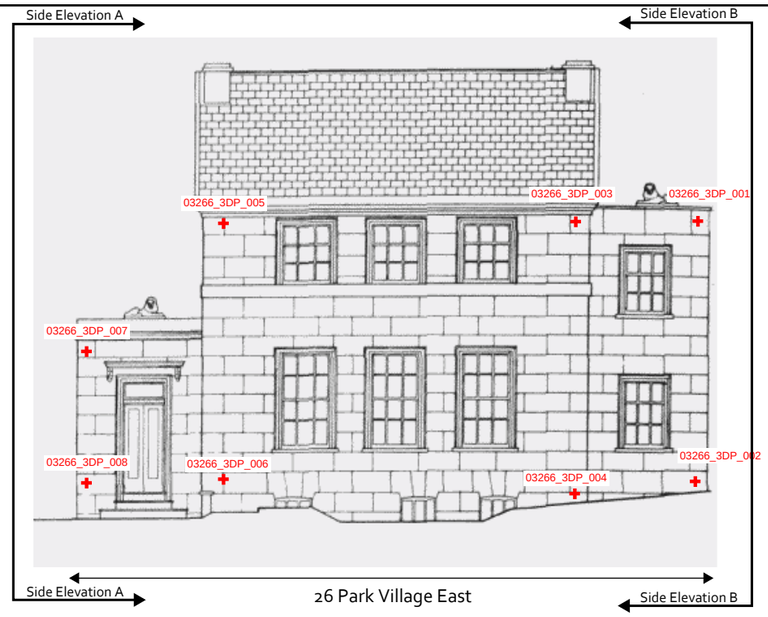
Title	Reference
HS2 Technical Standard – Sound, Noise and Vibration Instrumentation and Monitoring · High Speed Rail London-West Midlands	HS2-H S2-EN-STD-000-000009
HS2 Environmental Minimum Requirements Annex 1: Code of Construction Practice https://www.gov.uk/government/publications/environmental-minimum-requirements	CS755 02/17
SCSjv Phase 3 Ground Movement Assessment Report - Building Assessment Euston Cavern and Shaft - Euston Throat West S1	1MC03-SCJ_SDH-GT-REP-SS01_SL03-000018 C03.2
SCSjv Designers Monitoring Plan - Area East Buildings Package 2 (EB2) - S1MDL	1MC03-SCJ_SDH-GT-PLN-SS01-000002
SCSjv Surveys for Design Assessment [Heritage] 16 Park Village East, London, NW1 7PX	1MC03-SCJ_OTB-PM-REP-S000-000289
SCSjv Pre-construction Condition Surveys 16 Park Village East, London, NW1 7PX	1MC03-SCJ_WGL-PM-REP-S000-000378
SCSjv Designer Monitoring Plan - 10 12 14 16 26 28 Park Village East – Asset Protection Area East - Section 3 – S1	1MC03-SCJ_SDH-GT-REP-SS01-000012
SCSjv Detailed Mitigation Design Report - 16 Park Village East - Asset Protection Area East - Section 3 – S1	1MC03-SCJ_SDH-GT-REP-SS01-000009
SCS Technical Note - Phase 1 Geotechnical Desk Study - Park Village East Wall S1	1MC03-SCJ_SDH-GTNOT-SS01_SL03-000014
SCS Technical Note - Phase 2 Geotechnical Desk Study - Park Village East Wall S1	1MC03-SCJ_SDH-GT-NOT-SS01_SL03-000015

11 Appendix A – Instrumentation Design Drawings (as proposed in SCSjv Designers Monitoring Plan - 10 12 14 16 26 28 Park Village East Asset Protection Area East - Euston Throat West Buildings Package 1 - APD-ESCT-01 Document no: 1MC03-SCJ_SDH-GT-REP-SS01-000012)

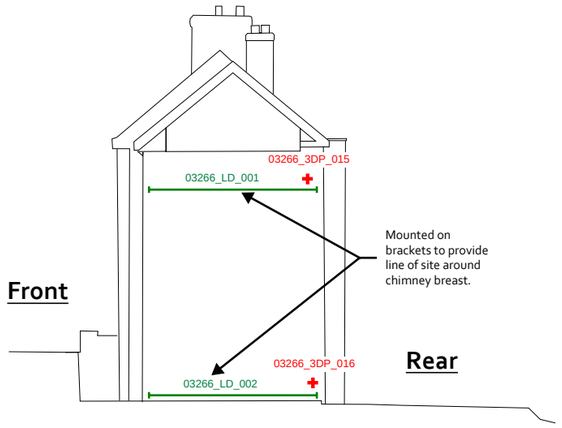


Isometric View of Asset

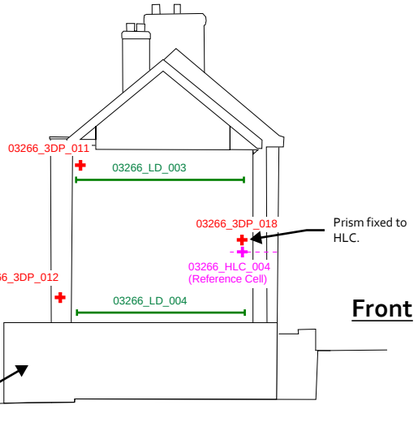
Elevation of Hydraulic Load Cell (HLC) Installation can be amended on site to suit conditions/HAMS approval



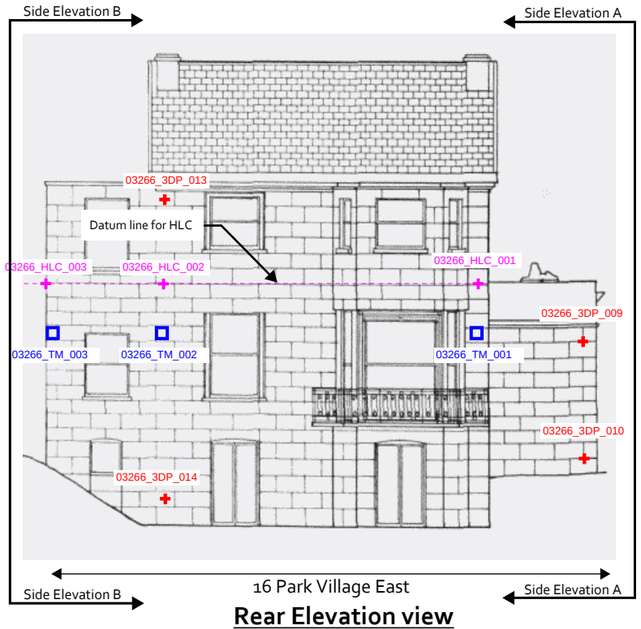
Front Elevation view



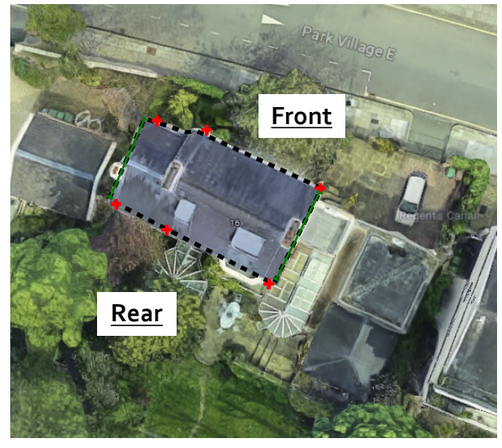
Side Elevation B



Side Elevation A



Rear Elevation view



Top view

General notes:

1. Do not scale from this drawing.
2. Monitoring the effects of ground movement on other assets that may be located within the asset vicinity, such as utilities, is outside the scope of this drawing.
3. Historic record drawings have been used to create this sketch (Refer to Section 11 - 1MC03-SCJ_SDH-GT-REP-SS01-000006 for details). Actual building details could vary and should be confirmed by a survey to confirm the monitoring locations are appropriate.
4. All third party assets which have a DMP should be baseline monitored for a year prior to HS2 local works where possible. Baseline monitoring is assumed to provide readings every month where possible.
5. The I&M information provided in this drawing is in line with the Mitigation Strategy Document C01.
6. Positive values of Z movement is settlement downwards.
7. Refer to table drawing for trigger levels to monitoring indicated on this drawing.
8. Black dashed line on isometric and top view denotes boundary of asset.

Approx. number of monitoring points:	Legend:
17	3D prisms (3DP)
3	Tiltmeters (TM)
6	Levelling Studs (LS)
4	Automatic Hydraulic Load Cell (HLC)
4	Laser Distometer

Title: Monitoring Positioning	Date: 09/12/2023
SCS Asset Number: SCSMW_03266	SCS Asset Name: 16 Park Village East
HS2 Chainage: 1+229 km	Asset Owner(s): Private Ownership
Location: Euston Cavern	Grid Reference: TQ 28728 83442