Project	Blandfield
Title	Report recommending action in relation to failed wall currently supporting retention

Revision history

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1. Terms of reference

Peverel Scotland Limited have appointed Applied Engineering Design Limited (AED) to produce a report recommending a course of action for the correction of the situation currently pertaining with regard to the large retaining wall forming the north-east boundary of the Blandfield residential development located at the boundary of the Beaverbank and Pilrig districts of Edinburgh.

2. Limitations

This report focusses on the background to, then selection and costing of a solution to the practical issue of the failing retaining wall.

3. Terminology

We have tried to avoid technical language in the report with the exception of some descriptive terms relating to retaining walls.

In the context of a retaining wall, "failure" means movement beyond acceptable limits, typically 0.5% of the height.

Retaining walls support "retention" or "backfill" behind them. The backfill can in turn support loads on the surface (people, cars, buildings) known as "surcharge". The weight of the backfill plus the surcharge loads on top combine to compress the body of the backfill. When it does this it tries to expand out sideways, much like a lump of putty. This presses against the back of the retaining wall and gives rise to what is known as "lateral earth pressure". It is this force that a retaining wall must adequately resist if it is to stand up without significant deformation occurring.

4. Previous reports and correspondence

Attention is directed to the previous reports and correspondence by City of Edinburgh Council, Goodson, and AED contained in Appendix A-Previous reports and Appendix E-Monitoring data. 's report concludes that the wall is the property of the Blandfield development.

5. Historical development

Prior to the construction of the railway line from 1852-1865, there was nothing of note in the area and the land was used primarily for distributed housing and horticulture of one type or another. The railway (a branch line of the North British Railway) is present as a single track by 1865 and has become more significant by 1876, with two lines. A boundary line is shown at this time. The Rosebank Ironworks is present on the 1876 map, in the east quadrant of the junction between the railway and Broughton Road.

A gas works occupies the site of the current housing development on the 1888 map but there is little evidence of a retort house or the usual infrastructure of actual coal gas production, with only a gas holder and the words "Gas Work" indicating the use of the site. As such it is unclear if the site was merely used as a storage location or as an actual production site. Pollution would be much more

significant from the latter use. Other sources refer to the site as simply a gas holder station, which is of less concern.

The 1932 map indicates open ground to the rear of the current line of the wall, with no specific indication of a steep slope, but with a triangular area of land cordoned off, widening towards the bridge. This could be a batter. In 1944 a linear building is indicated along the present day line of the rear of the wall. This is likely to be kennels associated with the cat and dog home and suggests the area was by then relatively flat and level.

The gas holder was still present in 1958 and the rest of the site was still occupied by the cat and dog home. By 1961 the site is predominantly a car park with evidence of refuelling facilities for gas board vehicles. Blandfield House does not exist at this time. The gas holder appears to have been removed in 1971 by which time Blandfield House has been built. The site then remained relatively unchanged until the current development was built.

The current development was subsequently built 1998-2000 with the residential buildings supported on piles with the ancillary structures such as bike storage buildings supported on strip or pad foundations. The 11kV Scottish Power substation appears to be supported on their own proprietary deep concrete non-piled foundation. Some contamination is recorded as having been instructed to be removed from the northern edge of the site during the construction of the flats.

Refer to historical maps in Appendix B-Historical maps.

6. Consequences of past use of the site

This aspect of the report focusses on issues relating to coal gas storage and production.

The site was used for storing coal gas in a conventional cylindrical gas holder. Storage of coal gas, especially in older water-sealed tanks also leads to pollution of the ground, although not to the same level as the production process itself. Coal gas production is a major cause of serious and persistent ground pollution and the possibility of its existence is not to be taken lightly. Examination of the historical records does not clearly indicate that there was coal gas production equipment on site (typical indicators are chimneys, railway sidings and tanks). We note that coal gas production in the area appears to have been initially concentrated at the large site at Calton Road then subsequently at Granton and other large peripherally located plants around the city.

Examination of the project records for the current development held by City of Edinburgh Council indicates that an environmental investigation of the site was carried out by Wimtec Environmental Limited and a range of contaminants found, most relating to coal gas storage, refer to the summary report in Appendix A-Previous reports. The only area of contamination indicative of coal gas production was in the north corner of the site but coal gas storage-related contamination was relatively widespread and precautionary measures were recommended site-wide in relation to gases and heavy metals.

Given the type of contamination present it is of note that there is no record of fuller investigation and sampling in the middle portion of the site. This may have been due to a lack of evidence of other polluting activities here and the presence of Blandfield House, blocking access for sampling in the centre of the site at the time. There is no record of other preliminary exploration and sampling that may have been carried out here and which may have informed these attitudes. Our own experience of gas works sites is that they should be thoroughly explored with few assumptions made.

Hopefully these questions will be laid to rest once we have obtained the site investigation report in full. We are unable to get this from Halcrow and are currently pursuing other potential sources. Wimtec themselves are no longer trading. Until that time we cannot rule out the possibility of further coal gas production related pollution on the site.

In summary, our current view is that the site has been up filled with uncontrolled material in the past which may include waste from gas works sites, but that it is unproven that the site itself contained an operational coal gas production plant. Other contaminants known to have been found on the site may still be present such as petroleum hydrocarbons from leaking fuel tanks. In these respects the site is no different from many others in former industrial zones throughout towns in the UK.

7. The wall

The north-east site boundary line of the site consists of the tall brick/stone wall in question ("Wall A") on the development side and a low rough stone wall ("Wall B") to the railway side of that. They are hard against one another. It is not possible to trace the genesis of either wall in detail, but the masonry of Wall B suggests it is a field/railway boundary while the arrangement and construction of Wall A suggests that it was built later. Reference should be made to Goodson's Report in Appendix A-Previous reports.

Wall A contains different types of masonry. The lower part is of squared coursed rubble stone of unknown thickness while the upper part is 215 thick brickwork generally with 110mm pier outstands on the inside and a concrete cope. The upstand of the wall is generally 1.3m-1.4m high. This overall construction is indicative of different stages of development, during which it has been raised in height. The retained height varies from approximately 1.8m in the south to 3.3m in the north.

The brick uppermost portion of Wall A, visible from inside the site, is of the same style and detailing as another large brick wall on the south-west side of the development (known henceforth as "Wall C"). This wall is also failing, albeit to a lesser degree. This suggests Wall C and the final stages of Wall A were built at the same time to enclose the site within. The style and construction of these walls agrees with this taking place at some time between 1914 and 1945.

The majority of the deformation of Wall A in the length where greatest outward movement has taken place (15m-55m from the northern tip of the site), occurs in the height from the top of Wall B upwards, that is to say from 2m above track level to the cope. Potential reasons for this include differing thicknesses of construction between stone and brick portions and the propping effect from Wall B. Uneven founding for the brick on the top of the stone wall and the structural break at the boundary between stone and brickwork portions of Wall A may also play a part.

Wall A is shown on the site survey drawing used as the basis of the Halcrow demolition plan of 1998. This is a professionally produced dimensionally accurate site survey drawing and there is no reason to suspect it depicts the wall inaccurately. On the drawing the two lines depicting the wall are predominantly straight. However over a length of around 18m, centred on a point 25m from the north corner of the site, there is an outward bulge of the two lines of approximately 200mm. This location accords with the present day position of the greatest deformation of the wall. Refer to Appendix D-Surveys. This bulge or kink in the wall is also present on other Halcrow drawings where the wall is depicted, e.g. the drainage layout plan.

As part of this investigation a new geometric survey of Wall A has been commissioned, refer to Appendix D-Surveys. Among other data this survey provides line and level information for:

- inner face at ground level
- outer face of cope
- outer face at upper ground level
- outer face of Wall A at top Wall B

Today, through the worst affected area, Wall A at the top of Wall B follows a reasonably straight line and does not follow either the deviation of the top of the wall described by either the new survey or the survey of 1998. It is therefore reasonable to assume that, here at least, Wall A has not moved appreciably over time. Hence the outward movement of the lines representing Wall A on the 1998 survey indicate a leaning of the wall at that time rather than poor horizontal alignment of an essentially vertical wall. A lean of 200mm would exceed the 0.5% limit on deflection.

It is unknown what work was carried out in relation to Wall A during the contract to construct the flats. The information we have available suggests that some deformation of the wall would have been visible in 1998. It may be the case that at the time the wall was understood to be the property and liability of the railway body. Appropriate interaction with the railway body may have been conducted in accordance with this understanding. How this understanding would relate to the similarity of Wall A (upper part) and Wall C (the latter by virtue of its location being unlikely to be the property of the railway) is unknown. No records of relevant correspondence are available to us and as such it cannot be postulated what studies, discussions and agreements took place. However, it is unlikely that no action would have been taken by the professional team in this regard.

Notwithstanding this, Wall A has been of concern to Network Rail since 2008 and is visibly very deformed on aerial photographs dating from 2009. Refer to Appendix C–Historical photographs. Temporary shoring was instructed by Network Rail in late 2008 but is not clearly visible on the photographs from 2009 so there is some dubiety regarding when it was actually erected. Network Rail instructed extension of the works in 2013. It is unclear if any enhancement of the existing propping was carried out at that time. Refer to Appendix E-Monitoring data.

8. Causes of failure

The purpose of Wall A at the time of initial erection and then of subsequent raising is unknown, but the foresight required to plan for its current function; retaining up to 3.3m of backfill, is unlikely to have been present. The level of design likely to have been applied at these times is also unknown, but it is probable that it was not significant. It is therefore perhaps unsurprising that Wall A is struggling to resist the loads present now, or indeed those that were present in 1998.

The survey drawing used as a basis for Halcrow's demolition drawing of 1998 provides ground level data along the inside face of the wall. The survey which has been commissioned as part of this investigation provides data which enables the levels then and now to be compared. This comparison shows that while the site remains at the same level in the northernmost corner, generally it is now of the order of 250mm higher along the boundary in question than it was in 1998. This will increase the lateral force on the rear of the wall by around 1.25kN/m^2 which could be enough in some circumstances to initiate movement. The level increase may be indicative of the 300mm capping layer recommended to be installed as protection against heavy metals in the ground in the summary report on ground conditions contained in the City Archives, in turn suggesting that this capping was installed

without the costly removal of an equivalent thickness of contaminated material that would have been necessary to maintain unaltered finished levels across the site.

Wall C on the opposite, north-west side of the development is also leaning outwards from the site. It is somewhat unclear why this is happening and as yet AED have not been instructed to study this wall. However, the fact that it is leaning outwards from the site, but not retaining a height of material on the inside suggests foundation failure. Wall C is likely to have an engineered foundation of some sort, while Wall A is not. Given the potential failure of the former, the persistence of the latter is interesting. Together with the relative stiffness of the lower portion of Wall A, it may be the case that this 2m high stone section of the wall is of relatively robust construction.

As part of the new development a new Scottish Power substation was built to replace an existing older unit already on the site. The old substation was centred 7.5m from the wall and may have been a relatively modest installation. The new substation is of a modern specification and is centred 2.4m from the wall. Based on the evidence available, a long term increase in the lateral earth pressure on the back of the wall at this location over and above that present in 1998 is to be expected. This increase cannot be estimated until the weight and full construction of the substation and its foundations is confirmed.

At its southerly end, Wall A retains approximately 1.9m. The wall becomes taller as one moves northwards, retaining some 4m at its northerly end. At each end the wall is vertical within acceptable tolerances. At the point of greatest deformation it retains approximately 3.2m of material. The reasons for the greatest deformation not being at the point of greatest height are likely to include:

- Restraint from the adjacent road bridge construction at the north end of the wall
- Roots of the large tress behind the north end of the wall binding the ground together, reducing lateral earth pressures

The presence of the new substation near the zone of greatest movement may also be having an effect, but this is unknown pending further research on the construction of the substation and its foundations.

Bike storage buildings sitting on pad foundations have been built between the gable ends of several of the blocks of flats and the back of the retaining wall. While these are relatively light, single storey structures, based on the evidence available, an attendant local increase in the lateral earth pressure on the back of Wall A over and above that present in 1998 is to be expected.

Immediately prior to the development and from photographs it appears for some time prior to that, the site was largely surfaced with impermeable materials and positively drained to the sewer system. As part of the development the site was resurfaced with a mixture of drained hard surfacing and undrained soft landscaping. This may have increased the moisture content of the soil retained by Wall A with an attendant increase in bulk unit weight and therefore lateral earth pressure on Wall A.

In summary, Wall A is supporting a height of backfill and local surcharges that results in forces which, by virtue of its overall construction, it is unable to resist. To date this has resulted in progressive deformation of Wall A with the worst affected region being centred on a point some 25m from the northern corner of the site. However movement is now visible over 110m of the 146m length of Wall A. Records and research indicate that deformation appears to have been present at the 25m point prior to the construction of the flats.

A bullet point summary would be as follows:

- Wall A is now accepted to be the property of the Blandfield site and the evidence used to determine this was available in 1998.
- There is evidence that Wall A was locally but measurably deformed in 1998, prior to the development.
- Lateral earth pressure on Wall A would be expected to have undergone long term increases in various places since 1998 due to the following actions, carried out as part of the development:
    - Raising of the ground level behind Wall A.
    - Presence of the gable end bike sheds.
    - Presence of the new substation.
    - Change from predominantly drained impermeable surfacing to a mixture of drained hard surfacing and undrained soft landscaping.

9. Current situation

Wall A has failed by outward movement over the majority of the northern 100m of its length. The majority of the movement is outwards at the cope. At the worst point Wall A is out of plumb by approximately 400mm, corresponding roughly with the position of the substation. The is a length of 15m, 65m from the northern end of Wall A, over which it appears to have rotated outwards at the foundation by up to 150mm, with the cope remaining more or less on line.

Wall A is clearly no longer capable of withstanding the loads on it. Were it not for the presence of the temporary support works installed by Network Rail there is no reason to believe it would be continuing to move outwards, rotating one way or the other at different positions. Ultimately this process would lead to the actual collapse of Wall A. As the residential development is founded on piles this would be unlikely to affect the building in the short term but it could cause movement in the ground over a width of up to 8m from the back of Wall A. This might affect underground services as well as the level of the ground under nearby areas of the building. The effect on the railway line would, in all likelihood, be to close the line to traffic, pending clearance of the debris. Closure and subsequent clearance would be likely to have a significant cost attached to them.

The temporary support works installed by Network Rail are described by them as follows:

> *"There was no formal design for the temporary shoring measures we installed at the wall. It was a rapid emergency response in an effort to protect our Operational line. The detail was quickly established on site and it would be of insufficient theoretical capacity to sustain the forces which could be encountered in the worst case scenario.*
>
> *We took a pragmatic approach taking the view that any support was an improvement to the unsupported wall which we were looking at on the day. Also, the shoring was constructed from "off the shelf timbers" with a limited life expectancy in the exposed situation on site. There is no proper long term foundation for the shoring. It is merely shallow-dug into the track ballast.*
>
> *The remaining life span of the shoring should be regarded as none remaining. i.e. it is life expired now, since it is not adequate to support any worsening condition of the wall."*

Network Rail's position is very clear – the temporary works are not adequate to support the retained height of material behind Wall A, any surcharges (e.g. the substation), plus the weight of the toppling wall itself. No liability on the part of Network Rail should therefore be attached to the presence of the shoring.

It has been established that Wall A is in the ownership of the Blandfield site and that the condition of the wall must be addressed without delay by a solution having an appropriate design life. The normal value of 100 years is recommended. The wall currently leans over the property of Network Rail and this must be rectified by any solution enacted.

Wall A is not currently moving and it has moved little since monitoring by Network Rail began in November 2013, see Appendix E-Monitoring dat.

However, this is a relatively short period of time. Under some combinations of conditions, after wall movement it can take some time for the full pressure of the ground to re-establish on the rear of the wall and cause further movement. Together with Network Rail's stance on the longevity of their shoring and the consequences of failure in terms of the effect on the Blandfield site and on the operability of the railway line, it is important to address the replacement of Wall A during 2015.

10. Regulatory framework

10.1. City of Edinburgh Council

10.1.1. Planning

The replacement for Wall A will require a formal Planning Application to City of Edinburgh Council. The initial application will take up to 6 weeks to go through its initial cycle. Amendments until acceptance is achieved will take another 4 weeks each.

10.1.2. Warrant

A Building Warrant application will be required for the wall, supported by a design certificate. It is likely that this will be subject to scrutiny by Building Control due to the seriousness of the operations involved and they may make particular requests in relation to the submission of design.

10.1.3. Tree matters

Council have confined that the trees in question are not subject to restrictions.

10.2. Network Rail

Network Rail will require to be consulted in detail on the technical proposals and their implementation, leading to a formal sign-off. Fees will be payable before and during the works. Full time liaison with Network Rail will be required during the works, with attendant costs.

10.3. Scottish Power

Action will be required in relation to the Scottish Power plant to safeguard the 11kV substation facility, cables and the electrical supply to the area. The involvement of Scottish Power in the project is likely

to be extensive, both in terms of sign off on the proposals and actual work on their part to enable the wall-related work itself to take place.

11. Proposals

11.1. Concerns, issues, restrictions

Of primary concern in the choice of a solution are the cost and duration of the works, with the latter being a major influence on the former due to the value of any contract preliminaries and the cost of interacting with Network Rail over time, including numerous track possessions. Working space is another significant issue on this project and the requirement for this must be minimised.

The requirement to remove the leaning wall from above Network Rail's property, problems relating to acceptability of any new structure on the Network Rail side of Wall A, together with the unavailability of track land for purchase, requires that the wall be taken down and replaced with a new retaining structure wholly within the existing site boundary, rather than be made safe and stable in its current position and state.

The access width requirements for the substation, the need for replacement bike storage buildings and for the maintenance of current garden sizes means that any new wall must be on the line of the existing wall.

If required, the removal of the existing wall adjacent to the end of the existing housing blocks involves the risk of ground movement beneath the blocks. This is unacceptable as it will cause issues with the services in the ground, the thermal and moisture performance of the building, gas collection in voids, together with increased chances of vermin entry, together with unknown effects on the piles themselves.

11.2. Options

As stated in previous reports a number of different solutions were initially considered ranging from tying the existing wall back with ground anchors to encapsulating Wall A in a new embankment built on land purchased from Network Rail.

Ultimately the restrictions present made unacceptable those solutions which either intruded permanently on Network Rail's property or moved the retaining wall back into the site to avoid this (e.g. in order to have anchor hardware on the outside of the wall while keeping everything within the boundary). Equally, options which provide a solution with a design life that is less than 50 years are unlikely to be appropriate as this would devalue the flats. Solutions with a design life less than 100 years are unlikely to be accepted by Network Rail. Solutions requiring a long time to implement are equally unacceptable. Remaining options must therefore provide timeous, comprehensive long term solutions only.

Remaining solutions considered included:

- in-situ concrete retaining walls
- a range of bored and driven piled and sheet piled solutions, installed from the high level, track level or a mix
- a range of proprietary prefabricated solutions based on crib or gabion wall principles

In-situ concrete solutions were considered for the new wall and dismissed due to numerous factors. These included: cost, quality and programme matters; working room requirements of this type of work relating to plant and materials storage needs and the nature of the build process itself; noise, dust and inconvenience issues caused by long term wet trade works.

All piled solutions were then evaluated and subsequently dismissed due to the necessity to frequently occupy the track area with very large items of plant capable of installing piles up to 10m long, from which the rail infrastructure must be fully protected during possessions and, in the case of sheet piling, due to considerable concerns over vibration and noise nuisance to adjoining properties.

11.3. Recommended solution

The process of elimination above leaves the relatively conventional and economic gabion basket retaining wall solution of the type shown in Figure 1.

These are erected relatively rapidly on a pre-prepared foundation with activity carried out both from behind and from in front of the wall's line, minimising track possession time. Little wet trade work is required once the foundation is poured, and plant and equipment is largely minimised to some crane use and modest compaction plant only. This minuses noise, mess and disruption. Work is relatively weather-independent and a range of quite attractive and relatively natural appearances are available as-built.

Construction of a new wall of this type requires full removal of the existing wall. To counter the issue of ground movement beneath the ends of the buildings the ground will be solidified with an injected cementitious grout to form a thick curtain wall under the full width of the end of each block, integral with the building's piles and encasing them, preventing material under the buildings from moving. Refer to Figure 3.

Construction of the works would require to be phased, with two enabling phases dealing with Scottish Power plant and grouting of the ground below the gables of the flats respectively, followed by phased construction of the wall itself. This latter stage is suggested as phased so that most of the material excavated can be stored on site rather than off site or sent for disposal. Movement off site would require special measures to be taken, with associated costs.

Discussions have been held with contractors regarding to the practicalities of erecting a new wall of this type. The basic assumptions implicit in the proposal are reasonable and the costs provided are representative.

On balance, after outside consultation and pending site investigation, at the present time we recommend this as the most cost-effective solution that complies with the project's requirements and restrictions.

However, given the sums involved, we would also suggest that a final, formal enquiry be made to Network Rail regarding the cost of rapidly purchasing 50% of the width of the railway over the length of the site. If this were favourably received we would welcome the opportunity to review the option to encapsulate the wall in an embankment, effectively extending the site outwards across the railway as a slope, leading down to a new fenced boundary at track level.

12. Costs

The following amounts are estimates based on information available at the time of writing, industry rates and high level cost estimates provided by utilities, stakeholders and wall component providers. Actual costs will be known once the proposal has Planning and Building Warrant and a set of compliant tenders have been received. This cost should be considered indicative, we recommend a detailed cost plan is prepared once the design is sufficiently advanced. Main contract programme is estimated at 26 weeks.

Estimated costs are contained in Appendix G-costs.

13. Next steps

The next step is to submit a Planning Application to Council based on the gabion wall solution chosen. They will confirm the visual acceptability of this proposal. If it is not acceptable a concrete faced wall a more refined appearance will have to be chosen and this will increase the cost by around £12,000, see Figure 2-MacWall. Other similar options exist but we anticipate one of these will be acceptable to Council, but the cost of compliance should these initial options be rejected cannot be quantified at this stage.

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Applied Engineering Design Limited
09 January 2015

Figures

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Figure 3-Jet grouting 15

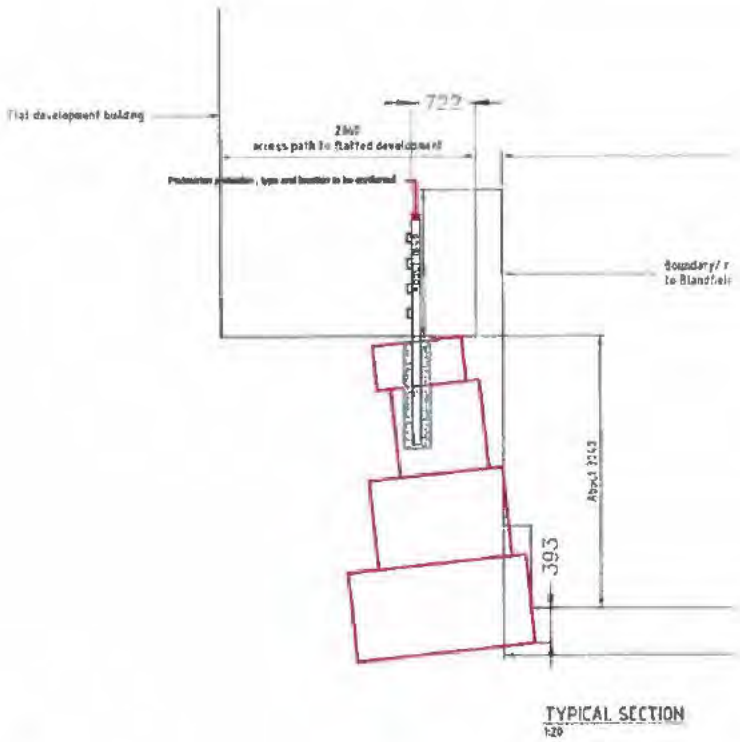


Figure 1-Gabion wall

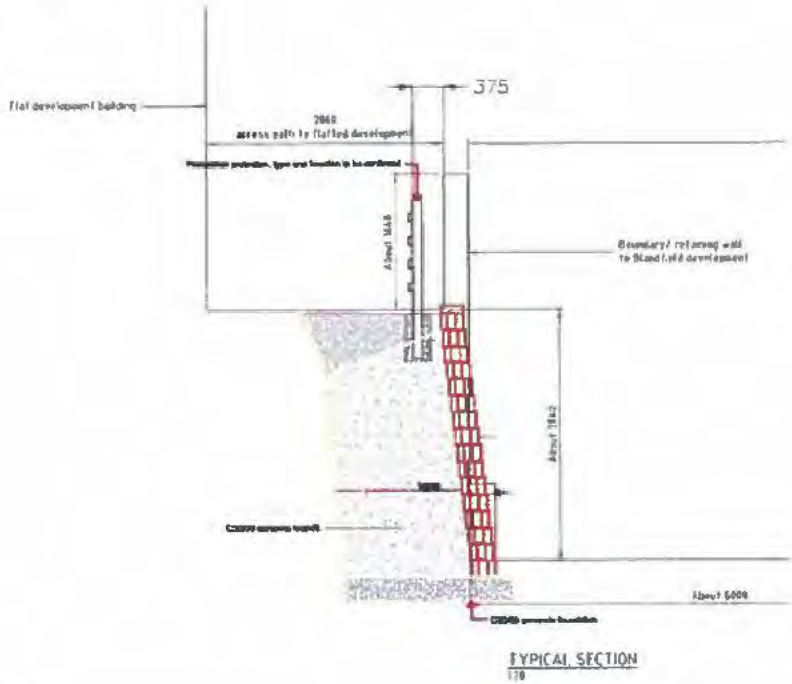


Figure 2-MacWall

Jet Grouting

Jet Grouting is an erosion/replacement system that creates an engineered, in situ soil/cement product known as Soilcrete. Effective across the widest range of soil types, and capable of being performed around subsurface obstructions and in confined spaces, jet grouting is a versatile and valuable tool for soft soil stabilization, underpinning, excavation support and groundwater control.



Figure 3-Jet grouting

Appendices

Appendix A-Previous reports

Blandfield Retaining Wall Inspection
Powderhall
Edinburgh

Structural Inspection

Goodson Associates

Blandfield Retaining Wall Inspection
Powderhall
Edinburgh

Structural Inspection

Client: Network Rail

Date: February 2014

Project No: 12276

Goodson Associates
53 Melville Street
Edinburgh
EH3 7HL

Email: edinburgh@goodsons.com
Web: www.goodsons.com
Tel: 0131 226 2044
Fax: 0131 226 3107

Contract number	12276	Signature	Date
Prepared by:	[redacted]	[redacted]	26 February 2014
Checked by:	[redacted]	[redacted]	27 February 2014

Goodson Associates
53 Melville Street
Edinburgh
EH3 7HL

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Goodson Associates
53 Melville Street
Edinburgh
EH3 7HL

1.0 Introduction

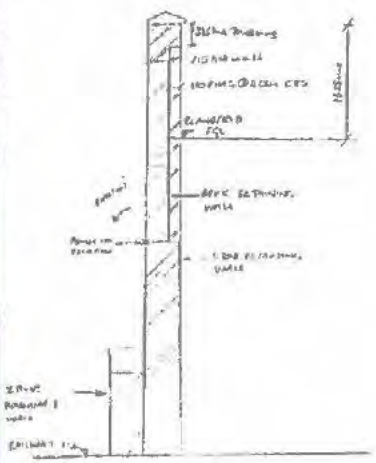
At the request of Network Rail, Goodson Associates inspected the Blandfield retaining wall to give an independent assessment of its condition. The inspection was carried out on the afternoon of Tuesday 25th February 2014, it was a clear, dry day.



2.0 Description

The wall in question runs along the boundary of the Blandfield development and the railway line which serves the Powderhall Waste Transfer Station. The wall retains the Blandfield development by approximately 3m, is approximately 146m long and is of varying construction.





2.0 Description (continued)

A stone wall approximately 1m high runs along the railway side of the retaining wall, this is thought to be the original railway boundary wall, and will be referred to as such throughout this report.

Immediately behind the development side of the low level boundary wall is the retaining wall. The base of this is a stone wall approximately 2m high, of which 1m is visible beyond the boundary wall, above this a brickwork wall has been built, this wall is approximately 2m high and retains another 1m approximately. The brickwork retaining wall construction is 215thk brick, with 465mm wide by 110mm deep piers at 4.06m centres and a widened aesthetic detail at the head.

The top brick section of wall is aesthetic and matches the boundary wall to the west of the site, as such it is assumed that this was the original boundary wall for the Powderhall Gas Works or possibly the subsequent British Gas Service Depot.



Retaining wall viewed from Blandfield



Blandfield west boundary wall

3.0 Condition Survey

The retaining wall shows sign of rotation movement in towards the railway line from the base of the brickwork to the top of the wall.

The retaining wall is currently retaining the Blandfield development. Within the development the bike stores have been built up against the retaining wall and are showing signs of rotation towards the railway line. Rotation of the bike stores is evident at the movement joint to the main building, these joints have opened up to approximately 90mm at the head but have stayed at approximately 25mm at the base and there is cracking evident in the timber cladding at high level.







3.0 Condition Survey (continued)

The substation access roadway is also showing signs of movement. The cracking runs almost the full length of the access road this shows that the distance between the building and the pin kerb/retaining wall has increased. These cracks will allow water ingress which will exacerbate the problem.





We note however that there is no sign of movement to the main buildings, with the exception of common local cracking to the heads of the lintels, which is of no structural concern.

Whilst props are in place at the railway side of the wall these will not be sufficient to avoid a collapse and already appear to be taking strain and loads from the wall. Additionally the props do not run the full length of the wall as the railway line widens out to two tracks and there is insufficient space for props.

The brick retaining wall is showing excessive rotation along its length, we measured the rotation off of the vertical of up to 470mm. This is well in excess of acceptable limits of approximately 70mm, assuming the wall is 215mm thick at the point of rotation.

4.0 Conclusions

The rotation of the wall is well in excess of acceptable limits even if the wall at the point of rotation is greater than what is visible. The retaining wall is over-stressed and is not structurally sound. There is a risk of collapse at any time with no warning.

We would recommend that immediate action is taken to make the wall sound in its temporary condition and to replace the wall as soon as possible. The replacement wall must be designed in accordance with current standards and must be approved by Network Rail due to the proximity of the railway line.

We also noted during our visit that the substation access roadway is being used for parking. We would advise that this access road is closed off with immediate effect, as surcharges applied by a vehicle are likely to exacerbate the problem.

1843-REP-01-P1

applied engineering design

Project	Blandfield Wall
Title	Interim statement

Revision history

Issue	Date	By	Checked	Description
P1	071214		-	draft for comment

© applied engineering design, 6 darnaway street, edinburgh, eh3 6bg. tel: +44(0)131 2255116. email: design@aed.eu.com

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1. Terms of reference

Peverel Scotland Limited have appointed Applied Engineering Design Limited (AED) to produce a report recommending a course of action for the correction of the situation currently pertaining with regard to the large retaining wall forming the north-east boundary of the Blandfield residential development. The wall has failed and is in the process of failing outwards over the adjacent railway line. Failure is currently slowed by the presence of limited lifespan temporary works erected on the railway line by Network Rail.

2. Work undertaken

- Gathering archive material
- Gathering new site data
    - Surveys
    - Monitoring
- Working with other stakeholders to probe various ways forwards
    - Scottish Power
    - Network Rail
    - City of Edinburgh Council
- High level scoping of solutions
    - Assessment of a wide range of potential solutions

2.1. Archive material

2.1.1. Material sources

AED have successfully gathered information on the development and the site in general from various archive sources including:

- City of Edinburgh Council Planning and Building Control
    - Planning and warrant drawings
- City of Edinburgh Council archives
    - Drainage records
- Scottish Power
- British Telecommunication plc
- Scottish Gas Networks
- Scottish Water
- Royal Commission on The Ancient and Historic Monuments of Scotland
- Photographic records of the city
- Nearby borehole records

2.1.2. Findings

As suspected, the record drawings of the building indicate that it is founded many metres below the zone of ground influenced by the failing retaining wall, on concrete piles. As such the wall's condition presents no immediate risk to the stability of the housing development.

The subject of coal gas production on the site has been investigated and found to be not proven, despite the presence of a gas holder on the site in the past.

2.2. Gathering new site data

As agreed at the first Resident's meeting, we have volunteered to undertake weekly monitoring of the wall positon relative to the building. We have found no evidence of movement during this period. This suggest that for the time being the wall has come to rest against the temporary timber shoring installed by Network Rail.

During site works is has been noted that the existing similarly constructed red painted brick wall on the south-west side of the site, separating the development from the semi-detached houses fronting McDonald road, is also failing. Instructions regarding the inclusion of this wall in the recommendations of the report have been sought from Peverel.

AED have tendered and commissioned a geometric survey of the wall which we will overlay over the topographical survey of the site made circa 1998, which includes the wall alignment at that time. This may yield some useful information on the movement of the wall over time and potentially any movement of the wall before the development was built. Any of this information has the potential to be informative in terms of any legal action to be taken. This survey will be complete by 12 December 2014.

2.3. Working with other stakeholders

2.3.1. Scottish Power

We have held several meetings with Scottish Power on site. During these discussions and later by email we have made progress on the following:

- The substation
    - Design done when initially installed
    - Construction works carried out
    - Removal or relocation potential
- Associated underground cables
    - Relocation of supply cables
        - Currently running between the wall and the buildings, hampering future work

2.3.2. Network Rail

We have had email correspondence with Network Rail's solicitor Louisa Black and subsequently with both Asset Protection Scotland and Operational Property Scotland within Network Rail, regarding a number of issues and questions:

- Access for geometric survey of wall
- Discussions re:
  - Purchase of railway land by Blandfield owners
  - Requirements placed on works adjacent the railway
  - Longevity of existing timber protective works

2.3.3. City of Edinburgh Council

Discussion are ongoing with the Planning Department regarding any restrictions on the appearance of a replacement wall.

3. High-level assessment of solutions

AED have carried out preliminary studies on a number of viable options including the following:

1. Taking down the wall and rebuilding using:
   a. Masonry
   b. Concrete
   c. Gabions
   d. Proprietary retaining wall systems
2. Brace wall and tie-back
3. Strengthen with steelwork then anchor through the wall, back under the site
4. Purchasing a strip of land from Network Rail followed by:
   a. encapsulating the current wall in a sloping embankment
   b. constructing a sequence of walls stepping down to the track
5. Replacing the wall with driven sheet piling, prior to demolition of the existing wall

4. Current position

Sufficient information was received from Network Rail last week to make it clear that:

- There is no realistic prospect of land being purchased from them in order to facilitate any of the options under consideration which require permanent land-take from Network Rail. This results in a reduction of the options listed above.
- While they wish the wall to be fixed without delay and despite the low use of the line they are not in a position to grant preferential wayleaves for construction works and all matters must be subject to the normal restrictions pertaining to a live railway lines.
- The existing shoring represents an expedient action on their part but should not be assumed to provide stability to the wall.

Scottish Power continue to be helpful in providing information on their assets and input to proposals which feature total or partial relocation of their plant.

There is a reduced likelihood of gas works contaminants in the ground beneath the site which makes certain options more attractive and the occurrence of Special Waste disposal costs during the works less likely.

Discussion are ongoing with proprietary retaining wall solution providers to use their products in replacement of the wall, should this prove advantageous.

As a result of the above, AED are now in a position to advance the production of the final report and recommendations, although not in time to complete the task for the 9 December 2014 Residents' meeting or before the Christmas 2014 break.

5. Report delivery

We now propose to deliver the final report in draft format for discussion by 12 January 2015.

Applied Engineering Design Limited
08 December 2014

Harper Macleod LLP

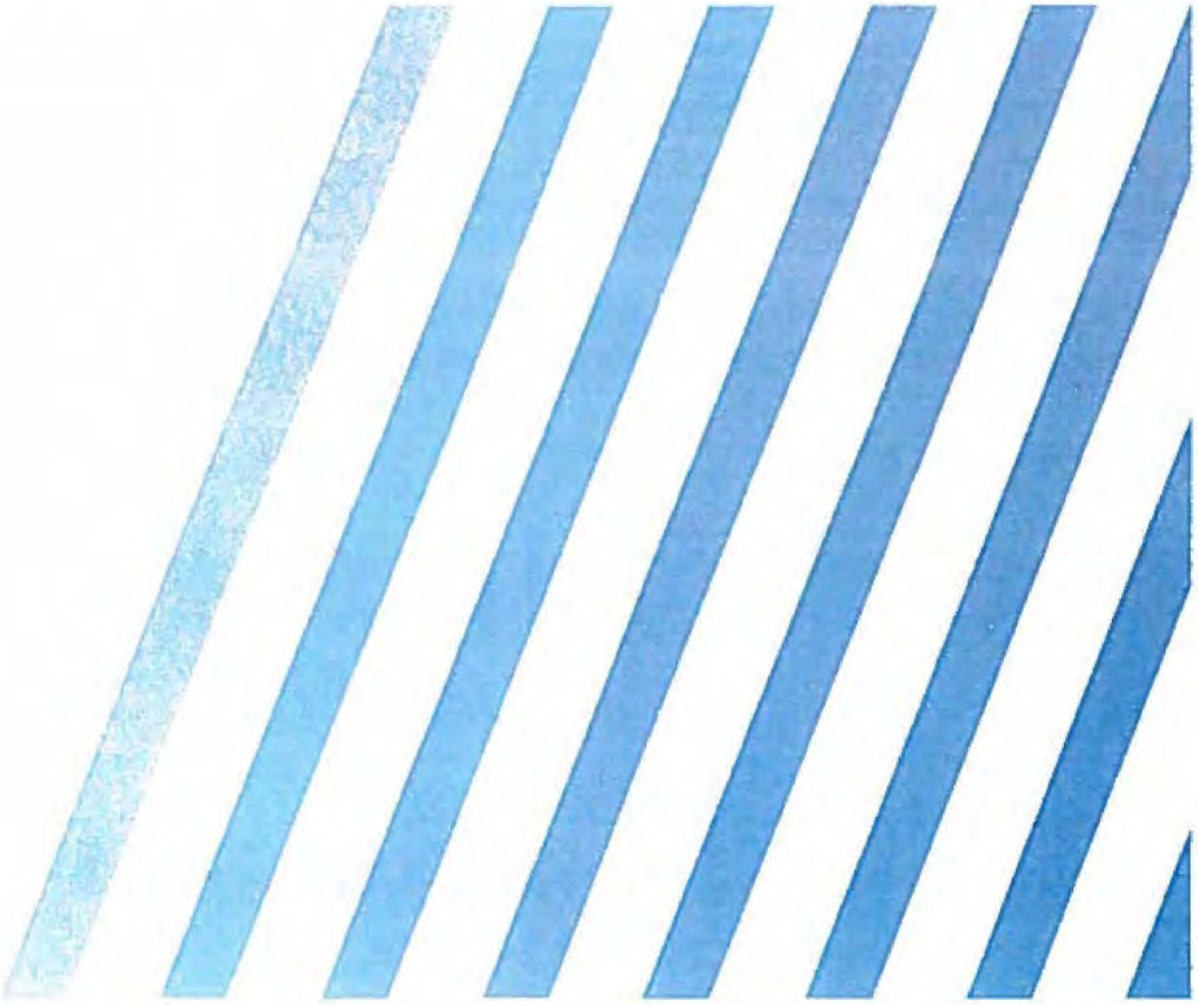
Opinion by

[redacted]/

Network Rail Infrastructure Limited and [redacted] and 146 Others/

relative to/

OWNERSHIP OF RETAINING WALL AT BLANDFIELD, POWDERHALL, EDINBURGH



Contact

[redacted]
Partner
Harper Macleod LLP

t/ 0141 227 9323
f/ 0141 229 7370
e/ [redacted]@harpermacleod.co.uk

The Ca'd'oro
45 Gordon Street
Glasgow
G1 3PE
t/ 0141 221 8888
f/ 0141 226 4198

14-18 Cadogan Street
Glasgow
G2 6QN
t/ 0845 878 4504
f/ 0141 308 4347

8 Melville Street
Edinburgh
EH3 7PS
t/ 0131 247 2500
f/ 0131 247 2501

Alder House
Cradlehall Business Park
Inverness
IV2 5GH
t/ 01463 798 777
f/ 01463 798 787

e/ info@harpermacleod.co.uk
www.harpermacleod.co.uk

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Opinion

by

[redacted]

for

Network Rail Infrastructure Limited and [redacted] and 146 Others

relative to

Ownership of Retaining Wall at Blandfield, Powderhall, Edinburgh

1.0 Introduction

I have received a Joint Remit from the above parties through their respective solicitors, Maclay Murray & Spens LLP and Gebbie & Wilson. The terms of the remit are contained in a letter of instruction from Maclay Murray & Spens to me dated 15th August 2014. Accompanying that letter of instruction was a folder of papers including the parties' Sasine titles and various plans, reports and photographs. The parties' submissions are contained in the said letter of instruction. The issue relates to the ownership of a retaining wall ("the Retaining Wall") which, as a physical matter, lies between a residential housing estate known as Queens Gardens Housing Development or Blandfield Development, Broughton Road, Edinburgh and the railway line.

1.1 There are in fact two walls, a lower stone built wall approximately one metre in height ("the Lower Wall") and behind that the Retaining Wall. The base of the Retaining Wall is also stone of approximately two metres in height but the top section of the Retaining Wall is made of brickwork for a further two metres in

height. The Retaining Wall runs for approximately 146 metres in length from an overhead railway bridge to the southmost boundary of the housing development. It is accepted that the stone Lower Wall is older than the stone base of the Retaining Wall.

2.0 The Railway Title

As with many Network Rail titles the original deed is in favour of a private railway company. In this case it is a disposition by Robert Latta in favour of the North British Railway Company recorded in the New Particular Register of Sasines kept for the Sheriffdom of Edinburgh and Constabularies of Haddington etc. on 26th March 1866. The description of the subjects in that disposition is in the following terms:-

"All and Whole these three acres and three hundred and seventy nine decimal or One thousandth parts of an Acre imperial measure or thereby lying in the parishes of Saint Marys and Saint Cuthberts in the County of Edinburgh as the same are delineated and coloured red on the Map or Plan thereof signed by me as relative hereto and which lands hereby conveyed are parts and portions of All and Whole the Lands of Blandfield as particularly described in the Instrument of Sasine in my favour recorded in the New Particular Register of Sasines for the Sheriffdom of Edinburgh on the Sixteenth day of May in the year Eighteen hundred and fifty three with the tiends of the said lands and others hereby conveyed together with all rights and pertinents belonging to the said lands and others hereby conveyed, and all such right title and interest in and to the same as I and my foresaids are or shall become possessed of and are by the said Acts empowered to convey;"

No physical boundaries are mentioned in this description which is perilled entirely on the attached plan. The plan does not contain any legend nor any reference to specific boundary features such as walls or fences.

3.0 The Blandfield Development Title

the Blandfield Development was constructed by Barratt Homes Limited. Barratt's title is described in three separate dispositions as follows:-

(a) Disposition by North British Railway Company in favour of Edinburgh and Leith Gas Light Company recorded in the Division of the General Register of Sasines for the County of Edinburgh on 16th May 1883.

(b) Disposition by Ebenezer Erskine Scott to the Edinburgh and Leith Gas Light Company recorded in the said Division of the General Register of Sasines on 12th November 1883.

(c) Disposition by Noel Brittain Erskine as Trustee for McFarlane and Erskine with consents in favour of McFarlane and Erskine Limited recorded in the said Division of the General Register of Sasines on 20th May 1943.

3.1 The description in the disposition by North British Railway Company to the Gas Company of 1883 is in the following terms:-

"All and Whole that triangular piece of ground part of the lands of Blandfield delineated and coloured green on the plan annexed and subscribed as relative hereto consisting of three hundred and thirty eight square yards imperial measure or thereby bounded on the north or north east by the wall of the Edinburgh Leith and Granton Brach of our Railway along which it extends twenty five feet or thereby on the east or south east by another part of the lands of Blandfield along which it extends one hundred and eighty feet or thereby and on the west or north west partly by Bonnington Road and partly by the wing wall of the Bridge

carrying said road over our Railway along both of which it extends one hundred and eighty five feet or thereby with the pertinents and which triangular piece of ground is part and portion of All and Whole these three acres & three hundred and seventy nine decimal or one thousandth part of an acre imperial measure or thereby parts and portions of the lands of Blandfield particularly described and disponed in Disposition granted by Robert Latta, writer, in Edinburgh with consent therein mentioned in our favour dated twentieth and twenty first March eighteen hundred and sixty six and recorded in the New Particular Register of Sasines for the Sheriffdom of Edinburgh etc. on the twenty sixth day of March Eighteen hundred and sixty six and lyes in the County of Edinburgh together with all our rights title and interest present and future in and to the said triangular piece of ground and others Declaring as regards the mines and minerals in and under the said piece of ground and the solum of the wall along Bonnington Road including the solum of the said wing wall these presents shall only convey such right and interest if any which we have therein."

3.2 The description of the ground conveyed in the disposition by Ebenezer Erskine Scott to the Gas Company also of 1883 is in the following terms:-

"All and Whole that part or portion of the lands of Blandfield consisting of two acres Imperial measure or thereby delineated and coloured red on the Plan annexed and subscribed a relative hereto and bounded as follows videlicet on the north by the wall of The Edinburgh Leith and Granton Branch Railway of The North British Railway Company along which it extends Four hundred and forty eight feet six inches or thereby on the east by another part of the Lands of Blandfield belonging to me along which it extends Two hundred and one feet three inches or thereby on the south by another part of the Lands of Blandfield belonging to me along which it extends Four hundred and thirteen feet six inches

or thereby and on the west partly by Broughton or Bonnington Road along which it extends twenty six feet or thereby and partly by ground belonging to the said The Edinburgh and Leith Gas Light Company along which it extends one hundred and eighty feet or thereby."

3.3 The description of land contained in the disposition by Noel Brittain Erskine as Trustee in favour of McFarlane & Erskine Limited of 1943 is in the following terms:-

"<u>In the First Place</u> All and Whole that area of ground containing Three hundred and twenty seven decimal or one thousandth parts of an acre or thereby Imperial Measure bounded as follows videlicet:- on the south west by McDonald Road, Edinburgh along which it extends One hundred and twenty seven feet three inches or thereby, on the north west by ground formerly belonging to the Governors of George Herriot's Trust along which it extends eighty seven feet two inches or thereby on the north east by the property formerly of the Edinburgh and Leith Gas Commissioners along which it extends one hundred and eighty two feet ten inches or thereby and on the south east by ground also formerly belonging to the said Governors of George Herriot's Trust presently forming the access road leading from McDonald Road to the Broughton Soap Works along which it extends seventy seven feet or thereby which area of ground forms the south west portion of All and Whole that area of ground containing seven hundred and fifty eight decimal or one thousandth parts of an acre or thereby Imperial Measure bounded as follows videlicet:- on the south west by McDonald Road, Edinburgh along which it extends three hundred and forty five feet six inches or thereby on the west also by McDonald Road along which it extends ten feet or thereby again on the south west by McDonald Road along which it extends seventeen feet six inches or thereby again on the west by Broughton Road along which it extends

ninety one feet six inches or thereby on the south east by the property formerly of the Edinburgh and Leith Gas Commissioners along which it extends four hundred and three feet or thereby and on the north east by ground formerly belonging to the said Governors forming the access road leading to McDonald Road to the Broughton Soap Works along which it extends twenty seven feet or thereby as the said area of ground under description is delineated and coloured pink? and edged green on the plan prepared by Donald Alexander Young, Architect, in Edinburgh and Superintendent of Works of the Trust and annexed and subscribed as relative to contract of feu between the said Governors the ..... Typesetting Company Limited dated First, Second, Third and Twelfth and recorded in the Division of the General Register of Sasines applicable to the County of Edinburgh Twenty Third all days of February in the year Nineteen Hundred." [1]

3.4 I have seen a copy of the disposition in favour of Barratt Homes Limited and I have seen a copy of a title sheet for one of the flats within the Barratt Development namely title sheet MID 13452 in respect of a flat at 142/15 Broughton Road, Edinburgh. The property section of that title sheet indicates that the flat lies within a development edged red. I have not seen copies of the plans which were attached to the three Sasine dispositions forming the Barratt title.

3.5 I have noted that reference is made to the north or north east boundaries of the lands conveyed to the Gas Company as being:-

"*The wall of the Edinburgh Leith and Granton Branch of our Railway.*"

3.6 Although the disposition to the North British Railway Company only refers to a plan some help is afforded by the fact that the same railway company conveyed some of its ground to the Gas Company and in that disposition the north or north east boundary is stated to be the physical feature of a wall which is stated to

[1] *Parts of the disposition are difficult to read*

belong to the railway. On that basis one can accept that a wall was in existence some time before the granting of that disposition in 1883. So far as the disposition of 1943 is concerned none of the boundaries is stated to be the wall of the Railway or indeed any ground belonging to the Railway.

4.0 The Sasine Presumptions

The general rule is that where subjects in a Sasine title are stated to be bounded by a particular physical feature that feature is excluded. There are special presumptions applicable to public roads, mutual walls and certain water boundaries. However where subjects are stated to be bounded by a wall (as opposed to a mutual wall) the wall itself and the ***solum*** of the wall are excluded from the subjects conveyed [2]. Generally speaking a physical boundary will rule even if a surface area or a lineal measurement or indeed a demonstrative plan would indicate a different boundary line provided the boundary feature is clear [3]. The physical boundary relied on however must be clear and unambiguous [4]. There is also another presumption which can operate where two out of three description features are consistent. Thus if physical boundaries conflict with a plan attached to the deed but there is also an area measurement the plan can be preferred even to the physical boundaries if on a scaling it accords with the measurement [5].

4.1 It should be emphasised that these are presumptions only and according to Halliday at least, where there is litigation the function of the court is to determine what the intention of the parties was at the time the description was actually

---

[2] *Smyth v Allan (1813) 5 Pat. App. 669; Rankine, The Law of Land Ownership in Scotland 110; Halliday, Conveyancing Law and Practice 2nd Ed 33-11; Gordon and Wortley, Scottish Land Law 3-44; Conveyancing (Re-issue) Title Stair Memorial Encyclopaedia para 135*

[3] *Ure v Anderson (1834) 12S 494; Fleming v Baird (1841) 3D 1015; Blyths Trustees v Shaw Stewart (1883) 11R 99; Drumallayn Development Trust v Page 1987 SLT 379; Gibson v Bonnington Sugar Refining Co (1869) 7M 394; Currie v Campbell's Trustees (1888) 16R 237; Royal & Sun Alliance Insurance v Wyman-Gordon Limited 2001 S.L.T. 1305; Rutco Incorporated v Jamieson 2004 G.W.D. 30-620; Hamilton v Dumfries & Galloway Council 2007 G.W.D. 20-347; Halliday, Conveyancing Law and Practice 2nd Ed 33-13; Gordon and Wortley, Scottish Land Law 2nd Ed 3-08*

[4] *Luss Estates Co v BP Oil Grangemouth Refinery Limited 1987 S.L.T. 2001*

[5] *North British Railway v Moon's Trustees (1879) 6R 640*

framed. Halliday takes the view that extrinsic evidence is competent as to the circumstances of the transaction as is evidence of possession. There will of course be no-one able to give evidence as to the intentions of the parties in 1883. It seems unlikely that any walls had been erected at the time the North British Railway Company took title from Robert Latta in 1866 [6].

5.0 Measurements on Site

No evidence from surveyors has been presented to me. It did occur to me that the dispositions of 1883 to the Gas Company both contained references to plans, lineal measurements and surface areas. On the basis that there has been no plotting of the lineal measurements nor any calculation of where the surface area might lead the presumption set out above I assume the parties agree that the physical boundary (i.e. the wall as described in the deeds) will rule.

6.0 Construction Evidence

In relation to the time of construction of the two walls there is evidence from the British Geological Survey and building stone assessment that the Lower Wall was build before the Retaining Wall. Logically if the Lower Wall was the only wall in place at the time of the grant of the two 1883 dispositions to the Gas Company then that is the wall referred to in these titles and accordingly the ***solum*** on which the Retaining Wall rests was conveyed to the gas company. The evidence also suggests that there would have been no need for a retaining wall in 1863.

7.0 The Submissions for the "Barratt" Proprietors

The proprietors of the Blandfield Development have argued that the lower half of the Retaining Wall would have been built in stone by the Railway Company at the same time as the road bridge crossing over the Railway was built. The brick attachment would presumably have been built thereafter by the Gas Company

[6] *Entry was taken in 1865*

when they increased the level of their adjacent ground. It is also argued that it would have been necessary to raise the level to accommodate the road bridge and provide sufficient height above the railway line and that that would have been the reason for the stone base part of the retaining wall to have been erected by the Railway Company on their own ground.

8.0 The Registered Title

The Barratt Homes title was a disposition by BG plc in their favour recorded in the Division of the General Register of Sasines applicable to the County of Midlothian on 13th November 1998. The subjects conveyed were described by reference to the two dispositions of 1883 and the disposition of 1943 so that everything that was described in these three dispositions was conveyed to Barratts. For the purposes of this Opinion I am assuming that the north east red boundary line on the title plan for MID 13452 is at the outer extremity of the Barratt title and that this red line is meant to represent:-

"*The wall of the Edinburgh Leith and Granton Branch Railway of the North British Railway Company.*"

I make this point because the extent of the Barratt title is governed by Land Registration law rather than pure property law.

8.1 The property section of MID 13452 [7] includes the common rights set out in the deed of conditions granted by Barratt Homes Limited in 1999. The phrase "Whole Area" is defined in that deed of conditions as:-

"*The whole of the area of ground comprising the Queens Gardens Housing Development, Broughton Road, Edinburgh with all buildings and erections whether heritable or moveable thereon.*"

[7] *I assume all titles to the flats are the same*

"Mutual Areas" is defined as those parts of the Whole Area to which all Proprietors have a right in common in terms of the title deeds excluding common parts of that particular block of flats. These mutual areas are stated to include if within the Whole Area entrance roads, pavements, internal private roads, landscaped and amenity areas and more importantly:-

"*The walls, fences and other boundary enclosures of the whole areas* [presumably the reference to areas in the plural is a mistake]."

9.0 Opinion

There are various possible conclusions in this case:-

(a) The wall referred to in the Sasine titles may be the Lower Wall in which case the Retaining Wall is not within the Railway title.

(b) The wall referred to in the Sasine titles is the Retaining Wall in which case the Retaining Wall is within the Railway title.

(c) Although the Retaining Wall was conveyed to Barratt Homes Limited by the Disposition of 1998 it is nevertheless outwith the red line shown on the individual registered title plans for the flats and accordingly may not be within the definition of a "Mutual Area" in terms of the deed of conditions.

9.1 I have discussed separately with the two firms of solicitors representing the parties what is actually on site. Both have confirmed to me that there is no interior estate wall and that the Barratt Estate does physically run up to the face of the retaining wall. There are private pathways abutting the estate-ward face of that wall.

9.2 The geological evidence clearly suggests the two walls were built at different times. It also suggests that the Lower Wall was the first to be built and accordingly would have been the wall referred to in the Sasine titles for the Gas

Company. It is also unlikely that had the Retaining Wall been built first there would have been any need to subsequently build the Lower Wall. Having considered all the documents presented to me and the representations made on behalf of the parties I am of the opinion that the Retaining Wall was in the ownership of the Gas Company and was accordingly conveyed with its ***solum*** to Barratt Homes Limited. On the basis that there is no other estate wall constructed by Barratt Homes and that the Retaining Wall does form the north east boundary of the estate I am further of the view that it falls within the definition of "Mutual Areas" contained in the deed of declaration of conditions by Barratt Homes Limited being a wall or boundary enclosure of the "Whole Area". On this basis the wall is owned in common by the individual owners in the estate.

The Opinion of

[redacted]

45 Gordon Street
Glasgow
G1 3PE

22nd September 2014

QUICKNOTE

THE CITY OF EDINBURGH COUNCIL

PROPERTY SERVICES DEPARTMENT

SENDER:
1. DETACH FILE COPY
2. SEND TOP AND SECOND COPY TO ADDRESSEE

RECIPIENT:
1. WRITE REPLY AT BOTTOM
2. RETAIN TOP AND RETURN SECOND COPY TO SENDER

RE: 98/01532/STAGE 'A'

FROM: [redacted] TEL NO: 4575

STRUCTURES REF:

TO: B.C.D. REF:

MESSAGE: CONTAMINANTS DATE: 19.8.98

REFER TO THE ENCLOSED SUMMARY AND ESPECIALLY PAGE 12 OF THE WIMTEC REPORT RE - P.A.H. (POLYNUCLEAR AROMATIC HYDROCARBONS). LIAISE WITH THE CONTRACTOR RE THE CDM SAFETY FILE ON PROTECTION FOR OPERATIVES PRIOR TO ANY SITE VISIT.

[redacted]

REPLY: DATE:

WARRANT Nº 98/01532 / Stage A

BLANDFIELD HOUSE, 140 BROUGHTON ROAD

LAND CONTAMINATION - SUMMARY OF WIMTEC ENVIRONMENTAL REPORT.

A. FORMER USE - Contained Gas holders until the 1960s. Replaced with Office Block, car parks and filling stations removed recently.

B. GEOCHEMICAL CONTAMINANTS

HAZARD	RECEPTOR	RISK
LEAD	HUMAN	LOW
MERCURY	"	LOW
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)	"	HIGH (localised Northern corner of site)
COPPER	PLANTS	MODERATE
ZINC	"	LOW (generally) MODERATE (locally)
METALS	GROUNDWATER	LOW
AMMONIACAL NITROGEN	"	HIGH (localised)

RECOMMENDATIONS

1) METALS - Provide a topsoil/subsoil capping layer of 300 mm minimum where landscaped
2) P.A.H. - Remove if localised, Encapsulate if widespread.
3) Filling stations - further investigations required
4) Asbestos audit for the buildings on site should be obtained from British Gas.
5) GROUNDWATER - No action as groundwater described as utility rather than potentially drinking water.

P.T.O.

C. GAS

1) GASHOLDER LOCATION –

METHANE > 1% volume

SO9 15% volume

CO_2 > 1.5% Max 3.2% R2

OXYGEN. ~~deficiency~~ deficiencies in SO8 & SO10 where ~~=~~ CO_2 & Methane quite low.

HYDROGEN SULPHIDE & CYANIDE – NONE DETECTED.

= Pressure of the gas negligible throughout.

2) OTHER LOCATIONS –

METHANE < 0.4% volume otherwise insignificant

CO_2 > 1.5% Max 5.9% R3.

3) SO9 PURGED – METHANE entered the tube at about 1.7 l/hr.

4) CONCLUSIONS

a) Pockets of gas moving within the soil rather than significant gas generation

b) Migration possibly occurring to outwith the former tanks areas.

5) RECOMMENDATIONS

a) As there is no evidence of the generation of methane in large amounts a passive venting system should suffice

b) see Extract from the report.

ADDENDUM

PAH localised and being removed.

It is recommended that any building placed partly or wholly over the former gas holder should be provided with a passive venting system comprising a layer of single sized aggregate below the floor slab, within which layer should be place perforated pipe at minimum 6m centres.

A gas proof membrane with aluminium layer should be placed either below the floor slab (in which case a protective layer will be required between it and the aggregate layer) or above it (below a thick screed or other protective layer of concrete). The membrane should be taken through the floor and walls of the building and sealed at all joints and all service entries, etc, to form a continuous layer.

The results of the monitoring indicate that potentially explosive concentrations of methane will need to be vented. Accordingly, these gases could present a hazard if vented at ground level. On this basis, through-wall vents or venting trenches are considered inappropriate. It is therefore recommended that a solid pipe should be connected to the perforated pipes and taken to roof level. This arrangement will have the added benefit of increasing the efficiency of the venting system by a stack effect. A rotating cowl may be added to stacks to increase this effect.

The risk to any building wholly outside the former gasholder appears to be considerably less. However, given the increased sensitivity of the proposals over the existing office accommodation and the small risk of gas migration, it may be prudent to add a gas proof membrane to guard against any slight risk which may remain. The membrane should be continuous and sealed as above. However, the granular layer, piping and stacks should not be necessary.

Principal Scientist Director

LKR/IMF/PP

This report is not to be used for contractual or engineering purposes unless the report text and inside front cover sheet are signed where indicated by both the originator of the report and the checker/approver, and the report is designated 'FINAL' on this cover sheet.

SITE INVESTIGATION DEPARTMENT
WIMTEC ENVIRONMENTAL LIMITED
UPHALL

Appendix B-Historical maps



1856



1865



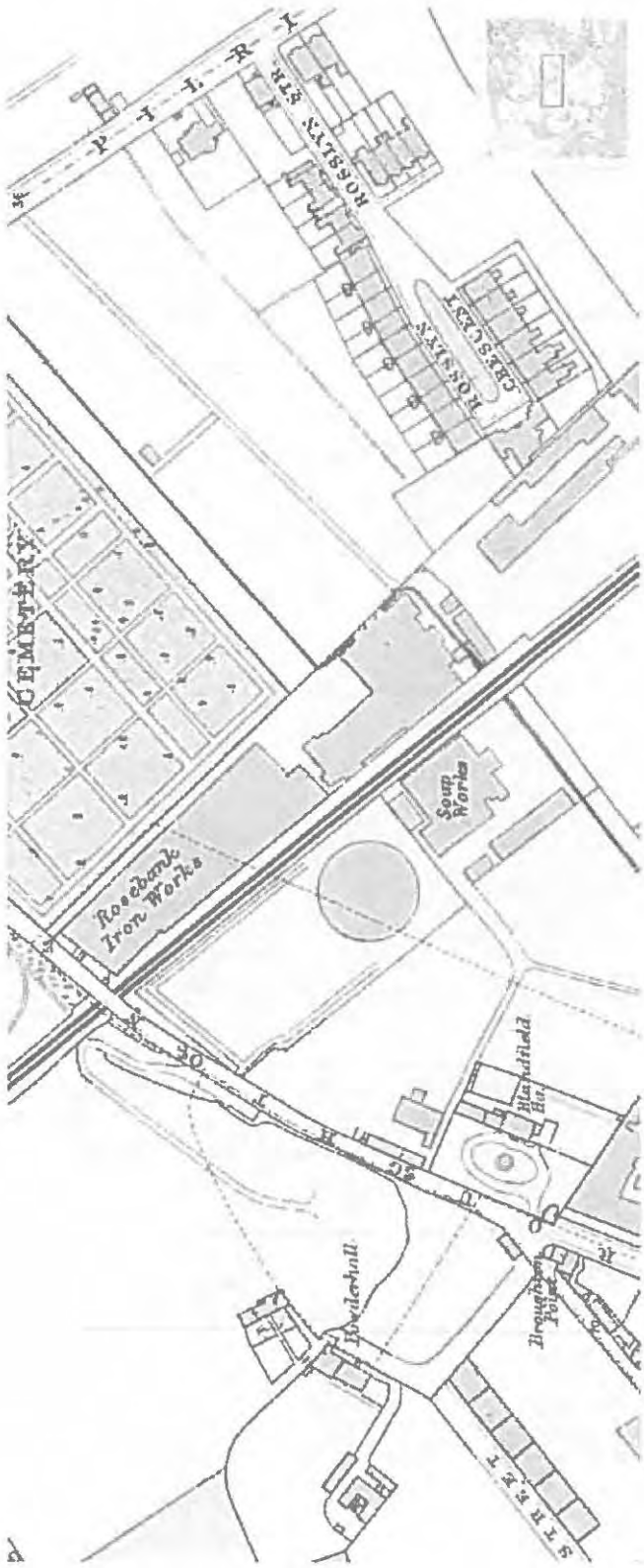
1876



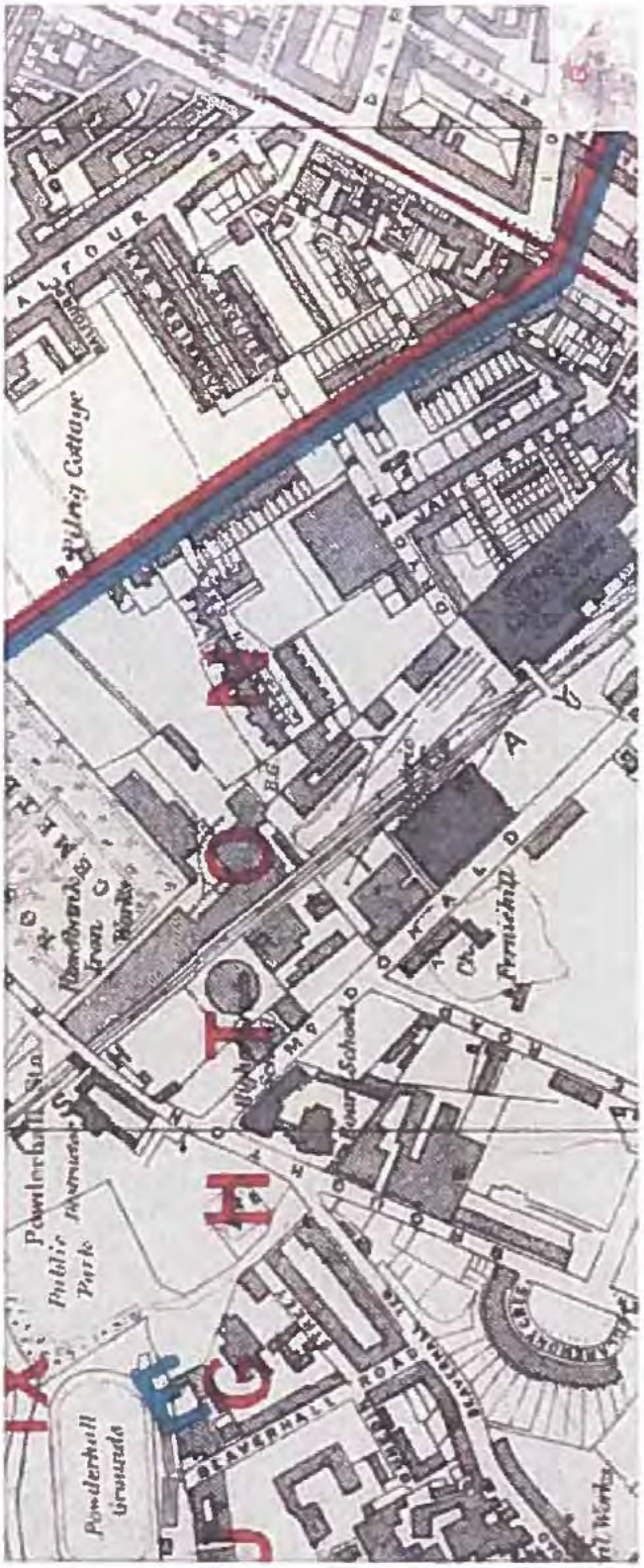
1882



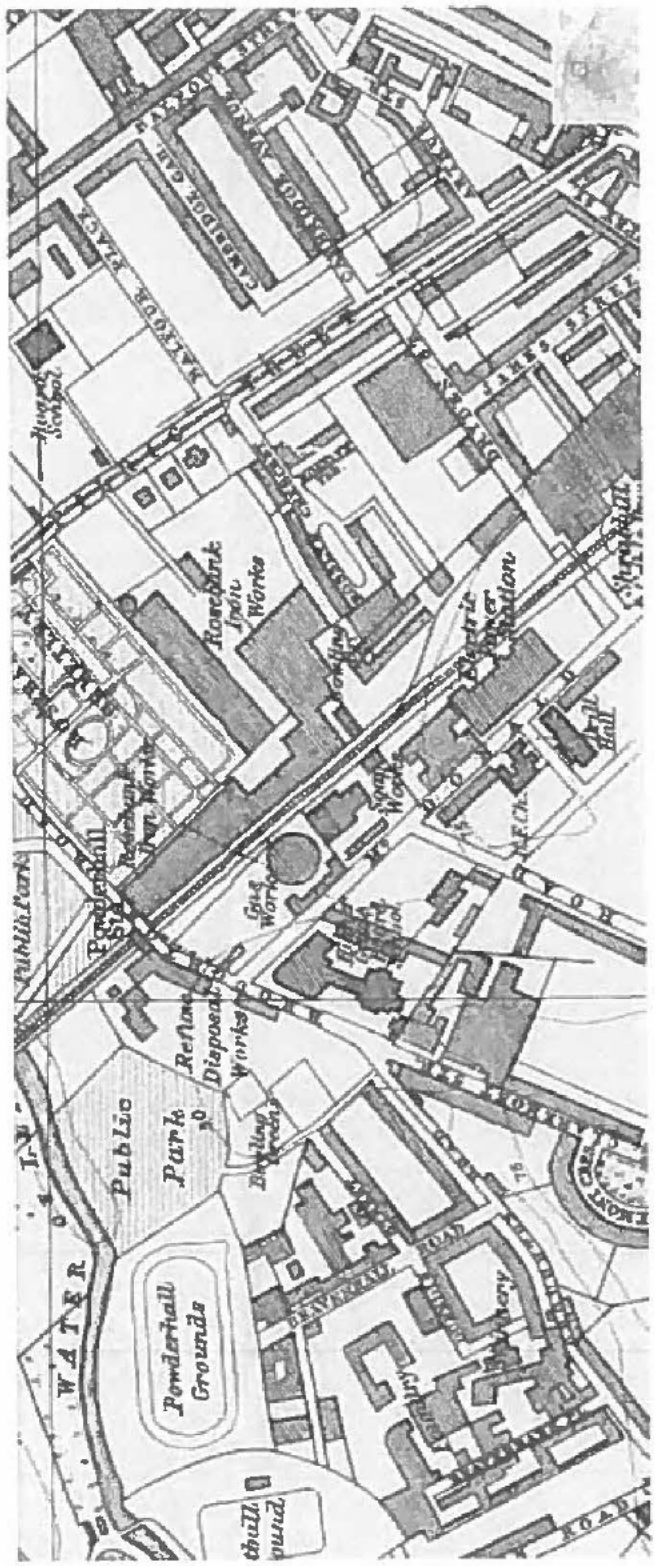
1888


CEMETERY
Rosebank Iron Works
Soup Works
Hazelfield
Howdenhall
Broughton Toll
Rosebank Cottages
Rosebank Terrace
Caledonian Crescent

1893


ALTOUR ST
Powderhall Cottage
Powderhall Public Park
Powderhall grounds
BEAVERHALL ROAD
ST MARGARETS ROAD
Primrose Bank Primary School
Chalmers Memorial

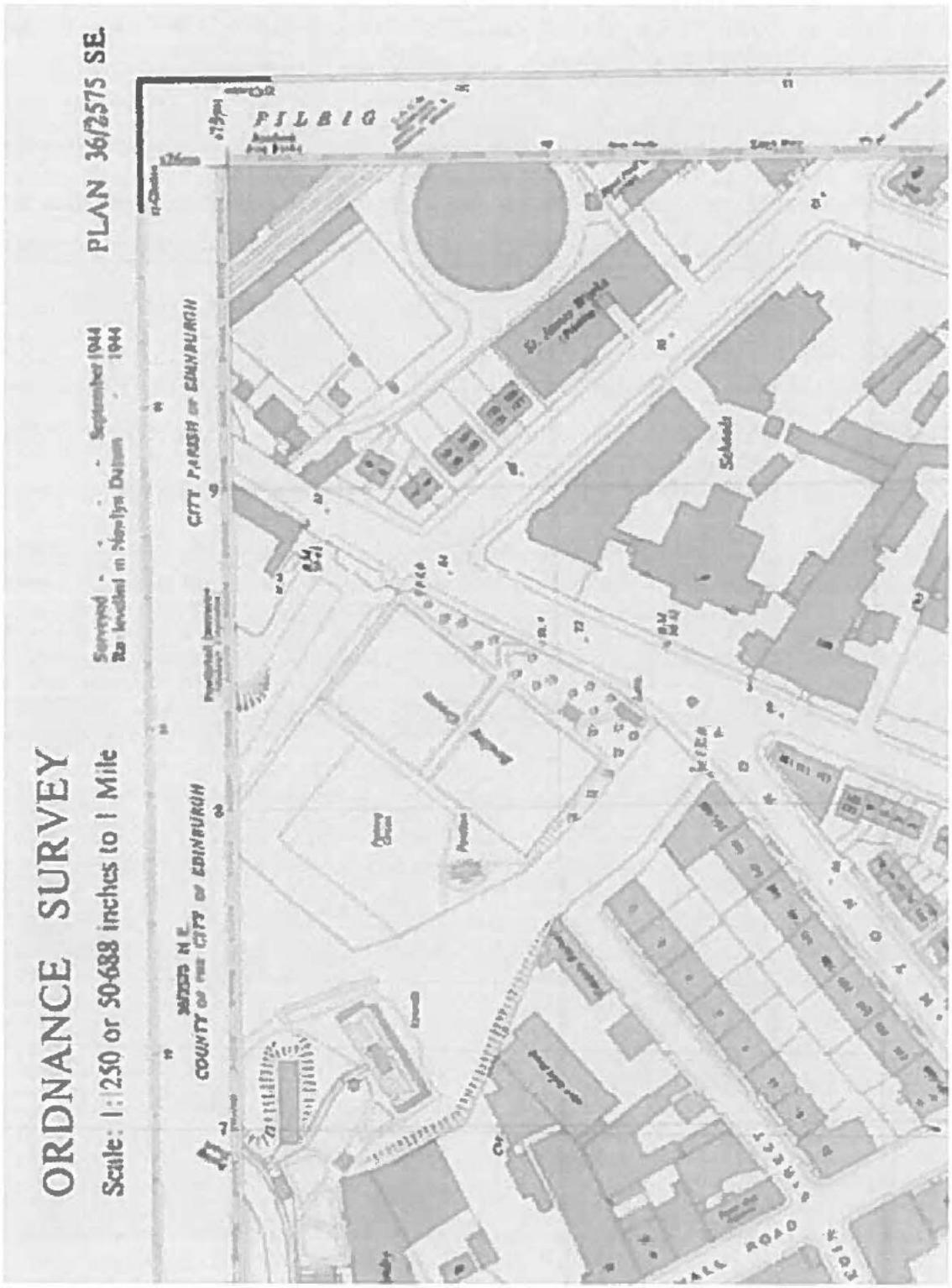
1905


Powderhall Grounds
Public Park
WATER
Powderhall Station
Rosebank Print Works
Gas Works
Refuse Disposal Works
Public Park
CAMBRIDGE STREET
YORK ROAD
LONDON ROAD

1918



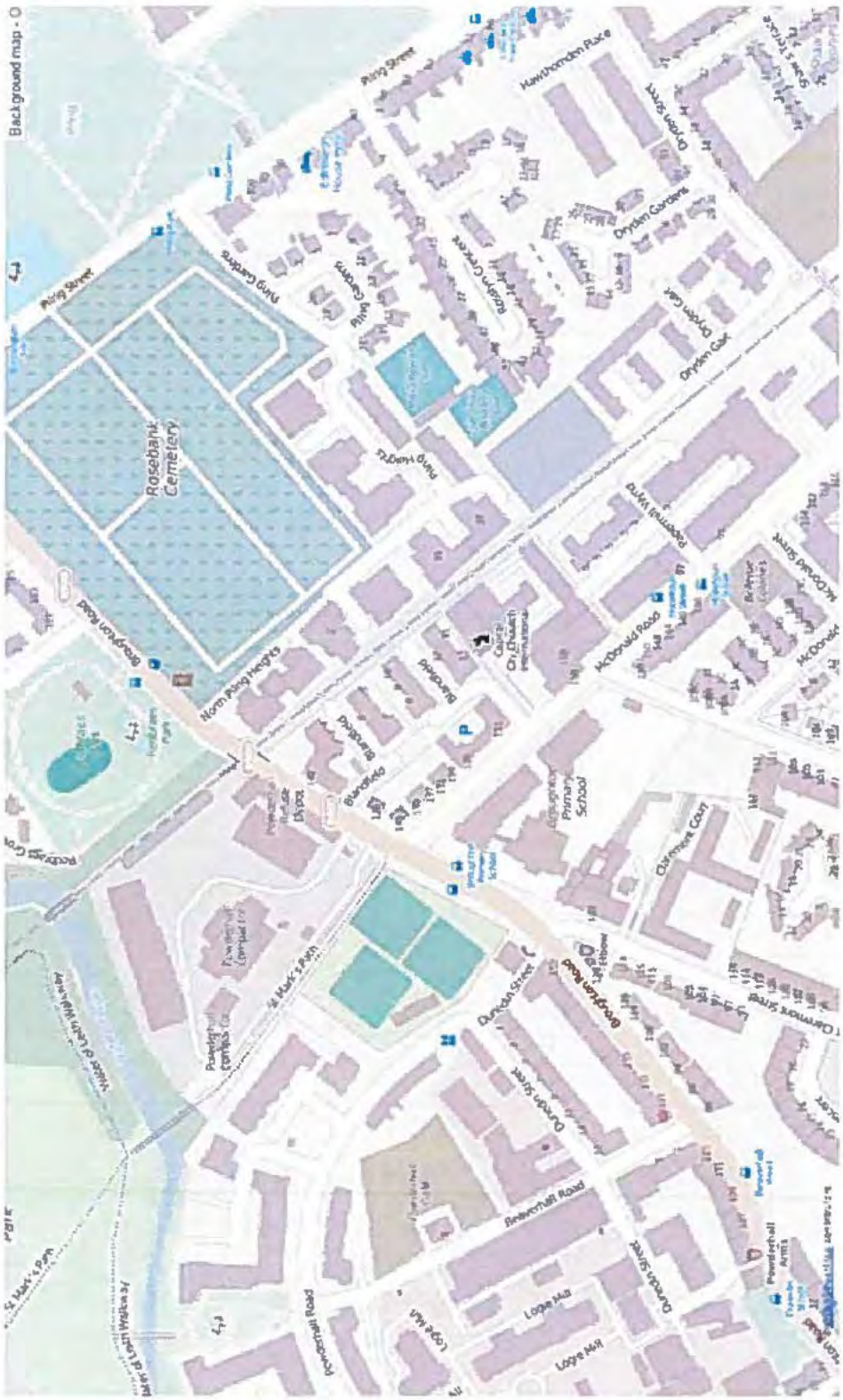
1932


ORDNANCE SURVEY
Scale: 1:1250 or 50·688 inches to 1 Mile
PLAN 36/2575 SE.
PILRIG
CITY PARISH OF EDINBURGH
COUNTY OF THE CITY OF EDINBURGH
Schools

1944


Leith Links
Cemy
Cemy
Cemy
Warriston
Royal Botanic
Garden
A902

1961

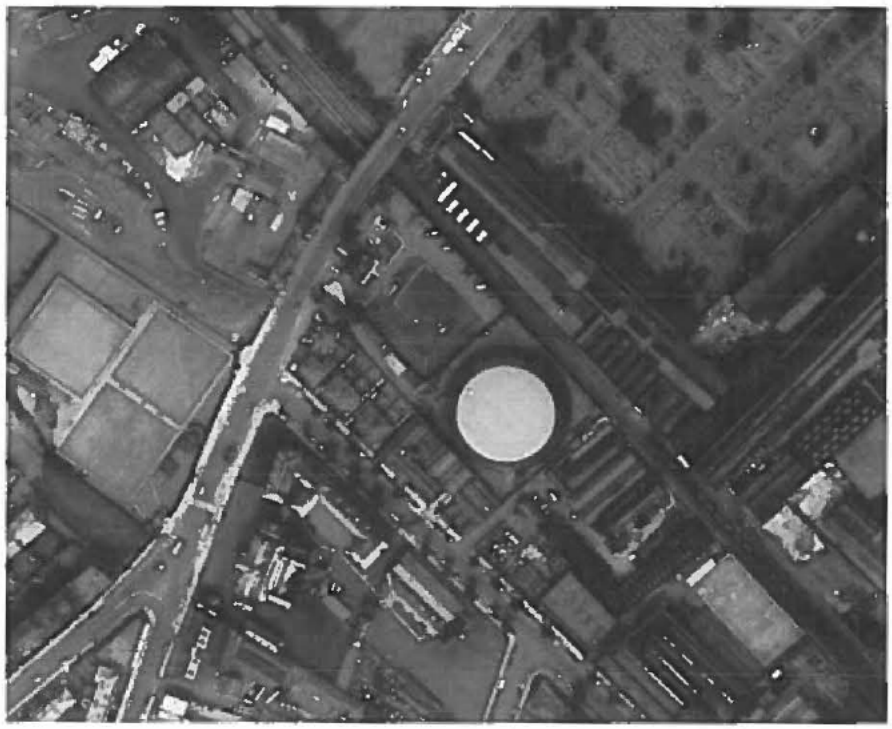

Background map - O
Rosebank Cemetery
Pilrig Street
Hawthornden Place
Dryden Street
Dryden Gardens
Dryden Gait
Pilrig Gardens
Pilrig Crescent
Pilrig Heights
Broughton Road
North Pilrig Heights
Bloomfield
Bloomfield Terrace
Bloomfield Depot
Powderhall Complex
Powderhall Bowling Club
St Mark's Park
Union of Leith Walkway
Duncan Street
Powderhall Road
Logie Mill
Powderhall Stables
Powderhall Arms
McDonald Road
McDonald Street
Pentland Vyrnd
Clermont Court
Clermont Street
Broughton Primary School
Rockville Gardens

2014

Appendix C–Historical photographs



1946



1961



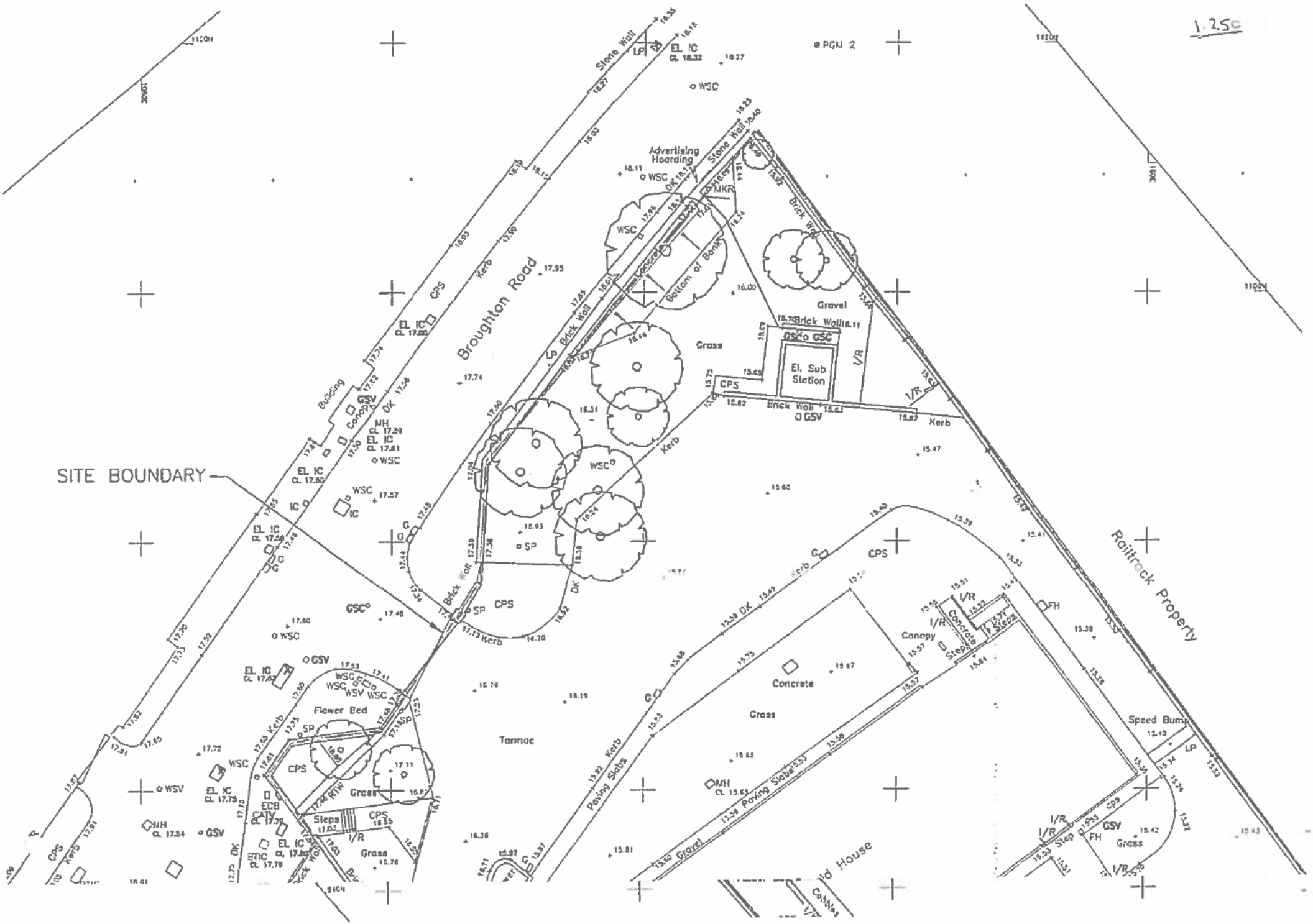
1971



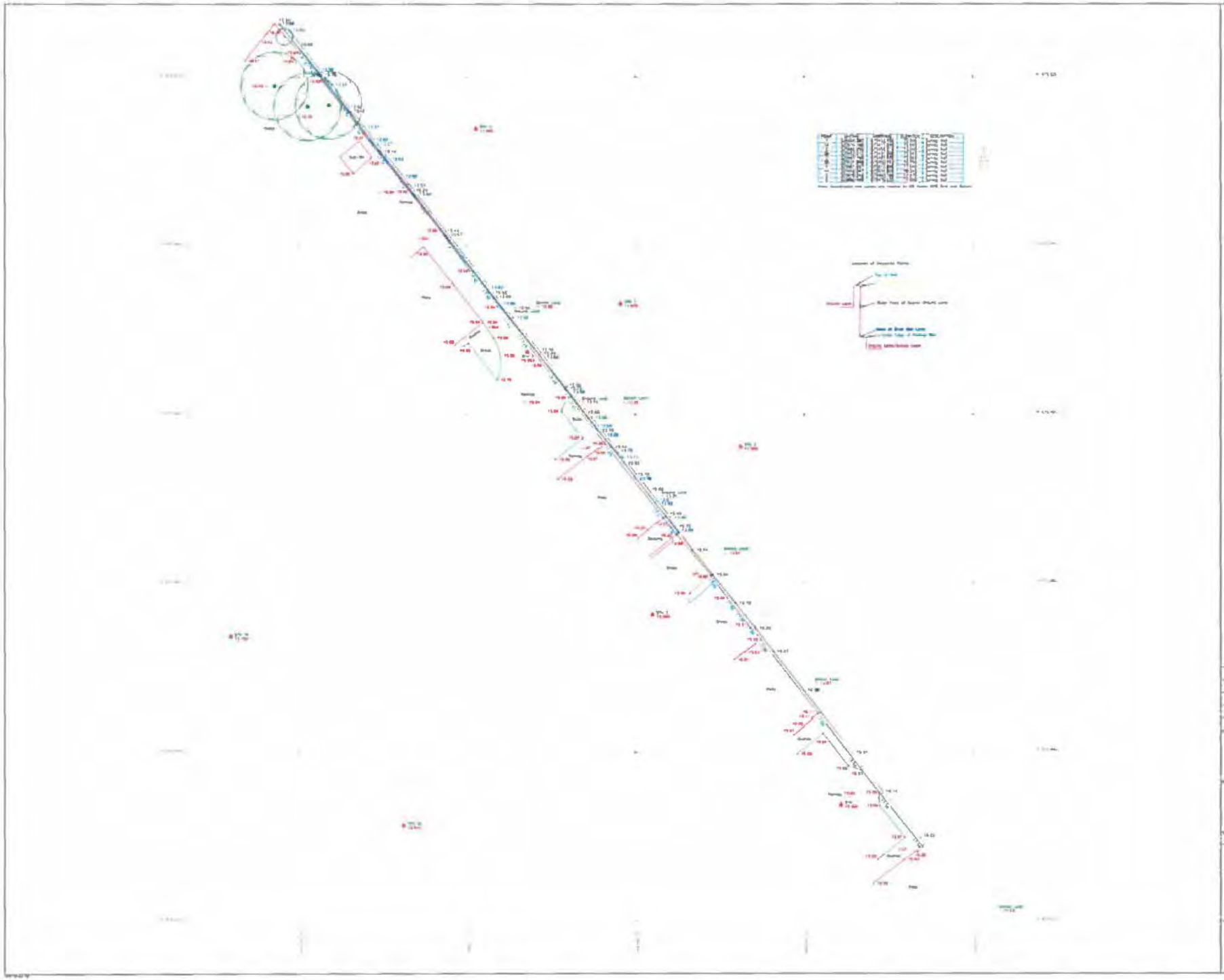
2009

Appendix D-Surveys

1998


1:250
SITE BOUNDARY
Broughton Road
Railtrack Property
Stone Wall
Advertising Hoarding
Brick Wall
Gravel
Grass
El. Sub Station
Concrete
Tarmac
Flower Bed
Steps
Canopy
Speed Bump
Paving Slabs
Cobbles
Kerb
Building
Bottom of Bank
PGM 2

2014



FOLIAGE

SYMBOLS

NOTE:

Blanchfield Wall
Edinburgh

Topographic
Survey

APPLIED ENGINEERING DESIGN
6 Dornoway Street
Edinburgh
EH3 6BG
tel 0131 564 1311

Loy Surveys
Chartered Land Surveyors

Appendix E-Monitoring data

BRIDGE & STRUCTURE EXAMINATION REPORT

Additional Examination

ELR: CPH	*Contract Mileage:* 002 *m* 0175 *yds* 7.95 *ch*	*Struc. Ref* R/026/002.0175

Examination Type:	Additional Exam	NR ID:	11001986	Exam Date:	27-Nov-2014
Area:	Scotland East	BRS:	0	OS Ref:	NT26177534
Structure Name:	DOWNSIDE	Type:	WR	Exam ID	2542587
Route:	Craigentinny - Powderhall (Goods Line)			Complete Examination:	N/A

Section A: To Be Completed By The Examining Organisation

HIDDEN PARTS NOT EXAMINED (EXCLUDING FOUNDATIONS)	Part	Reason

ITEM	DESCRIPTION	LOCATION	Est. Cost £ +/- 20%	Priority Within	Quantity	Severity	Probability	Risk Score	Works Category
1	Liaise with the personnel responsible for the maintenance and up keep of the wall and arrange for immediate repairs to stabilise / rebuild		0.00			5	2	E10	Brickwork/Stone Repairs

Engineers Notes

Signed For Employer	Name	Date 3-Dec-2014

Network Rail

BRIDGE & STRUCTURE EXAMINATION REPORT

Additional Examination

amey

ELR: CPH	Contract Mileage: 002 m 0175 yds 7.95 ch	Struc. Ref R/026/002.0175

Structure Type WR	Network Rail ID 11001986	Rpt ID 3886	Exam ID 2542587

OS Ref: NT26177534 BRS: Name: DOWNSIDE

Line: Craigentinny - Powderhall (Goods Line)

Exam Date
27/11/2014

Frequency	Reason For Examination:	Last Additional
2 Weekly	SCO-STR-0036	30/10/2014

The examiner should record any deterioration in condition or development of defects or other factors, which might place at risk the rail traffic, customers, staff or the public at large. Special reference should be made to those structures or parts of structures whose condition may require action before the next examination.

Examiner General Comments

Bi-weekly total station monitoring of the railway boundary retaining wall. 49 targets have been installed to the brick wall. Several reference targets have been installed on permanent stable features.
Wall will be examined visually in addition to the monitoring.

Has all of the structure been examined? No

(If no, state reasons below)

Bi-Weekly logging of monitoring points.

SIGNED [redacted]

EXAMINERS NAME [redacted]

DATE 3 Dec 2014

Amey Comments & Recommendations

Notes for attention

See attached Summary Sheet [X]

Further action required / query [ ]

No action required at present [ ]

Signed [redacted]

Engineer [redacted]

Date 3-Dec-2014

Network Rail Comments & Actions

Signed _____

SME _____

Date _____

27th November 2014:

Weather: Dry, 12C.

Comments on monitoring results:

All targets were observed four times using a Trimble S6 total station. The site grid has been established so that outward movement of the wall will be shown by a DECREASE in northings.

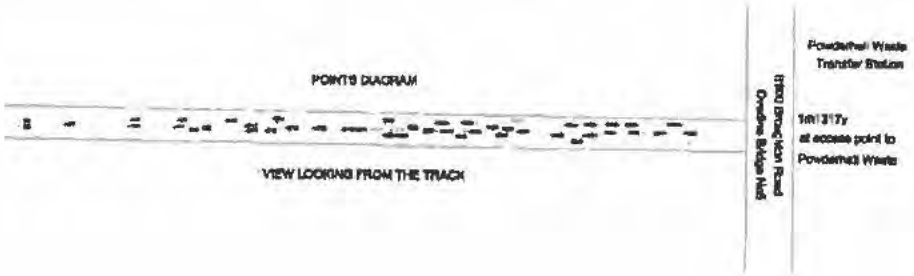
The boundary wall was visually examined and there were no visible changes when compared to the previous examination photos.

POINTS DIAGRAM



VIEW LOOKING FROM THE TRACK

Points Diagram 1



Points Diagram 2

BRIDGE MONITORING

CPH R026/002.0175 MONITORING

Project no. CPCE13C08

STRUCTURE No: R026/002.0175

ELR: CPH

Monitoring zero date 04/11/2013

NOTE: The 'Difference' columns highlight the differences between the latest measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No. 01						Point No W2					
	Reading	Difference	Reading	Difference	Level	Difference	Reading	Difference	Reading	Difference	Level	Difference
04/11/2013	998.787	Base	1008.184	Base	100.784	Base	999.281	Base	1008.175	Base	101.018	Base
25/11/2013	998.787	0.000	1008.184	0.000	100.784	0.000	999.241	-0.040	1008.171	-0.004	101.018	0.000
09/12/2013	998.788	0.001	1008.184	0.000	100.784	0.000	999.240	-0.041	1008.172	-0.003	101.018	0.000
19/01/2014	998.788	0.001	1008.185	0.001	100.784	0.000	999.241	-0.040	1008.174	-0.001	101.018	0.000
22/04/2014	998.788	0.001	1008.185	0.001	100.784	0.000			Point not visible			
25/04/2014	998.788	0.001	1008.185	0.001	100.784	0.000	999.282	0.001	1008.172	-0.003	101.018	0.000
06/05/2014	998.788	0.001	1008.182	-0.002	100.784	0.000			Point not visible			
19/05/2014	998.788	0.001	1008.181	-0.003	100.783	-0.001			Point not visible			
07/07/2014	998.788	0.001	1008.181	-0.003	100.783	-0.001	999.280	-0.001	1008.175	-0.000	101.018	0.000
25/07/2014	998.788	-0.000	1008.183	-0.001	100.784	0.000	999.280	-0.001	1008.175	-0.000	101.018	0.000
07/08/2014	998.788	0.000	1008.183	-0.001	100.784	0.000	999.282	0.001	1008.175	-0.000	101.018	0.000
27/08/2014	998.787	-0.001	1008.178	-0.006	100.784	0.000	999.283	0.002	1008.180	0.005	101.018	0.000
04/09/2014	998.788	0.001	1008.180	-0.004	100.784	0.000	999.284	0.003	1008.172	-0.003	101.018	0.000
16/09/2014	998.788	0.001	1008.181	-0.003	100.784	0.000	999.283	0.002	1008.172	-0.003	101.018	0.000
02/10/2014	998.788	0.001	1008.178	-0.006	100.784	0.000	999.282	0.001	1008.171	-0.004	101.018	0.000
20/10/2014	998.788	0.001	1008.183	-0.001	100.784	0.000	999.283	0.002	1008.173	-0.002	101.018	0.000
30/10/2014	998.788	0.001	1008.182	-0.002	100.784	0.000	999.283	0.002	1008.174	-0.001	101.018	0.000
21/11/2014	998.788	0.001	1008.183	-0.001	100.784	0.000	999.282	0.001	1008.175	0.000	101.018	0.000

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No. C/0C/215C/08

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base date 04/11/2013

NOTE: The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W3						Point No W4					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	998 499	Base	1008 314	Base	100 832	Base	1012 988	Base	1008 308	Base	100 282	Base
23/12/2013	998 499	0.000	1008 317	0.003	100 832	0.000	1012 988	0.000	1008 308	0.000	100 282	0.000
05/07/2014	998 499	0.000	1008 317	0.003	100 832	0.000	1012 987	-0.001	1008 307	-0.001	100 282	0.000
18/08/2014	998 500	0.001	1008 318	0.004	100 832	0.000	1012 987	-0.001	1008 307	-0.001	100 282	0.000
23/09/2014	998 498	-0.001	1008 317	0.003	100 832	0.000	1012 987	-0.001	1008 307	-0.001	100 282	0.000
15/10/2014	998 499	0.000	1008 316	0.002	100 832	0.000	1012 988	0.000	1008 307	-0.001	100 282	0.000
06/11/2014	998 499	0.000	1008 317	0.003	100 832	0.000	1012 988	0.000	1008 308	0.000	100 282	0.000
18/11/2014	998 500	0.001	1008 318	0.004	100 832	0.000	1012 988	0.000	1008 308	0.000	100 282	0.000
27/11/2014	998 499	0.000	1008 317	0.003	100 832	0.000	1012 988	0.000	1008 308	0.000	100 282	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No. C/0C/215C/08

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base date 04/11/2013

NOTE: The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W3						Point No W4					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1012 988	Base	1008 308	Base	100 832	Base	1012 988	Base	1008 308	Base	100 282	Base
23/12/2013	1012 987	-0.001	1008 308	0.000	100 833	0.001	1012 988	0.000	1008 307	-0.001	100 282	0.000
05/07/2014	1012 987	0.000	1008 307	-0.001	100 832	0.000	1012 988	0.000	1008 307	-0.001	100 282	0.000
18/08/2014	1012 988	0.001	1008 308	0.000	100 832	0.000	1012 988	0.000	1008 307	-0.001	100 282	0.000
23/09/2014	1012 988	0.001	1008 307	-0.001	100 832	0.000	1012 988	0.000	1008 307	-0.001	100 282	0.000
15/10/2014	1012 987	-0.001	1008 307	-0.001	100 832	0.000	1012 988	0.000	1008 307	-0.001	100 282	0.000
06/11/2014	1012 987	0.000	1008 307	-0.001	100 832	0.000	1012 988	0.000	1008 307	-0.001	100 282	0.000
18/11/2014	1012 987	0.000	1008 307	-0.001	100 832	0.000	1012 988	0.000	1008 308	0.000	100 282	0.000
27/11/2014	1012 987	0.000	1008 307	-0.001	100 832	0.000	1012 988	0.000	1008 308	0.000	100 282	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: C/0C215C/DE

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the difference between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W7						Point No W8					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1027 880	Base	1008 418	Base	101 863	Base	1027 883	Base	1008 421	Base	101 864	Base
25/11/2013	1027 881	0.001	1008 417	-0.001	101 863	0.000	1027 883	0.000	1008 420	-0.001	101 864	0.000
03/07/2014	1027 882	0.002	1008 418	0.000	101 863	0.000	1027 884	0.001	1008 421	0.000	101 864	0.000
19/07/2014	1027 881	0.001	1008 417	-0.001	101 864	0.001	1027 884	0.001	1008 420	-0.001	101 864	0.000
21/04/2014			POINT NOT VISIBLE				1027 885	0.002	1008 420	-0.001	101 863	0.000
16/05/2014			POINT NOT VISIBLE				1027 884	0.001	1008 421	0.000	101 864	0.000
18/06/2014			POINT NOT VISIBLE				1027 884	0.001	1008 421	0.000	101 864	0.000
16/07/2014	1027 880	0.000	1008 418	0.000	101 863	0.000	1027 883	0.000	1008 421	0.000	101 864	0.000
23/07/2014			POINT NOT VISIBLE				1027 883	0.000	1008 421	0.000	101 863	0.000
07/08/2014			POINT NOT VISIBLE				1027 884	0.001	1008 421	0.000	101 864	0.000
21/08/2014			POINT NOT VISIBLE				1027 885	0.002	1008 421	0.000	101 864	0.000
04/09/2014			POINT NOT VISIBLE				1027 884	0.001	1008 421	0.000	101 864	0.000
18/09/2014			POINT NOT VISIBLE				1027 884	0.001	1008 421	0.000	101 864	0.000
30/09/2014			POINT NOT VISIBLE				1027 884	0.001	1008 421	0.000	101 864	0.000
27/10/2014			POINT NOT VISIBLE				1027 883	0.000	1008 421	0.000	101 864	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: C/0C215C/DE

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the difference between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W9						Point No W10					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1036 346	Base	1008 344	Base	101 873	Base	1036 349	Base	1008 478	Base	99 846	Base
25/11/2013	1036 346	0.000	1008 344	0.000	101 873	0.000	1036 349	0.000	1008 478	0.000	99 846	0.000
03/07/2014	1036 346	0.000	1008 344	0.000	101 873	0.000			POINT NOT VISIBLE			
19/07/2014	1036 346	0.000	1008 344	0.000	101 873	0.000			POINT NOT VISIBLE			
21/04/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 348	-0.001	1008 478	0.000	99 846	0.000
16/05/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 477	-0.001	99 846	0.000
18/06/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 478	0.000	99 846	0.000
16/07/2014	1036 346	-0.001	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 478	0.000	99 846	0.000
23/07/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 478	0.000	99 846	0.000
07/08/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 478	0.000	99 846	0.000
21/08/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 478	0.000	99 846	0.000
04/09/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 478	0.000	99 846	0.000
18/09/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 478	0.000	99 846	0.000
30/09/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 478	0.000	99 846	0.000
27/10/2014	1036 346	0.000	1008 343	-0.001	101 873	0.000	1036 347	-0.002	1008 478	0.000	99 846	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project no: CDCB19CD8

STRUCTURE No: R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Date	Point No W11						Point No W12					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1540.366	Base	1008.660	Base	100.502	Base	1538.188	Base	1008.453	Base	100.249	Base
25/12/2013	1538.364	-0.002	1008.667	0.007	100.502	0.000	1538.182	-0.006	1008.454	0.001	100.249	0.000
03/01/2014	1538.362	-0.004	1008.667	0.007	100.502	0.000	1538.182	-0.006	1008.454	0.001	100.249	0.000
15/01/2014	1538.365	-0.001	1008.668	0.008	100.502	0.000	1538.182	-0.006	1008.453	0.000	100.249	0.000
22/01/2014	1538.365	-0.001	1008.667	0.007	100.503	0.001	1538.182	-0.006	1008.453	0.000	100.249	0.000
29/01/2014			POINT NOT visible				1538.182	-0.006	1008.453	0.000	100.249	0.000
05/02/2014	1538.364	-0.002	1008.667	0.007	100.503	0.001	1538.182	-0.006	1008.453	0.000	100.249	0.000
19/02/2014	1538.362	-0.004	1008.667	0.007	100.503	0.001	1538.182	-0.006	1008.453	0.000	100.249	0.000
19/03/2014			POINT NOT visible				1538.182	-0.006	1008.453	0.000	100.249	0.000
23/03/2014			POINT NOT visible				1538.182	-0.006	1008.453	0.000	100.249	0.000
27/04/2014	1538.364	-0.002	1008.668	0.008	100.503	0.001	1538.182	-0.006	1008.453	0.000	100.249	0.000
21/05/2014			POINT NOT visible				1538.182	-0.006	1008.453	0.000	100.249	0.000
04/06/2014			POINT NOT visible				1538.182	-0.006	1008.453	0.000	100.249	0.000
18/06/2014			POINT OBSTRUCTED				1538.182	-0.006	1008.453	0.000	100.249	0.000
02/07/2014	1538.364	-0.002	1008.668	0.008	100.503	0.001	1538.182	-0.006	1008.453	0.000	100.249	0.000
30/07/2014			POINT NOT visible				1538.182	-0.006	1008.453	0.000	100.249	0.000
20/08/2014			POINT NOT visible				1538.182	-0.006	1008.453	0.000	100.249	0.000
27/11/2014			POINT NOT visible				1538.182	-0.006	1008.453	0.000	100.249	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project no: CDCB19CD8

STRUCTURE No: R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Differences' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Date	Point No W12						Point No W12					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1542.815	Base	1008.290	Base	101.488	Base	1538.881	Base	1008.453	Base	100.249	Base
25/12/2013	1542.814	-0.001	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
03/01/2014	1542.814	-0.001	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
15/01/2014	1542.815	0.000	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
22/01/2014	1542.814	-0.001	1008.291	0.001	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
29/01/2014	1542.815	0.000	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
05/02/2014	1542.813	-0.002	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
19/02/2014	1542.813	-0.002	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
19/03/2014			POINT NOT visible				1538.879	-0.002	1008.453	0.001	100.249	0.000
23/03/2014	1542.813	-0.002	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
27/04/2014	1542.813	-0.002	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
21/05/2014	1542.811	-0.004	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
04/06/2014	1542.811	-0.004	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
18/06/2014	1542.811	-0.004	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
02/07/2014	1542.811	-0.004	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
30/07/2014	1542.811	-0.004	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
20/08/2014	1542.811	-0.004	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000
27/11/2014	1542.810	-0.005	1008.290	0.000	101.488	0.000	1538.879	-0.002	1008.453	0.001	100.249	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: CDCE15CD8

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Date	Point No W15						Point No W16					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1060.849	Base	1008.817	Base	100.232	Base	1061.441	Base	1008.481	Base	101.361	Base
29/12/2013	1060.847	-0.002	1008.819	0.002	100.242	0.010	1061.443	0.002	1008.485	0.004	101.361	0.000
03/02/2014	1060.852	0.003	1008.819	0.002	100.232	0.000	1061.441	0.000	1008.485	0.004	101.361	0.000
18/03/2014	1060.847	-0.002	1008.819	0.002	100.232	0.000	1061.441	0.000	1008.485	0.004	101.361	0.000
23/04/2014	1060.847	-0.002	1008.819	0.002	100.232	0.000	1061.441	0.000	1008.485	0.004	101.361	0.000
12/05/2014	1060.849	0.000	1008.819	0.002	100.232	0.000	1061.441	0.000	1008.485	0.004	101.361	0.000
04/06/2014	1060.847	-0.002	1008.819	0.002	100.232	0.000	1061.441	0.000	1008.485	0.004	101.361	0.000
18/06/2014	1060.847	-0.002	1008.819	0.002	100.232	0.000	1061.441	0.000	1008.485	0.004	101.361	0.000
02/07/2014			POINT NOT VISIBLE						POINT NOT VISIBLE			
23/07/2014			POINT NOT VISIBLE						POINT NOT VISIBLE			
27/07/2014			POINT NOT VISIBLE				1061.477	0.036	1008.493	0.012	101.360	-0.001
07/08/2014			POINT NOT VISIBLE				1061.441	0.000	1008.481	-0.004	101.364	0.003
21/08/2014			POINT NOT VISIBLE				1061.441	0.000	1008.485	0.000	101.362	0.001
04/09/2014			POINT NOT VISIBLE				1061.441	0.000	1008.487	0.002	101.364	0.003
18/09/2014			POINT NOT VISIBLE				1061.441	0.000	1008.481	-0.004	101.362	0.001
02/10/2014			POINT NOT VISIBLE						POINT NOT VISIBLE			
16/10/2014			POINT NOT VISIBLE						POINT NOT VISIBLE			
30/10/2014			POINT NOT VISIBLE						POINT NOT VISIBLE			
27/11/2014			POINT NOT VISIBLE				1061.453	0.012	1008.481	-0.004	101.364	0.003

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: CDCE15CD8

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Date	Point No W17						Point No W18					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1061.817	Base	1008.808	Base	100.060	Base	1062.448	Base	1008.487	Base	100.073	Base
29/12/2013	1061.816	-0.001	1008.816	0.008	100.062	0.002	1062.447	-0.001	1008.626	-0.002	100.073	0.000
03/02/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
18/03/2014	1061.817	0.000	1008.816	0.008	100.062	0.002	1062.446	-0.002	1008.627	-0.002	100.073	0.000
23/04/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
12/05/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
04/06/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
18/06/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
02/07/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
23/07/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
27/07/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
07/08/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
21/08/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
04/09/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
18/09/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
02/10/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
16/10/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
30/10/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000
27/11/2014	1061.808	-0.009	1008.806	-0.002	100.060	0.000	1062.448	0.000	1008.629	0.000	100.073	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: C/0C815C/08

STRUCTURE No: R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the difference between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visit.

Date	Point No W18						Point No W19					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1068.181	Base	1068.834	Base	199.847	Base			POINT OBSTRUCTED			
28/12/2013	1068.181	0.000	1068.834	0.001	199.847	0.000						
03/02/2014	1068.180	-0.001	1068.835	0.001	199.847	0.000						
19/03/2014	1068.180	-0.001	1068.835	0.001	199.847	0.000						
22/04/2014	POINT OBSTRUCTED											
26/05/2014	POINT OBSTRUCTED											
30/06/2014	1068.178	-0.003	1068.835	0.001	199.847	0.000						
14/08/2014	POINT OBSTRUCTED											
17/07/2014	1068.180	-0.001	1068.835	0.001	199.847	0.000						
25/09/2014	1068.177	-0.004	1068.835	-0.001	199.847	0.000						
07/08/2014	POINT OBSTRUCTED											
21/08/2014	POINT OBSTRUCTED											
04/09/2014	POINT OBSTRUCTED											
18/09/2014	POINT OBSTRUCTED											
02/10/2014	1068.174	-0.007	1068.835	-0.001	199.848	0.001						
30/10/2014	1068.117	-0.064	1068.840	0.004	199.847	0.000						
20/11/2014	1068.181	0.000	1068.833	-0.001	199.847	0.000						
27/11/2014	1068.180	-0.001	1068.832	-0.002	199.847	0.000						

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: C/0C815C/08

STRUCTURE No: R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the difference between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visit.

Date	Point No W21						Point No W22					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1064.738	Base	1068.838	Base	199.878	Base						
28/12/2013	1064.739	0.000	1068.838	0.001	199.878	0.000						
03/02/2014	1064.740	0.002	1068.838	0.000	199.878	0.000						
19/03/2014	1064.739	0.001	1068.838	0.001	199.878	0.000						
22/04/2014	POINT OBSTRUCTED											
26/05/2014	POINT OBSTRUCTED											
30/06/2014	1064.740	0.002	1068.838	0.001	199.878	0.000						
14/08/2014	POINT OBSTRUCTED											
17/07/2014	1064.739	0.001	1068.837	-0.001	199.878	0.000						
25/09/2014	1064.737	-0.001	1068.838	0.000	199.878	0.000						
07/08/2014	1064.739	0.001	1068.837	-0.001	199.878	0.000						
21/08/2014	POINT OBSTRUCTED											
04/09/2014	POINT OBSTRUCTED											
18/09/2014	POINT OBSTRUCTED											
02/10/2014	1064.738	0.000	1068.838	0.000	199.878	0.000						
30/10/2014	1064.737	-0.001	1068.838	0.000	199.877	-0.001						
20/11/2014	1064.739	0.001	1068.838	0.000	199.878	0.000						
27/11/2014	1064.738	0.000	1068.837	-0.001	199.878	0.000						

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 (ADDITIONAL)

Project No: CDC21SCDE

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Differences' above highlight the differences between the base measurements taken on the 04/11/2013 and the most recent taken on each subsequent monitoring visit.

Date	Point No W15						Point No W16					
	Reading	Difference	Reading	Difference	Level	Difference	Reading	Difference	Reading	Difference	Level	Difference
04/11/2013	1068.226	Base	1068.641	Base	99.865	Base	1067.174	Base	1068.640	Base	99.864	Base
23/12/2013	1068.227	0.001	1068.641	0.000	99.864	-0.001	1067.174	-0.001	1068.640	0.001	99.864	0.000
03/07/2014	1068.227	0.001	1068.641	0.000	99.864	-0.001	1067.174	-0.001	1068.640	0.001	99.864	0.000
16/07/2014	1068.227	0.001	1068.641	0.000	99.864	-0.001	1067.174	-0.001	1068.640	0.001	99.864	0.000
22/08/2014	1068.225	-0.001	1068.642	0.001	99.864	-0.001	POINT OBSTRUCTED					
4/09/2014	POINT OBSTRUCTED						1067.174	-0.001	1068.643	0.003	99.861	-0.003
26/09/2014	1068.224	-0.002	1068.643	0.001	99.864	-0.001	1067.173	-0.001	1068.642	0.002	99.864	0.000
19/10/2014	1068.226	0.001	1068.642	0.000	99.864	-0.001	POINT OBSTRUCTED					
31/10/2014	1068.224	0.000	1068.640	-0.002	99.864	-0.001	POINT OBSTRUCTED					
21/11/2014	1068.224	-0.002	1068.640	0.000	99.861	-0.003	1067.172	-0.001	1068.640	-0.002	99.864	0.000
07/12/2014	1068.224	0.000	1068.640	-0.002	99.860	-0.004	POINT OBSTRUCTED					
21/12/2014	1068.223	-0.001	1068.640	-0.002	99.863	-0.001	POINT OBSTRUCTED					
4/01/2015	POINT OBSTRUCTED						POINT OBSTRUCTED					
02/02/2015	1068.224	+0.001	1068.639	-0.003	99.860	-0.004	POINT OBSTRUCTED					
20/02/2015	1068.223	-0.001	1068.638	-0.004	99.864	0.000	POINT OBSTRUCTED					
20/03/2015	1068.223	0.000	1068.641	-0.001	99.863	-0.001	POINT OBSTRUCTED					
21/04/2015	1068.223	0.000	1068.640	-0.002	99.863	-0.001	POINT OBSTRUCTED					

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 (ADDITIONAL)

Project No: CDC21SCDE

STRUCTURE No R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Differences' above highlight the differences between the base measurements taken on the 04/11/2013 and the most recent taken on each subsequent monitoring visit.

Date	Point No W15						Point No W16					
	Reading	Difference	Reading	Difference	Level	Difference	Reading	Difference	Reading	Difference	Level	Difference
04/11/2013	1068.226	Base	1068.641	Base	99.865	Base	1067.174	Base	1068.640	Base	99.864	Base
23/12/2013			POINT OBSTRUCTED				1067.174	-0.001	1068.640	0.001	99.864	0.000
03/07/2014	1068.227	0.001	1068.641	0.000	99.865	0.000	1067.174	-0.001	1068.640	0.001	99.864	0.000
16/07/2014	1068.227	0.001	1068.641	0.000	99.865	0.000	1067.174	-0.001	1068.640	0.001	99.864	0.000
22/08/2014			POINT OBSTRUCTED				1067.174	-0.001	1068.640	0.001	99.864	0.000
4/09/2014	1068.225	-0.001	1068.642	0.001	99.864	-0.001	1067.174	-0.001	1068.643	0.003	99.861	-0.003
26/09/2014	1068.224	-0.002	1068.643	0.001	99.864	-0.001	1067.173	-0.001	1068.642	0.002	99.864	0.000
19/10/2014	1068.226	0.001	1068.642	0.000	99.864	-0.001	POINT OBSTRUCTED					
31/10/2014	1068.224	0.000	1068.640	-0.002	99.864	-0.001	POINT OBSTRUCTED					
21/11/2014	1068.224	-0.002	1068.640	0.000	99.861	-0.003	1067.172	-0.001	1068.640	-0.002	99.864	0.000
07/12/2014	1068.224	0.000	1068.640	-0.002	99.860	-0.004	POINT OBSTRUCTED					
21/12/2014	1068.223	-0.001	1068.640	-0.002	99.863	-0.001	POINT OBSTRUCTED					
4/01/2015			POINT OBSTRUCTED				POINT OBSTRUCTED					
02/02/2015	1068.224	+0.001	1068.639	-0.003	99.860	-0.004	POINT OBSTRUCTED					
20/02/2015	1068.223	-0.001	1068.638	-0.004	99.864	0.000	POINT OBSTRUCTED					
20/03/2015	1068.223	0.000	1068.641	-0.001	99.863	-0.001	POINT OBSTRUCTED					
21/04/2015	1068.223	0.000	1068.640	-0.002	99.863	-0.001	POINT OBSTRUCTED					

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: COC81SCDE

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Date	Point No W27						Point No W28					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1078.358	Base	1008.719	Base	99.845	Base	1078.851	Base	1008.719	Base	99.842	Base
29/12/2013	POINT OBSTRUCTED								POINT OBSTRUCTED			
03/02/2014	1078.359	0.000	1008.719	0.000	99.845	0.000	1078.851	0.000	1008.719	0.000	99.842	0.000
19/02/2014	1078.470	0.111	1008.709	-0.010	99.845	0.000	1078.851	0.000	1008.719	0.000	99.842	0.000
27/04/2014	1078.467	0.108	1008.708	-0.011	99.845	0.000	1078.851	0.000	1008.719	0.000	99.842	0.000
27/05/2014	1078.468	0.109	1008.708	-0.011	99.845	0.000	POINT OBSTRUCTED					
26/06/2014	1078.469	0.110	1008.708	-0.011	99.845	0.000	1078.851	0.000	1008.719	0.000	99.842	0.000
28/08/2014	1078.469	0.110	1008.708	-0.011	99.845	0.000	1078.851	0.000	1008.719	0.000	99.842	0.000
19/09/2014	1078.469	0.110	1008.708	-0.011	99.845	0.000	1078.851	0.000	1008.719	0.000	99.842	0.000
27/10/2014	1078.361	0.002	1008.709	-0.010	99.845	0.000	1078.851	0.000	1008.719	0.000	99.842	0.000
27/11/2014	1078.363	0.004	1008.709	-0.010	99.845	0.000	1078.846	-0.005	1008.719	0.000	99.842	0.000
01/04/2014	POINT OBSTRUCTED						1078.851	0.000	1008.719	0.000	99.842	0.000
21/04/2014	POINT OBSTRUCTED						1078.851	0.000	1008.709	-0.010	99.842	0.000
08/05/2014	POINT OBSTRUCTED						1078.851	0.000	1008.709	-0.010	99.842	0.000
18/05/2014	POINT OBSTRUCTED						1078.851	0.000	1008.719	0.000	99.842	0.000
03/06/2014	1078.358	-0.001	1008.708	-0.011	99.845	0.000	1078.851	0.000	1008.709	-0.010	99.842	0.000
25/06/2014	POINT OBSTRUCTED						1078.851	0.000	1008.709	-0.010	99.842	0.000
28/06/2014	1078.359	0.000	1008.708	-0.011	99.845	0.000	POINT OBSTRUCTED					
17/07/2014	POINT OBSTRUCTED						POINT OBSTRUCTED					

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: COC81SCDE

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: COC613C08

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Date	Point No W31						Point No W32					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1061.531	Base	1008.723	Base	99.747	Base	1061.806	Base	1008.727	Base	99.801	Base
29/12/2013	1061.527	-0.004	1008.730	0.007	99.746	-0.001			POINT OBSTRUCTED			
03/02/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
19/03/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
15/04/2014			POINT OBSTRUCTED				1061.804	-0.002	1008.728	0.001	99.801	0.000
14/05/2014			POINT OBSTRUCTED				1061.801	-0.005	1008.734	0.007	99.801	0.000
06/06/2014	1061.525	-0.006	1008.735	0.012	99.746	-0.001	1061.800	-0.006	1008.729	0.002	99.801	0.000
19/06/2014	1061.524	-0.007	1008.724	0.001	99.747	0.000			POINT OBSTRUCTED			
07/07/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
23/07/2014	1061.531	0.000	1008.723	0.000	99.746	-0.001			POINT OBSTRUCTED			
07/08/2014	1061.524	-0.007	1008.717	-0.006	99.747	0.000	1061.804	-0.002	1008.727	0.000	99.801	0.000
21/08/2014	1061.530	-0.001	1008.721	0.002	99.746	-0.001			POINT OBSTRUCTED			
04/09/2014	1061.525	-0.006	1008.722	-0.001	99.746	-0.001			POINT OBSTRUCTED			
18/09/2014	1061.527	0.002	1008.725	0.003	99.747	0.000	1061.809	0.005	1008.727	0.000	99.801	0.000
02/10/2014	1061.531	0.004	1008.722	-0.003	99.746	-0.001	1061.809	0.000	1008.727	0.000	99.801	0.000
30/10/2014	1061.537	0.006	1008.725	0.003	99.747	0.000	1061.809	0.000	1008.727	0.000	99.801	0.000
13/11/2014	1061.536	-0.001	1008.721	-0.004	99.746	-0.001	1061.807	-0.002	1008.727	0.000	99.801	0.000
27/11/2014	1061.535	-0.001	1008.723	0.002	99.746	0.000	1061.807	0.000	1008.728	0.001	99.801	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: COC613C08

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Date	Point No W33						Point No W34					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1048.509	Base	1008.688	Base	101.576	Base	1056.805	Base	1008.744	Base	100.648	Base
29/12/2013	1048.506	-0.003	1008.688	0.000	101.576	0.000			POINT OBSTRUCTED			
03/02/2014	1048.509	0.003	1008.685	-0.003	101.576	0.000	1056.805	0.000	1008.746	0.002	100.650	0.001
19/03/2014	1048.502	-0.007	1008.689	0.004	101.577	0.001	1056.810	0.005	1008.746	0.002	100.648	0.000
15/04/2014	1048.501	-0.001	1008.691	0.002	101.577	0.001	1056.803	-0.007	1008.743	-0.001	100.651	0.003
14/05/2014	1048.504	0.003	1008.683	-0.008	101.576	-0.001	1056.810	0.007	1008.742	-0.002	100.649	0.001
06/06/2014	1048.504	0.000	1008.683	0.000	101.576	0.000	1056.809	-0.001	1008.742	0.000	100.649	0.000
19/06/2014	1048.503	-0.001	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
07/07/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
23/07/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
07/08/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
21/08/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
04/09/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
18/09/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
02/10/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
30/10/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
13/11/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000
27/11/2014	1048.503	0.000	1008.683	0.000	101.576	0.000	1056.809	0.000	1008.742	0.000	100.649	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No. COCE13CDB

STRUCTURE no. R/026/002.0175
ELR CPH

Monitoring base data 04/11/2013

NOTE The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W33						Point No W34					
	Existing	Difference	Monitoring	Difference	Level	Difference	Existing	Difference	Monitoring	Difference	Level	Difference
04/11/2013	1008 172	Base	1008 782	Base	99.945	Base	1008 843	Base	1008 783	Base	99.815	Base
21/01/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
03/02/2014			POINT OBSTRUCTED				1008 841	0.002	1008 782	0.000	99.816	0.000
18/02/2014			POINT OBSTRUCTED				1008 841	0.002	1008 782	0.000	99.816	0.000
24/04/2014	1008 174	0.002	1008 784	-0.001	99.947	0.001	1008 840	0.003	1008 783	0.000	99.816	0.001
23/05/2014	1008 174	0.002	1008 781	0.001	99.946	0.000	1008 841	0.002	1008 782	-0.000	99.814	-0.001
06/06/2014	1008 173	0.001	1008 783	-0.001	99.948	0.002	1008 840	0.001	1008 783	0.000	99.817	0.002
19/06/2014	1008 175	0.003	1008 781	0.001	99.947	0.001	1008 840	0.001	1008 780	0.003	99.816	0.001
03/07/2014	1008 172	0.000	1008 781	0.000	99.947	0.001	1008 840	0.001	1008 781	0.002	99.817	0.002
17/07/2014	1008 172	0.000	1008 781	0.001	99.947	0.001	1008 840	0.001	1008 783	0.001	99.818	0.003
31/07/2014									POINT OBSTRUCTED			
07/08/2014	1008 173	0.001	1008 783	-0.001	99.946	0.000			POINT OBSTRUCTED			
21/08/2014	1008 172	0.000	1008 781	0.001	99.946	0.000			POINT OBSTRUCTED			
04/09/2014	1008 174	0.002	1008 783	-0.001	99.947	0.001			POINT OBSTRUCTED			
18/09/2014	1008 173	0.001	1008 784	-0.001	99.946	0.000			POINT OBSTRUCTED			
02/10/2014	1008 174	0.002	1008 784	-0.002	99.947	0.001			POINT OBSTRUCTED			
23/10/2014	1008 173	0.001	1008 783	-0.001	99.946	0.000	1008 839	0.000	1008 782	0.000	99.815	0.000
30/10/2014	1008 173	0.001	1008 780	0.002	99.946	0.000	1008 841	0.001	1008 783	0.001	99.815	0.000
27/11/2014	1008 174	0.002	1008 782	-0.001	99.946	0.000	1008 841	0.002	1008 783	0.000	99.815	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No. COCE13CDB

STRUCTURE no. R/026/002.0175
ELR CPH

Monitoring base data 04/11/2013

NOTE The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W37						Point No W38					
	Existing	Difference	Monitoring	Difference	Level	Difference	Existing	Difference	Monitoring	Difference	Level	Difference
04/11/2013	1008 771	Base	1008 781	Base	99.945	Base	1008 861	Base	1008 718	Base	101.568	Base
21/01/2014	1008 774	0.003	1008 781	0.001	99.944	0.002	1008 858	0.003	1008 718	0.000	101.567	0.000
03/02/2014			POINT OBSTRUCTED				1008 861	0.000	1008 719	-0.001	101.568	0.000
18/02/2014			POINT OBSTRUCTED				1008 861	0.000	1008 718	-0.000	101.568	0.000
24/04/2014	1008 774	0.003	1008 780	-0.002	99.943	0.002	1008 862	0.001	1008 718	-0.000	101.568	0.000
23/05/2014			POINT OBSTRUCTED				1008 862	0.001	1008 718	-0.000	101.568	0.000
06/06/2014	1008 774	0.003	1008 781	-0.001	99.945	0.000	1008 861	0.000	1008 718	-0.000	101.568	0.000
19/06/2014	1008 774	0.003	1008 779	0.001	99.944	0.001	1008 862	0.001	1008 718	-0.000	101.568	0.000
03/07/2014	1008 774	0.003	1008 781	0.000	99.944	0.001	1008 861	0.000	1008 718	0.000	101.568	0.000
17/07/2014			POINT OBSTRUCTED				1008 862	0.001	1008 718	0.000	101.568	0.000
31/07/2014	1008 772	0.001	1008 783	-0.002	99.943	0.002	1008 860	0.001	1008 718	-0.000	101.568	0.000
07/08/2014	1008 771	0.000	1008 782	0.000	99.943	0.002	1008 860	-0.001	1008 719	-0.001	101.568	-0.001
21/08/2014	1008 771	0.000	1008 782	0.000	99.943	0.002	1008 860	-0.001	1008 719	-0.001	101.568	-0.001
04/09/2014	1008 772	0.001	1008 781	-0.001	99.943	0.002	1008 860	-0.001	1008 719	-0.001	101.568	-0.001
18/09/2014	1008 771	0.000	1008 781	-0.001	99.943	0.002	1008 861	0.000	1008 718	0.000	101.568	0.000
02/10/2014			POINT OBSTRUCTED				1008 862	0.001	1008 718	0.000	101.568	0.000
23/10/2014	1008 771	0.000	1008 783	-0.002	99.943	0.002	1008 860	-0.001	1008 718	-0.000	101.568	0.000
30/10/2014	1008 771	0.000	1008 782	0.000	99.943	0.002	1008 860	-0.001	1008 719	-0.001	101.568	-0.001
27/11/2014	1008 772	0.001	1008 781	-0.001	99.943	0.002	1008 861	0.000	1008 719	-0.001	101.568	-0.001

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: COCE1AC08

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight any differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Date	Point No W19						Point No W20					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1191 798	Base	1308 777	Base	99.289	Base	1190 091	Base	1308 464	Base	101 541	Base
23/12/2013			POINT OBSTRUCTED				1190 091	0.000	1308 464	0.000	101 532	-0.009
03/02/2014	1191 798	0.000	1308 777	0.000	99.289	0.000			POINT OBSTRUCTED			
19/03/2014	1191 798	0.000	1308 778	0.001	99.289	0.000			POINT OBSTRUCTED			
23/04/2014	1191 798	-0.001	1308 777	0.000	99.289	-0.000			POINT OBSTRUCTED			
21/05/2014	1191 798	-0.001	1308 777	0.000	99.289	-0.000			POINT OBSTRUCTED			
26/06/2014	1191 798	-0.001	1308 778	0.001	99.289	0.000			POINT OBSTRUCTED			
18/07/2014	1191 798	0.000	1308 777	0.000	99.289	0.000			POINT OBSTRUCTED			
30/07/2014	1191 798	-0.001	1308 777	0.000	99.289	0.000			POINT OBSTRUCTED			
20/08/2014	1191 798	-0.054	1308 780	0.033	99.289	0.000			POINT OBSTRUCTED			
07/09/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
24/09/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
08/09/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
15/09/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
02/10/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
20/10/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			
27/10/2014			POINT OBSTRUCTED						POINT OBSTRUCTED			

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: COCE1AC08

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits

Date	Point No W21						Point No W22					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	1190 853	Base	1308 753	Base	99.219	Base	1191 864	Base	1308 418	Base	101 461	Base
23/12/2013	1190 854	0.001	1308 753	0.000	99.219	0.000	1191 864	0.000	1308 418	0.000	101 461	0.000
03/02/2014	1190 853	0.000	1308 753	0.000	99.219	-0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000
19/03/2014	1190 854	0.001	1308 753	0.000	99.219	0.000	1191 864	0.000	1308 418	0.000	101 461	0.000
23/04/2014	1190 854	0.001	1308 753	0.000	99.219	-0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000
21/05/2014	1190 853	0.000	1308 753	0.000	99.219	-0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000
26/06/2014	1190 853	0.000	1308 753	0.000	99.219	-0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000
18/07/2014	1190 854	0.001	1308 753	0.000	99.219	0.000	1191 864	0.000	1308 418	0.000	101 461	0.000
30/07/2014	1190 853	-0.001	1308 753	0.000	99.219	0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000
20/08/2014	1190 853	0.000	1308 753	0.000	99.219	0.000	1191 864	0.000	1308 418	0.000	101 461	0.000
07/09/2014			POINT OBSTRUCTED									
24/09/2014	1190 854	0.001	1308 753	0.000	99.219	0.000	1191 864	0.000	1308 418	0.000	101 461	0.000
08/09/2014	1190 853	-0.001	1308 753	0.000	99.219	0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000
15/09/2014	1190 853	0.000	1308 753	0.000	99.219	0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000
02/10/2014	1190 853	0.000	1308 753	0.000	99.219	0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000
20/10/2014	1190 853	0.000	1308 753	0.000	99.219	0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000
27/10/2014	1190 853	0.000	1308 753	0.000	99.219	0.000	1191 863	-0.001	1308 418	0.000	101 461	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R026/002.0175 MONITORING

Project No: COC810C08

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the difference between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W43						Point No W44					
	Eastings	Difference	Northings	Difference	Level	Difference	Eastings	Difference	Northings	Difference	Level	Difference
04/11/2013	411	Base	1008	Base	99	Base	411	Base	1008	Base	101	Base
29/12/2013			Point Obstructed									
03/01/2014			Point Obstructed								Point Obstructed	
16/01/2014			Point Obstructed								Point Obstructed	
22/04/2014			Point Obstructed				411	-0.001	1008	-0.003	101	0.001
24/04/2014			Point Obstructed				411	-0.001	1008	-0.001	101	0.000
28/04/2014	411	-0.001	1008	-0.002	99	0.000	411	-0.000	1008	-0.002	101	0.000
19/05/2014	411	-0.001	1008	-0.002	99	0.000	411	-0.000	1008	-0.002	101	0.001
27/07/2014	411	-0.002	1008	-0.004	99	0.000	411	-0.001	1008	-0.003	101	0.000
22/07/2014	411	-0.001	1008	-0.003	99	0.000	411	-0.000	1008	-0.003	101	0.000
07/08/2014	411	-0.001	1008	-0.003	99	0.000	411	-0.000	1008	-0.003	101	0.000
21/08/2014	411	-0.001	1008	-0.003	99	0.000	411	-0.001	1008	-0.004	101	0.000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18/09/2014	411	-0.001	1008	-0.002	99	-0.000	411	0.000	1008	-0.000	101	-0.001
01/10/2014	411	-0.001	1008	-0.002	99	-0.000	411	0.000	1008	-0.000	101	-0.001
31/10/2014	411	-0.002	1008	-0.004	99	-0.000	411	0.001	1008	-0.001	101	-0.001
20/11/2014	411	-0.001	1008	-0.003	99	-0.000	411	0.000	1008	-0.000	101	-0.001
27/11/2014	411	-0.001	1008	-0.003	99	-0.000	411	0.000	1008	-0.000	101	-0.001

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R026/002.0175 MONITORING

Project No: COC810C08

STRUCTURE No. R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The 'Difference' columns highlight the difference between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W45						Point No W46					
	Eastings	Difference	Northings	Difference	Level	Difference	Eastings	Difference	Northings	Difference	Level	Difference
04/11/2013	411	Base	1008	Base	99	Base	411	Base	1008	Base	101	Base
29/12/2013			Point Obstructed				411	-0.001	1008	-0.000	101	-0.001
03/01/2014			Point Obstructed				411	-0.000	1008	-0.001	101	-0.000
16/01/2014			Point Obstructed				411	-0.001	1008	-0.001	101	-0.000
22/04/2014			Point Obstructed				411	-0.001	1008	-0.002	101	-0.000
24/04/2014	411	-0.002	1008	-0.003	99	-0.000	411	-0.000	1008	-0.001	101	-0.000
28/04/2014	411	-0.001	1008	-0.003	99	-0.000	411	-0.000	1008	-0.002	101	-0.000
19/05/2014	411	-0.001	1008	-0.003	99	-0.000	411	-0.000	1008	-0.002	101	-0.000
27/07/2014	411	-0.001	1008	-0.003	99	-0.000	411	-0.000	1008	-0.002	101	-0.000
22/07/2014	411	-0.001	1008	-0.003	99	-0.000	411	-0.000	1008	-0.002	101	-0.000
07/08/2014	411	-0.001	1008	-0.003	99	-0.000	411	-0.000	1008	-0.002	101	-0.000
21/08/2014	411	-0.001	1008	-0.003	99	-0.000	411	-0.000	1008	-0.002	101	-0.000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18/09/2014	411	-0.001	1008	-0.002	99	-0.000	411	-0.000	1008	-0.000	101	-0.000
01/10/2014	411	-0.001	1008	-0.002	99	-0.000	411	-0.000	1008	-0.000	101	-0.000
31/10/2014	411	-0.001	1008	-0.003	99	-0.000	411	-0.000	1008	-0.001	101	-0.000
20/11/2014	411	-0.001	1008	-0.003	99	-0.000	411	-0.000	1008	-0.000	101	-0.000
27/11/2014	411	-0.001	1008	-0.003	99	-0.000	411	-0.000	1008	-0.000	101	-0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: COCE15CD0

STRUCTURE No: R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The "Differences" columns highlight the shift noted between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W41						Point No W42					
	Easting	Difference	Northing	Difference	Level	Difference	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	11172.278	Base	1008.881	Base	99.745	Base	11171.483	Base	1008.908	Base	99.738	Base
23/12/2013	11172.278	-0.000	1008.879	-0.002	99.746	0.001	11171.483	-0.004	1008.908	0.000	99.739	0.001
03/02/2014	11172.273	-0.005	1008.876	-0.005	99.745	0.000	11171.485	-0.002	1008.906	-0.002	99.738	0.000
25/02/2014	11172.271	-0.007	1008.878	-0.003	99.745	0.000				PLANT DESTRUCTED		
24/04/2014	11172.278	-0.000	1008.878	-0.003	99.746	0.001	11171.480	-0.007	1008.907	-0.002	99.738	0.000
23/05/2014	11172.277	-0.001	1008.874	-0.007	99.745	0.000	11171.479	-0.008	1008.905	-0.004	99.737	-0.001
26/06/2014	11172.277	-0.001	1008.875	-0.006	99.746	0.001	11171.481	-0.006	1008.904	-0.005	99.738	0.000
18/07/2014	11172.273	-0.005	1008.872	-0.009	99.745	0.000	11171.480	-0.007	1008.904	-0.005	99.738	0.000
07/08/2014	11172.277	-0.001	1008.878	-0.003	99.746	0.001	11171.480	-0.007	1008.907	-0.002	99.738	0.000
27/08/2014	11172.277	0.000	1008.878	-0.003	99.746	0.001	11171.480	-0.007	1008.907	-0.002	99.738	0.000
23/09/2014	11172.276	-0.002	1008.878	-0.003	99.746	0.001	11171.480	-0.007	1008.907	-0.002	99.738	0.000
16/10/2014	11172.278	0.000	1008.878	-0.003	99.746	0.001	11171.480	-0.007	1008.907	-0.002	99.738	0.000
03/11/2014	11172.278	-0.000	1008.878	-0.003	99.746	0.001	11171.480	-0.007	1008.907	-0.002	99.738	0.000
27/11/2014	11172.278	-0.000	1008.878	-0.003	99.746	0.001	11171.480	-0.007	1008.907	-0.002	99.738	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results

BRIDGE MONITORING

CPH R/026/002.0175 MONITORING

Project No: COCE15CD0

STRUCTURE No: R/026/002.0175
ELR: CPH

Monitoring base data 04/11/2013

NOTE: The "Differences" columns highlight the differences between the base measurements taken on the 04/11/2013 and the measurements taken on each subsequent monitoring visits.

Date	Point No W43					
	Easting	Difference	Northing	Difference	Level	Difference
04/11/2013	11174.464	Base	1008.896	Base	99.672	Base
23/12/2013	11174.464	0.000	1008.896	0.000	99.672	0.000
03/02/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
25/02/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
24/04/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
23/05/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
26/06/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
18/07/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
07/08/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
27/08/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
23/09/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
16/10/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
03/11/2014	11174.464	0.000	1008.896	0.000	99.672	0.000
27/11/2014	11174.464	0.000	1008.896	0.000	99.672	0.000

Nov 27th 2014 - CPH R/026/002.0175 - Results



Nov 27th 2014 - CPH R/026/002.0175 - Crack In Tarmac



Nov 27th 2014 - CPH R/026/002.0175 - Crack In Tarmac



Nov 27th 2014 - CPH R/026/002.0175 - Crack In Tarmac



Nov 27th 2014 - CPH R/026/002.0175 - Crack In Tarmac



Nov 27th 2014 - CPH R/026/002.0175 - Points W1-W5



Nov 27th 2014 - CPH R/026/002.0175 - Points W6-W9

ELR: CPH	Contract Mileage: 002 m 0175 yds 7.95 ch	Struc. Ref R/026/002.0175



Nov 27th 2014 - CPH R/026/002.0175 - Points W10-W16



Nov 27th 2014 - CPH R/026/002.0175 - Points W17-W20



Nov 27th 2014 - CPH R/026/002.0175 - Points W21-W25



Nov 27th 2014 - CPH R/026/002.0175 - Points W26-W30



Nov 27th 2014 - CPH R/026/002.0175 - Points W31-W35



Nov 27th 2014 - CPH R/026/002.0175 - Points W36-W39



Nov 27th 2014 - CPH R/026/002.0175 - Points W40-W44



Nov 27th 2014 - CPH R/026/002.0175 - Points W45-W49

Appendix F-Correspondence

THE CITY OF EDINBURGH COUNCIL

REPORT ON PLANS LODGED FOR BUILDING WARRANT NO 98/01532/STAGE A

Applicant Bennett Scotland Ltd

Architect ..... Phone No. .....

Situation Blandfield House 160 Braughton Rd.

Description of Work Stage Warrant - Ewet Flats Substructure & Drainage

Application Lodged Date	Report Date	Cleared Date
14.8.98	18.8.98	24/11/98

Plans Borrowed	Plans Returned	Relaxations
Date ..... BCO	Date 23/11/98 BCO [redacted]	Granted .....
Date ..... BCO	Date ..... BCO	
Date ..... BCO	Date ..... BCO	Refused .....

REPORT BY DIRECTOR OF PROPERTY SERVICES

Reg.		Adjusted By
C2.1	1) ~~AS DESIGN CERTIFICATES - THE FRONT OF THE CERTIFICATE CANNOT BE ALTERED (eg "entire completed structure, including all structural elements" CANNOT BE DELETED OR ALTERED); HOWEVER THE ELEMENTS BEING CERTIFIED CAN BE STATED ON THE BACK OF THE CERTIFICATE OR IN AN ACCOMPANYING LETTER AND A NOTE CAN BE ADDED TO THE END OF THE STATEMENT "... properly performed" REFERRING TO THE LETTER OR THE BACK OF THE CERTIFICATE. PROVIDE EVIDENCE OF THE ENGINEER'S CURRENT INSTITUTION MEMBERSHIP.~~	[redacted] 18/11
G2.1	~~2) PROVIDE INFORMATION ON THE FORMATION SEALING SYSTEMS. CLARIFY THE REMEDIAL WORKS FOR THE POLYNUCLEAR AROMATIC HYDROCARBONS.~~ Note on dwg. req'd. ~~3) PROVIDE DETAILS OF THE GAS DISPERSAL SYSTEM AND MEMBRANE.~~	[redacted] 18/11

Report By [redacted] Checked By ..... Cleared By [redacted]

Reg. | Adjusted By

3) ~~Provide~~ DETAILS OF ALL SEALS TO ~~SERVICES PIPES~~ etc.

15/11

G2.1 2) ~~Provide~~ ~~FOUNDATION~~ REINFORCEMENT DETAILS ~~INCLUDING~~ ARTWORKING WORKS.

~~3)~~

1. N.R.

G2.1 4) ~~Add the note regarding~~ PATHS ~~to~~ the drawings.

24/11

Date 29 September, 1998

Our Ref DL/LAH/4027

Your Ref



HALCROW
CONSULTANCY ENGINEERS
WATERMAN

8 Forres Street
Edinburgh EH3 6BJ
Telephone: 0131 220 4911
Fax: 0131 220 4913

Offices: Glasgow, Edinburgh, Falkirk, Newcastle, London

City of Edinburgh Council
Building Control
329 High Street
Edinburgh
EH1 1PN

For the attention of [redacted]

Dear Sirs

Blandfield House 140 Broughton Road
Queens Gardens Development
Building Warrant N° 98/01532/Stage A

We refer to the above application and respond to specific items raised in the report which reflect on information required/outstanding from Halcrow Waterman Ltd.

General Procedures

a) We have consulted with ESW to determine an acceptable drainage strategy for the development. It had been agreed that a single combined system be adopted and this is reflected in the enclosed drainage layout plan number 97/UE/4027/01 Rev B.

As the system is combined, discharging to an existing combined sewer SEPA have no involvement in the project.

C2.3 : A note indicating that the site is to be cleared of all surface soil and vegetable matter has been added to drgs nos. 97/UE/4027/101 and 102.

C2.6 : Whindust blinding to the hardcore has been noted on the typical section shown on drawing 97/UE/4027/103.

M2 : Detail drainage drawings numbers 97/UE/4027/301 to 305 inclusive are enclosed and cover all issues relating to external drainage covered in the report. Please note that the system combined.

Dealing with the structural report we respond as follows.

C2.1

1. We enclose 1 plastic and 2 paper copies of design certificate 4A with the text left unamended in full.

A Halcrow Group Company
Registered in Scotland No SC 176135
Registered Office St Stephens House,
279 Bath Street, Glasgow G2 4JL

HALCROW CONSULTING ENGINEERS
WATERMAN

The elements being certified have been stated on the back of the certificate and comprise of all ground beams and pile caps associated with the construction.

A copy of Mr Laings proof of membership of The Institute of Structural Engineers is enclosed.

2. Typical foundation reinforcement details are shown on drawing 97/UE/4027/105. A copy of which is enclosed.

G2.1

1a. There was no filling station on the site but merely a pump serving British Gas vehicles. The two existing fuel tanks were previously removed from site.

b) The area affected by Polynuclear Aromatic Hydrocabons is localised in nature. All contaminated soil within this area will be removed from site to a controlled licensed tip, to be replaced by clean granular inert imported material.

2) Detail drawings of the gas dispersal system to blocks B, C and D and the gas membrane to all blocks are shown on drawings numbers 97/UE/4027/110 and 111.

3) Details of seals to service pipes are shown on drawings ~~110 and 111~~ 103.

We trust that the foregoing will enable all structural and external drainage elements to be signed off however should you wish to discuss any of the foregoing in detail please do not hesitate to contact the undersigned.

Yours faithfully

For and on behalf of
HALCROW WATERMAN LTD

[redacted]

[redacted]
ASSOCIATE DIRECTOR

cc Barratt East Scotland -
Halliday Fraser Munro – [redacted]

Appendix G-costs

Item	Sub-item	Status	Cost	Provisional cost
Site investigation		Estimate	£ 8,000	
Planning fees		Estimate	£ 202	
Warrant fees		Estimate	£ 5,000	
Service diversions				
	New 11kV substation	High level Scottish Power estimate	£ 60,000	
	New cables	High level Scottish Power estimate	£ 31,000	
	Trenching, traffic management and reinstatement	Estimate	£ 23,160	
	New internal distribution boards and internal cabling	Provisional allowance		£ 35,000
Overall main contract preliminaries	Site provision, 30 weeks		£ 80,000	
Network Rail				
	Network Rail staff costs, site	Estimate	£ 25,000	
	Track possessions	35 no. (estimate)	£ 50,260	
Grout building foundations*			£ 135,000	
Underpinning/temporary works to other structures to be retained			£ 8,000	

*- at subsequent stages, alternatives to this technique should be sought, such a stacked, tied-back underpinning

Create working space for construction of new wall		Batter-back generally, excavate to line of grout at gables, take down existing wall, dispose of material to be taken off site	£ 72,000	
Install foundations for new wall, if required		Estimate		£ 20,000
Install retaining wall full length of site	Gabion type wall	Contractor's estimate	£ 129,000	
Extra-over for phased working to avoid taking contaminated material off-site		Provisional allowance		£ 35,000
e/o for new backfill etc.		Contractor's estimate		£ 16,000
New substation access		Estimate	£ 5,000	
Boundary fencing		Estimate	£ 5,000	
Making good to site including reinstatement of affected gardens to good standard		Estimate	£ 25,000	
Replacement bike sheds		Estimate		£ 33,000

Professional fees for design, detail, tender, procure, inspect, manage & final account	As fee quote of 14 October 2014: full service including contract administration on the basis that there will be no architect involved: £37,000	£ 37,000	
	Total estimate	**£ 698,622**	
	excluding provisional sums totalling an additional		**£ 139,000**