

REPORT N° 70012266

KIDDERPORE AVENUE

FLOOD RISK ASSESSMENT



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Project no: 70012266
Date: July 2015

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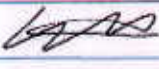
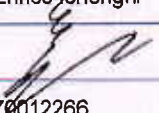
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1 EXECUTIVE SUMMARY

1.1.1 WSP | Parsons Brinckerhoff has undertaken this Flood Risk Assessment (FRA) to support the planning application for the proposed residential development by Mount Anvil at Kidderpore Avenue, Hampstead, London.

1.1.2 The proposed development involves;

- The retention of the site's five Grade II statutorily listed buildings. Kidderpore Hall, the Maynard Wing, the Chapel and the old Skeel Library will all be sensitively converted to residential use, and the Summerhouse will be restored in a new location on the site close to the Chapel. Three existing buildings will be demolished and replaced with new residential buildings: Lord Cameron Hall, Rosalind Franklin Hall and the Queen Mother's Hall. Other non-listed buildings will also be retained and sensitively converted to residential use, namely Bay House, Dudin Brown, and Lady Chapman Hall. Three existing buildings will be demolished and replaced with new residential buildings: Lord Cameron, Rosalind Franklin and the Queen Mother's Hall.
- Integrated in the Kidderpore Avenue elevation of the replacement for the Queen Mother's Hall will be an access to a basement area where car parking for residents and visitors will be provided. In total 97 spaces are proposed. The majority of cycle parking requirements will also be accommodated in the basement, amount to 312 spaces. Some cycle parking – in particular that intended to be used by visitors, amounting to 16 spaces – will be provided at ground floor level, carefully integrated into the hard and soft landscaping scheme.
- New buildings are proposed in two locations on the site. The first is between the Chapel and Queen Mother's Hall where 'pavilion' houses are proposed. A terrace of 'townhouses' is proposed between the Chapel and the Maynard Wing on the site of the previously-consented student accommodation development, planning permission for which remains extant by virtue of the development having been commenced.
- The proposed development also includes residents' facilities and a concierge.

The FRA investigates flood risk in the area and outlines the mitigation measures proposed to ensure the sustainable and safe development of the Proposal in line with the requirements of the National Planning Policy Framework (NPPF), the associated Flood Risk and Coastal Change Planning Practice Guidance (PPG) and the Environment Agency's (EA) Standing Advice.

A Drainage Strategy Statement has been produced by Tully De'Ath and is provided at Appendix G.

The site is shown on the EA detailed Flood Map as being located within Flood Zone 1; as is noted in the PPG the probability of fluvial and tidal flooding is less than 0.1% every year for Flood Zone 1.

Other possible sources of flooding have been investigated: however, based on the available information, the probability of flooding from all sources as been assessed as low.

The FRA has been produced in consultation with the EA, Thames Water (TW) and the London Borough of Camden (LBC). This report contains Environment Agency information under a suitable commercial licence.

2 INTRODUCTION

2.1 APPOINTMENT AND BRIEF

- 2.1.1 WSP | Parsons Brinckerhoff has been commissioned Mount Anvil Ltd to carry out a FRA to support the detailed planning application for development at Kidderpore Avenue, Hampstead, London. Please refer to Figure 1 for site location.
- 2.1.2 WSP | Parsons Brinckerhoff was employed as Consultant to provide this FRA and in doing so has exercised reasonable skill and care. This Report relates solely to the FRA for the above mentioned development which is in the London Borough of Camden.
- 2.1.3 This Report is intended for the sole benefit of the parties named above and shall not be capable of assignment. WSP | Parsons Brinckerhoff shall not be liable for any use of the report for any reasons other than that for which the report was originally prepared and provided.
- 2.1.4 Although this report was prepared using the degree of skill and care ordinarily exercised by engineers practicing under similar circumstances; please note that WSP | Parsons Brinckerhoff cannot take responsibility for errors in the information provided by third parties (e.g. Drainage Strategy Statement produced by Tully De'Ath) .

2.2 OBJECTIVE OF THE STUDY

- 2.2.1 This FRA investigates flood risk within the area and the mitigation measures required to ensure the safety of the proposed development.
- 2.2.2 The FRA has been produced in line with the requirements of the NPPF, the associated PPG, the EA Standing Advice, and in consultation with the EA, TW and the LBC.

2.3 STUDY METHODOLOGY

- 2.3.1 The appraisal process consisted of a desk study, site visit (undertaken on the 19/05/2015), data research and consultation with regulatory bodies and third parties. In addition, the following documents have been consulted:
- Preliminary Flood Risk Assessment (PFRA) for the London Borough of Camden published in April 2011.
 - Surface Water Management Plan (SWMP) for the London Borough of Camden published in July 2011.
 - The London Borough of Camden Flood Risk Management Strategy (FRMS) published in 2014.
 - Strategic Flood Risk Assessment (SFRA) for the London Borough of Camden published in July 2014.
- 2.3.2 This FRA has been produced taking into account the general recommendations of the NPPF and associated PPG, as well as Camden Development Policies.
- 2.3.3 This report contains Environment Agency information under a suitable commercial licence.

3 EXISTING SITE AND PROPOSED DEVELOPMENT

3.1 SITE LOCATION

3.1.1 The Site is located on Kidderpore Avenue, in the London Borough of Camden, at National Grid Reference (NGR) 525330 185849. A plan presenting the extent of the Site is shown in Figure 1 and Appendix A.



Figure 1 - Indicative Site Location

3.2 SITE DESCRIPTION

3.2.1 The site is currently owned by King's College London. The planning use of the site is student accommodation. There are ten buildings on the site.

3.2.2 The site is located on the crest of the hill along Kidderpore Avenue and therefore road levels fall east from about mid-point from the site and west from this point. A topographical survey of the Site (Appendix B) indicates that ground levels on the Site rise from 93m AOD at the west part of the site to 97.4m AOD at Old House, falling again from this point to 90m AOD to the east part of the site.

3.2.3 Site photos have been provided in Figures 2-5, refer to Figure 1 for photo locations.



Figure 2 – View 1, West along Kidderpore Avenue



Figure 3 – View 2, into the site from the South West



Figure 4 – View 3, Existing central green communal area



Figure 5 – View 4, Existing central green/footpath area

3.3 GEOLOGY AND HYDRO-GEOLOGY

- 3.3.1 The online British Geology Survey (BGS) map indicates that the bedrock geology underlying the Site is Claygate Member (Clay, Silt and Sand) with London Clay at depth, with no superficial deposits recorded. This is confirmed by Figures 4a and 4b of the SFRA (attached in Appendix C).
- 3.3.2 The online EA Aquifer designation Map shows the Site to be underlain by a Secondary A Bedrock Aquifer, but no Superficial Aquifer is indicated. A Secondary A Bedrock Aquifer is classified by the EA as *“permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers”*
- 3.3.3 A Ground Investigation Report¹ for the site was undertaken, and a final report issued in June 2015. This report confirms that based on the intrusive testing the geology consists of varying made ground geology, over the Claygate Member with London Clay at depth, this is consistent with BGS records. The Claygate Member was proven in boreholes at depths between 4.9-8.7m. The London Clay was encountered below the Claygate Member at considerable depth, whereby the deposits extended beyond the termination point of the boreholes themselves.
- 3.3.4 Infiltration testing was carried out as part of this Ground Investigation Report, in order to inform the drainage strategy. The geology has a very low soakage infiltration potential and infiltration is not considered suitable on site based on the BRE compliant infiltration testing undertaken.
- 3.3.5 Ground water levels were encountered at depths varying between 2.38m to 6.53m below ground level across the site within boreholes undertaken, indicating a perched water table within the Claygate Member.
- 3.3.6 The Ground Investigation Report also highlights the risk of contamination, associated with the Made Ground, however given the impermeable nature of the geology contamination pathways to ground water is deemed not to be a significant risk.
- 3.3.7 The mapping also indicates that site is located in a Ground Water Vulnerability Zone – Minor Aquifer High. This designation of is based on the ability for the Aquifer to ultimately diffuse pollution, the High classification indicates the soils have high leaching potential or lack of any low permeability drift deposits.
- 3.3.8 The site is not located within a Source Protection Zone (SPZ) according to the EA SPZ map, as confirmed by the EA (Appendix D). The closest SPZ is located at approximately 2 km to the south east of the site.

3.4 EXISTING WATERCOURSES

- 3.4.1 The River Kilburn ran historically at approximately 140m to the west of the site (Appendix C). The SFRA indicates that this river was culverted in the 19th century and incorporated into the TW public sewer network as the Ranelagh Sewer, which discharges into the River Thames at Battersea Park.
- 3.4.2 The Rivers Fleet, Tyburn, and Brent were historically located within the area and incorporated within the TW public sewer network. Therefore, there are no main rivers located in the LBC in the present day.

¹ Ground Investigation Report – Kidderpore Avenue undertaken by Soiltechnics, June 2015

- 3.4.3** Hampstead Ponds and Highgate ponds are located along the original path of one branch of the River Fleet at 2km to the east of the Site. The Fleet Storm Relief Sewer runs parallel to the Fleet Trunk Sewer and outfalls into the River Thames. According to Figure 2 of the SFRA, these culverted watercourses run at approximately 2 and 3km to the east of the site.
- 3.4.4** The headwaters of the River Brent, located approximately 2.8 km to the north west of the site remains as an open watercourse. This is classed as a Main River and is managed by the EA (refers to Appendix D).
- 3.4.5** The Grand Union Canal (Paddington Branch) flows in an easterly direction at 4 km to the south of the site.

3.5 EXISTING PUBLIC DRAINAGE

- 3.5.1** TW were contacted for information with regards to the current surface and foul water drainage arrangements in the proximity of the Site.
- 3.5.2** TW Asset Records (Appendix E) show a combined 305 mm diameter water sewer (designed to convey both foul water and surface water from domestic and industrial sources) running westerly beneath Kidderpore Avenue to the south west of the Site. Also beneath Kidderpore Avenue but running in an easterly direction, there is a 940x610 mm combined water sewer. One additional 305 mm combined sewer runs in a southerly direction beneath Kidderpore Gardens to join the latter running beneath Kidderpore Avenue.

3.6 EXISTING ARTIFICIAL WATER BODIES

- 3.6.1** The TW Kidderpore storage reservoir is located outside of the site, along the northern boundary of the site. This reservoir was built in 1867 and supplies water to north-west London.

4 PROPOSED DEVELOPMENT

4.1 DEVELOPMENT PROPOSALS

4.1.1 The proposed development involves;

- The retention of the site's five Grade II statutorily listed buildings. Kidderpore Hall, the Maynard Wing, the Chapel and the old Skeel Library will all be sensitively converted to residential use, and the Summerhouse will be restored in a new location on the site close to the Chapel. Three existing buildings will be demolished and replaced with new residential buildings: Lord Cameron, Rosalind Franklin and the Queen Mother's Hall. Other non-listed buildings will also be retained and sensitively converted to residential use, namely Bay House, Dudin Brown, and Lady Chapman Hall. Three existing buildings will be demolished and replaced with new residential buildings: Lord Cameron Hall, Rosalind Franklin Hall and the Queen Mother's Hall.
- Integrated in the Kidderpore Avenue elevation of the replacement for the Queen Mother's Hall will be an access to a basement area where car parking for residents and visitors will be provided. In total 97 spaces are proposed. The majority of cycle parking requirements will also be accommodated in the basement, amount to 312 spaces. Some cycle parking – in particular that intended to be used by visitors, amounting to 16 spaces – will be provided at ground floor level, carefully integrated into the hard and soft landscaping scheme.
- New buildings are proposed in two locations on the site. The first is between the Chapel and Queen Mother's Hall where 'pavilion' houses are proposed. A terrace of 'townhouses' is proposed between the Chapel and the Maynard Wing on the site of the previously-consented student accommodation development, planning permission for which remains extant by virtue of the development having been commenced.
- The proposed development also includes residents' facilities and a concierge.

4.2 VULNERABILITY CLASSIFICATION

4.2.1 Based on Table 2 in the PPG² to the NPPF, the proposed development is classified as 'more vulnerable' due to the residential use proposed.

4.3 SEQUENTIAL AND EXCEPTION TESTS

4.3.1 As stated in the NPPF and PPG, a sequential risk-based approach should be applied at all stages of the planning process to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. According to NPPF and PPG, the aim is to steer new developments to Flood Zone 1 (areas with low probability of river or sea flooding).

² Planning Practice Guidance. Table 2. Risk Vulnerability Classification. Available at: <http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-2-flood-risk-vulnerability-classification/>

- 4.3.2 The EA confirmed in their response letter dated 12/05/2015 (Appendix D) that the site is located in Flood Zone 1. The uses proposed for the site are classified as 'more vulnerable' in terms of flood risk vulnerability; which are considered appropriate in Flood Zone 1 and an Exception Test would not be required.

4.4 LOCAL DEVELOPMENT AND FLOOD RISK POLICY

- 4.4.1 Camden Development Policies³ (2010) forms part of the Camden Council's Local Development Framework (LDF), the group of documents setting out the planning strategy and policies
- 4.4.2 The Development Policies DP22 'Sustainable design and construction' , DP23 'Water' which fall under the wider Core Strategy Policy CS13 'Taking climate change through promoting higher environmental standards' have been considered relevant and considered when preparing this FRA.
- 4.4.3 In relation solely to flood risk and drainage, DP22 refers to the benefits of including of including green/brown roofs, as well as the wider adapting to climate change initiatives to reduce flooding. DP23, relates to the requirement to reduce surface water runoff and the inclusion of SuDS to reduce the risk of flooding.
- 4.4.4 The emerging Camden Local Plan⁴ will replace the Council's current Core Strategy and Development Policies planning documents, covering the period from 2016-2031. The relevant emerging policies in terms of this FRA would be CC3 'Water and flooding' and CC2 'Adapting to Climate Change' which fall under the main Chapter 8 title "Sustainability and Climate Change". A review of these policies in comparison with the current adopted policies simply reinforces the current strategy towards water/flood risk/climate change and sustainability and therefore the FRA will ensure continued compliance once the Camden Local Plan is adopted.

³ Camden Development Policies (2010-2025) Local Development Framework. Available at: http://www.camden.gov.uk/ccm/cms-service/download/asset?asset_id=2614532

⁴ London Borough of Camden (2015) Draft Camden Local Plan.

5 DEFINITION OF THE FLOOD HAZARD

5.1.1 Reference to relevant FRMS, SFRA, PFRA and SWMP is made, where appropriate, in the following sections and relevant figures are attached in Appendix C. We also refer to the correspondence with the relevant bodies, which is attached in Appendices D, E and F.

5.2 FLUVIAL AND TIDAL FLOODING

5.2.1 The SFRA and FRMS indicate that all main rivers historically located within LBC are now culverted and incorporated into the TW public sewer network and therefore there is no fluvial flood risk within LBC.

5.2.2 Consistent with this information, the Detailed Flood Map provided by the EA as part of their Product 4 shows that the site is located within Flood Zone 1, which is classified as having a 'low' probability of fluvial and tidal flooding based on the NPPF. This means a probability of fluvial and tidal flooding of less than 0.1% in any given year. The EA also confirmed in their response letter dated 12th May 2015 that they have no record of river flooding at the Site.

5.2.3 Based on the above information the probability of fluvial and tidal flooding for the site is considered to be negligible.

5.3 GROUNDWATER FLOODING

5.3.1 Figure 4e within the SFRA indicates that the Site does not lie within an area of increased susceptibility to elevated groundwater and there are no records of historical groundwater flooding based on LBC and EA records.

5.3.2 In addition, the EA Depth to Groundwater Map provided as part of the Product 4 indicates that groundwater in the area is over 100 m below ground level. However it should be noted this is in reference to the London Clay, not elevated ground water that could potentially be within the upper geology.

5.3.3 Ground water was encountered at depths varying between 2.38m to 6.53m below ground level across the site within boreholes undertaken, indicating a perched water table within the Claygate Member.

5.3.4 Given the urban nature of the proposed area, no known history of groundwater flooding, it is considered that the probability of groundwater flooding is low.

5.4 SURFACE WATER FLOODING

5.4.1 Figure 6 of the SFRA shows that the site is not located within a Local Flood Risk Zone (LFRZ) which is defined as an area where discrete flooding is possible, affecting houses, business or infrastructure. However it indicates that half of the site is located within a Critical Drainage Area (CDA). A CDA indicates an area where surface water management should be a key focus of any future development. The majority of Camden is located in CDA's.

5.4.2 The EA Risk of Flooding from Surface Water map (Appendix D) shows the whole of the Site to be located at very low risk of flooding, meaning less than 0.1% annual probability of surface water flooding (i.e. no flooding up to a 1 in 1000 year rainfall event).

- 5.4.3 This is consistent with Figure 3 of the SFRA that presents the Updated Flood Map for Surface Water (uFMfSW), the most recent and up-to-date surface water modelling available for LBC. This figure also shows the historic flood records in LBC. Kidderpore Gardens and Ferncroft Avenue were flooded in 1975 and Platt's Lane in 2002, but no flooding was recorded for the Site or Kidderpore Avenue.
- 5.4.4 No signs of surface water flood risk to the site were observed during the site visit, and levels fall away from building entrances within the site itself, mitigating any potential risk.
- 5.4.5 Based on all the above the probability of surface water flooding in the area can be considered as low.

5.5 SEWER FLOODING

- 5.5.1 The combined sewer network of the local area is designed to outfall into the River Thames during intense rainfall events when the sewer network reaches capacity. The SFRA has records indicating surcharging of the local sewer network during the 1975 and 2002 extreme rainfall events when the capacity was exceeded. The DG5 sewer flooding shown within Figures 5a and 5b (Appendix C) shows no records of external or internal sewer flooding for the local area surrounding the site.
- 5.5.2 As part of our consultation TW were asked for information with respect to flooding from sewers; TW has stated within their formal response that *'The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.'* (Appendix E).
- 5.5.3 Based on all the above the probability of sewer flooding in the area can be considered to be low.

5.6 ARTIFICIAL SOURCES OF FLOODING

- 5.6.1 Based on the EA online maps, the Site is shown to be outside of the maximum extent of flooding if Hampstead Ponds, Highgate Ponds and Maiden Lane Reservoir flooded.
- 5.6.2 However, Kidderpore reservoir is located just to the north of the site. Recent upgrade works have been completed to improve the reservoir's walls and roof. Correspondence with TW confirmed that these works were completed in January 2015. TW also confirmed that they hold no records of historical flooding occurring previously from this reservoir, and that the sealed concrete tank is inspected every week to ensure no flooding to adjacent properties. There is also a fully integrated overflow protection system which trips pumps once a high level alarm in the reservoir is activated and this is tested every 6 months.
- 5.6.3 Based on all the above the probability of flooding from artificial sources affecting the Site can be considered to be low.

6 CLIMATE CHANGE

6.1 BACKGROUND INFORMATION

6.1.1 There is an increasing body of scientific evidence that global climate is changing as a result of human activity. Past, present and future emissions of greenhouse gases are expected to cause significant global climate change during this century.

6.1.2 The nature of climate change at a regional level will vary: for the UK, more frequent short-duration, high intensity rainfall and more frequent periods of long-duration rainfall could be expected. Sea levels will also continue to rise.

6.2 DEVELOPMENT LIFETIME

6.2.1 The typical lifespan for residential developments in terms of flood risk and coastal change is considered 100 years. Based on this typical lifetime, the contingency allowance for climate change (as set out in Table 2 of the Environment Agency Guidance to support the NPPF⁵) that is potentially applicable to the site is a 30% increase in peak rainfall intensity by 2115. This allowance has been used for the proposed surface water drainage calculations in Section 8 of this report.

6.3 IMPACT OF CLIMATE CHANGE ON THE DEVELOPMENT

6.3.1 Based on the available information (Section 5), there are no significant sources of flooding at the site and therefore climate change is generally not expected to significantly impact on flood risk at the site.

6.3.2 However extreme rainfall is expected to increase as a consequence of climate change and the outline surface water strategy for the site (Section 8) has been developed taking this into account, according to the Environment Agency guidance to support the NPPF⁵. This is to ensure that the site does not exacerbate flooding to third parties, through increased surface water runoff, in the future.

⁵ Climate change allowances for planners. Environment Agency guidance to support the NPPF (2013). Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296964/LIT_8496_5306da.pdf

7 FLOOD RISK MITIGATION MEASURES

- 7.1.1 The probability of flooding from all sources (i.e. rivers and sea, surface water, groundwater, sewers, artificial) has been assessed to be low for this site, though the management of surface water for the proposed development needs to be considered.
- 7.1.2 Despite the low risk associated with groundwater flooding, it is recommended that the proposed basement be designed in accordance with best practice to ensure no ground water ingress via adequate waterproofing.
- 7.1.3 In order to provide mitigation measures to manage the surface water runoff, a Drainage Strategy Statement has been provided for the proposal by Tully De'Ath, this strategy is included in Appendix G.

8

OUTLINE SURFACE WATER DRAINAGE STRATEGY

- 8.1.1 Please refer to the Appendix G for Tully De'Ath Drainage Strategy Statement and associated plans.
- 8.1.2 In summary this Drainage Strategy Statement indicates that via the use of SuDS (green roofs and permeable paving) and traditional attenuation, proposed development surface water runoff has been significantly reduced in line with local policy for all storm events up to and including the 1 in 100 year event storm with an additional 30% intensity to allow for climate change.

9

OFF-SITE IMPACT

9.1.1

The Drainage Strategy Statement produced by Tully De'Ath has demonstrated that the proposal would result in a reduction in the surface water runoff from the site to a maximum combined rate of 9.9 l/s for all storm events up to and including the 1 in 100 year storm with an additional 30% intensity. The reduction in flow rate would reduce the impact on the local public drainage network, and essentially free up capacity, which may reduce the probability and impact of local public sewer flooding.

10 RESIDUAL RISK

- 10.1.1 The surface water strategy outlined in the Drainage Strategy Statement has been developed by considering a 30% increase in peak rainfall intensity by 2115; according to the Environment Agency guidance 'Climate change allowances for planners' to support the NPPF⁵. The strategy also considers exceedance flood routing to ensure flooding doesn't affect the buildings during extreme events.
- 10.1.2 The proposed basement car park has unimpeded pedestrian stair access to ground level, thus removing any residual risk if the basement ever floods.

11 CONCLUSION

- 11.1.1 WSP | Parsons Brinckerhoff has undertaken this FRA to support the planning application for the proposed residential re-development at Kidderpore Avenue, Hampstead, London.
- 11.1.2 The site is located in Flood Zone 1, where the proposed uses are deemed appropriate, and an Exception Test would not be required, as advised by the NPPF and PPG. In addition, the probability of flooding from all sources of flood risk (i.e. rivers and sea, surface water, groundwater, sewers, artificial) is considered to be low or negligible for this site.
- 11.1.3 Adequate waterproofing and unimpeded stair access will be provided for the basement car park, and thus reduce any residual risk to people.
- 11.1.4 Other sources of flooding have been considered and the sustainable management of surface water runoff has been identified as the key issue for the development.
- 11.1.5 The Drainage Strategy Statement developed by Tully De'Ath in consultation with the relevant approving bodies ensures that surface water is managed in accordance with local policy requirements both on site as well as ensuring there is no detrimental impact off site.

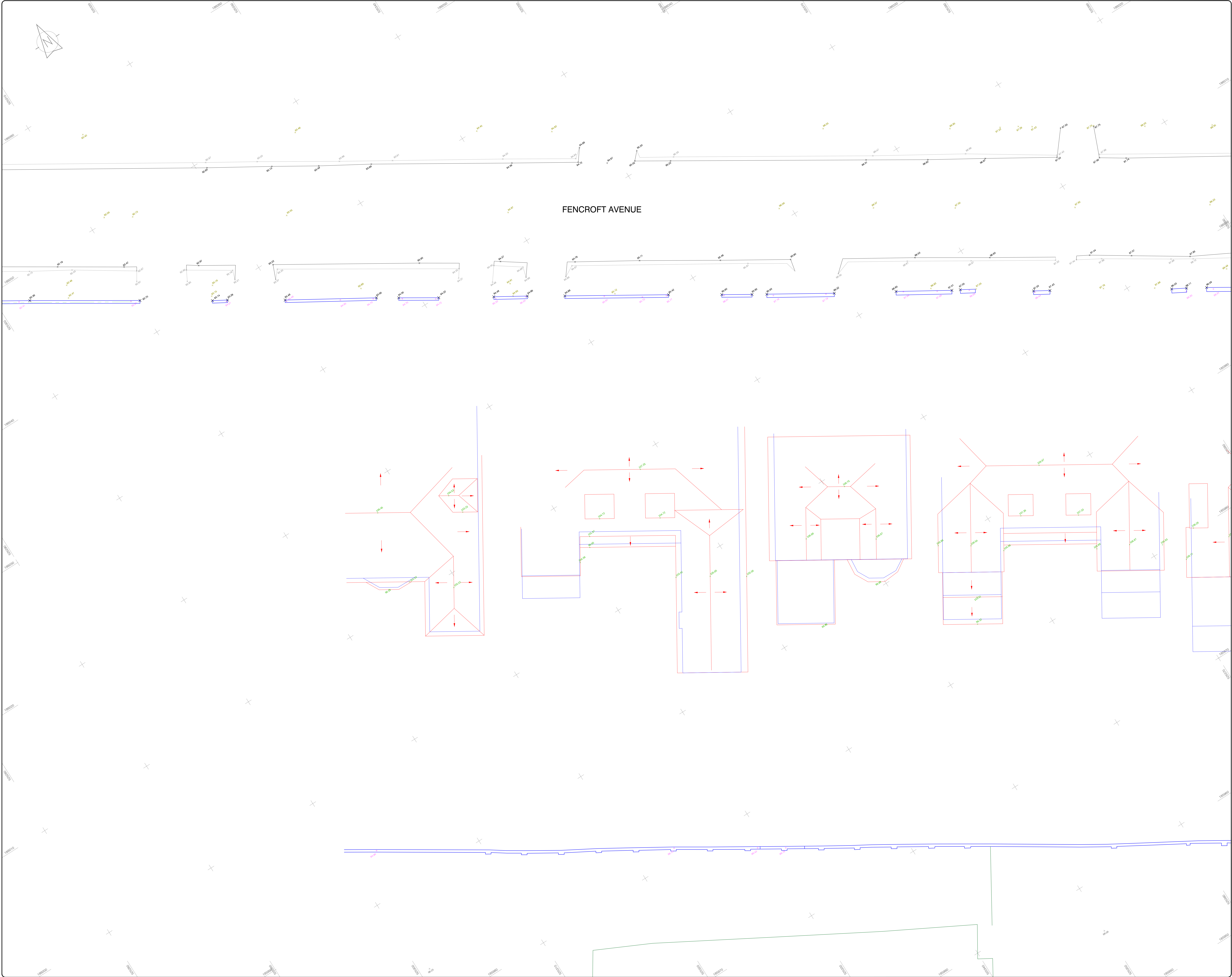
Appendix A

SITE LOCATION PLAN



Appendix B

TOPOGRAPHICAL SURVEY



LEGEND
Street Furniture & Services

- Gas Valve, Gully, Fire Hydrant, Inspection Cover, (Cable TV) Electricity, Circular Manhole, Manhole Square, Foul Manhole, Surface Water MH, Water Main, Valve, Stop Cock, Stop Valve, Top of Pipe, Air Valve, Duct, Fiber Optic, Electricity Pole, Telegraph Pole, Stay for pole, Over Head Wires, Electricity Cabinet, Bollard, Bus Shelter, Gate, Lamp Stand, Pole, Sign, Waste Bin, Traffic Light, Road Sign

- Natural Features
- Natural Surface, Contour lines, Bottom of Slope, Top of Slope, Lake Line, Pond Line, River, Stream, Water Level, Tree Coniferous, Tree Deciduous, Treeline, Bush, Top of Tree, Hedge Line, Scrub, Overgrowth, Invert Level

Built Features
Roads & Road Markings

- Building, Wall, Edge of Road, Footpath, Kerb (bottom), Kerb (top), CRASH Barrier, Railway, Line of Fence, Concrete Base, Surface Change, Survey Station, Hard Surface, Floor Level, Apex Height, Eaves Height, Parapet Height, Underside of Soffit, Top of Wall Level, Step Level, Land Drain, Floor Level, Ceiling Height, Falls Ceiling Height, Beam Height, Door Height, Floor to Ceiling, Height, Air Conditioner, Arrows Point Up, Sloping Ceiling, Fire Door

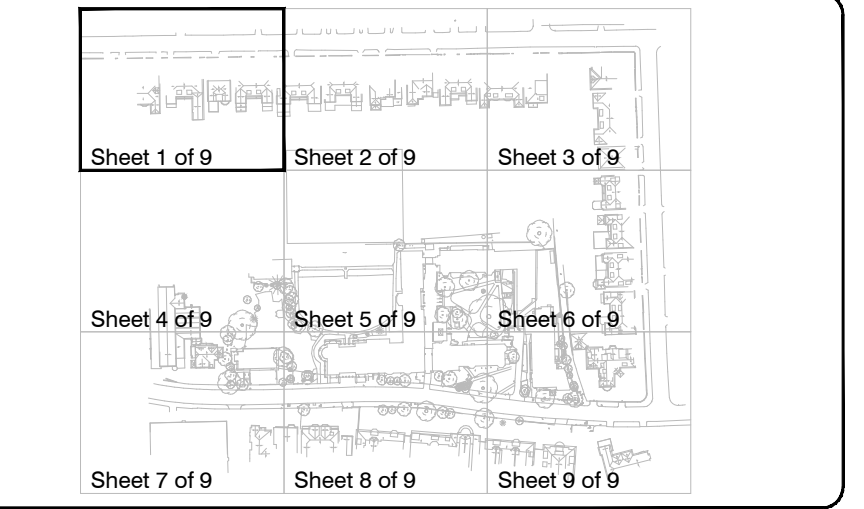
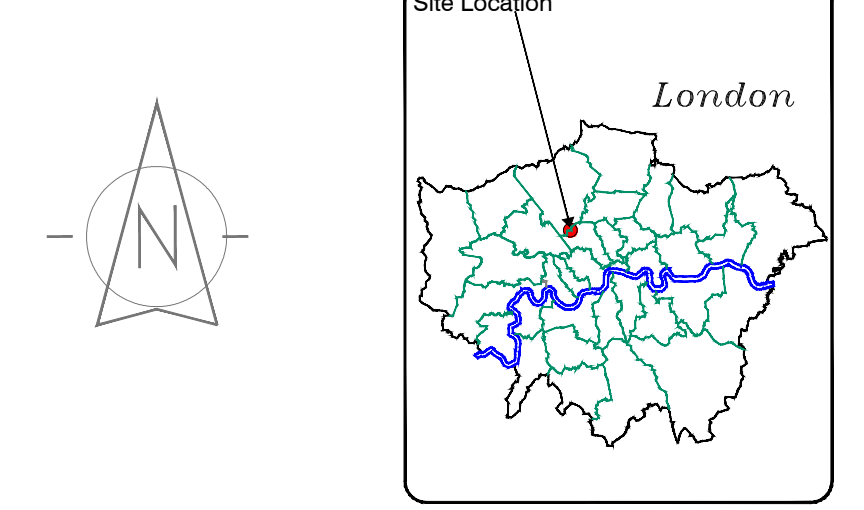
- Golf
- Fair Way, Green, Tee Box

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No	Date	Description
A	10/07/2014	PROVISIONAL ISSUE
B	07/10/2014	Extension of the area, ROL, north, Correction of the reservoir outline, building names added
C	20/03/2015	Survey back of Chapel
D	08/04/2015	Vegetation at back of Chapel added
E	15/04/2015	Additional levels at back of Chapel added



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UK Head Office
9 Devonshire Square
London
EC2M 4YF

Phone: (+44) 020 3178 6644
Email: london@murphysurveys.co.uk

www.murphysurveys.co.uk

Client : Mount Anvil

Project : Kidderpore Avenue

Date : 15/04/2015 Scale : 1:100 @ A0

Description : Topographic Survey

Drawing Number : MSL9992-T-RevE-01

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LEGEND
Street Furniture & Services

- Gas Valve, Valve, Stop Cock, Bus Shelter, Fire Hydrant, Stop Valve, Top of Pipe, Gate, Inspection Cover, Air Valve, Lamp Stand, (Cable TV) Electricity, Duct, Fbox Phone Box, (Telecoms), Fiber Optic, Pole, Circular Manhole, Electricity Pole, Sign, Manhole Square, Telegraph Pole, Waste Bin, Foul Manhole, Stay for pole, Traffic Light, Surface Water MH, Over Head Wires, Traffic Cabinet, Water Main, Electricity Cabinet, Road Sign

Natural Features

- Natural Surface, Tree Coniferous, Contour lines, Tree Deciduous, Bottom of Slope, Treeline, Top of Slope, Bush, Lake Line, Top of Tree, Pond Line, Hedge Line, River, Scrub, Stream, Overgrowth, Water Level, Invert Level

Built Features
Roads & Road Markings

- Building, Survey Station, Floor Level, Wall, Hard Surface, Ceiling Height, Edge of Road, FL, Floor Level, Falls Ceiling Height, Footpath, Apex, Apex Height, Beam Height, Kerb (bottom), Eaves, Eaves Height, Door Height, Kerb (top), Parapet, Parapet Height, Floor to Ceiling, Crash Barrier, Underside of Soffit, Height, Railway, Top of Wall Level, Air Conditioner, Line of Fence, Step Level, Arrows Point Up, Concrete Base, Land Drain, Sloping Ceiling, Surface Change, Fire Door

Golf

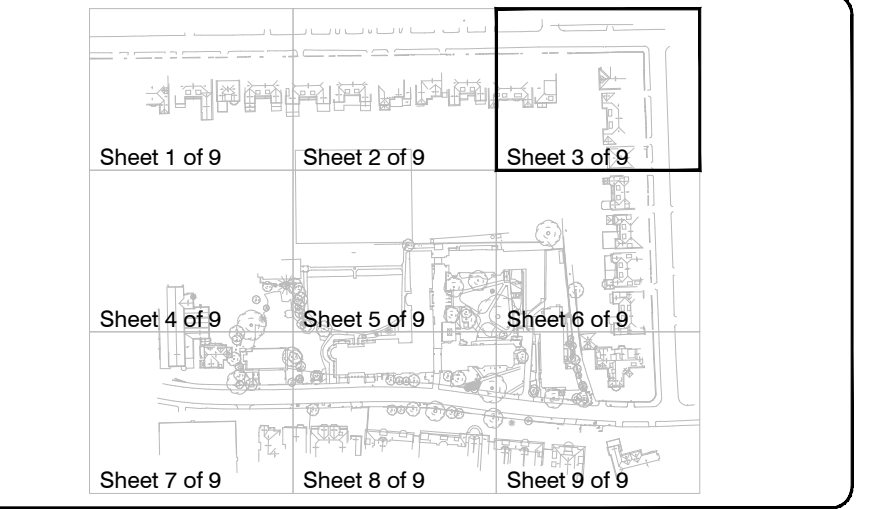
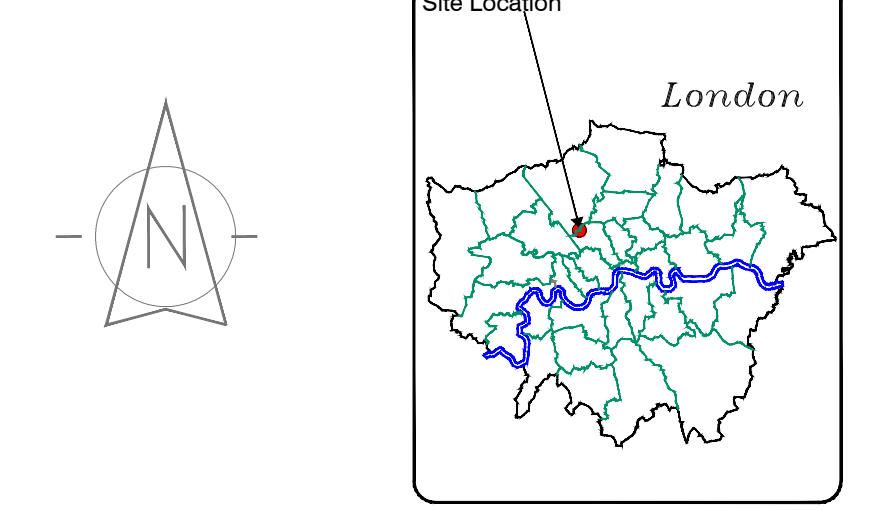
- Fair Way, Green, Tee Box

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Surveyed by : MS-GB	Date : 14/07/2014-18/03/2015	Datum : OSGB
Drawn by : MS-RB	Date : 15/07/2014-25/03/2015	Grid System : OSGB
Checked by : TMD-MM	Date : 16/07/2014-27-03-2015	
Revisions		
No	Date	Description
A	18/07/2014	PROVISIONAL ISSUE
B	07/10/2014	Extension of the area, ROL, north, Correction of the reservoir outline, building names added
C	25/03/2015	Survey back of Chapel
D	08/04/2015	Vegetation at back of Chapel added
E	15/04/2015	Additional levels at back of Chapel added



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EC2M 4YF

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Email: london@murphysurveys.co.uk

www.murphysurveys.co.uk

Client : Mount Anvil

Project : Kidderpore Avenue

Date : 15/04/2015 Scale : 1:100 @ A0

Description : Topographic Survey

Drawing Number : MSL9992-T-RevE-03

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LEGEND
Street Furniture & Services

GA	Gas Valve	VE	Valve	OB	Bollard
GS	Gully	SC	Stop Sign	BS	Bush Buster
H	Hyd	SV	Shut Valve		
H	Fire Hydrant	TOP	Top of Pipe	GATE	
IC	Inspection Cover	AV	Air Valve	LS	Lamp Stand
IC	(Cable TV) Electricity	DUCT	Duct	PO	Phone Box
IC	(Telecoms)	FOPTIC	Fiber Optic	POLE	
MC	Circular Manhole	E	Electricity Pole	SGN	Sign
MC	Manhole Square	ST	Streight Pole	GN	Waste Bin
MC	Four Manhole	STAY	Stay for pole	TL	Traffic Light
MC	Surface Water MH	OV	Over Head Wires	TCF	Traffic Cabinet
WM	Water Main	EBOX	Electricity Cabinet	RS	Road Sign

Natural Features

	Natural Surface		Tree Coniferous
	Contour lines		Tree Deciduous
	Bottom of Slope		Treeline
	Top of Slope		Bush
	Lake Line		Top of Tree
	Pond Line		Hedge Line
	River		Scrub
	Stream		Overgrowth
	Water Level		Invert Level

Built Features

Roads & Road Markings

	Building		Survey Station		Floor Level
	Wall		Header Surface		Ceiling Height
	Edge of Road		Floor Level		Beam Ceiling Height
	Footpath		Apex Height		Beam Height
	Kerb (bottom)		Eaves Height		Door Height
	Kerb, (top)		Parapet Height		Floor to Cill
	Crash Barrier		Underside of Soffit		Gill Height
	Railway		Underneath of Soffit		Height
	Line of Fence		Top of Wall Level		Air Conditioner
	Concrete Base		Step Level		Arrow Point Condition
	Surface Change		Land Drain		Slipping Condition
					Fire Door

Internal Survey Features

-  Floor Level
-  Ceiling Height
-  False Ceiling Height
-  Beam Height
-  Door Height
-  Floor to Cill
-  Cill to Head
-  Height
-  Air Conditioner
-  Arrows Point Up
-  Sloping Ceiling
-  Fire Door

Golf

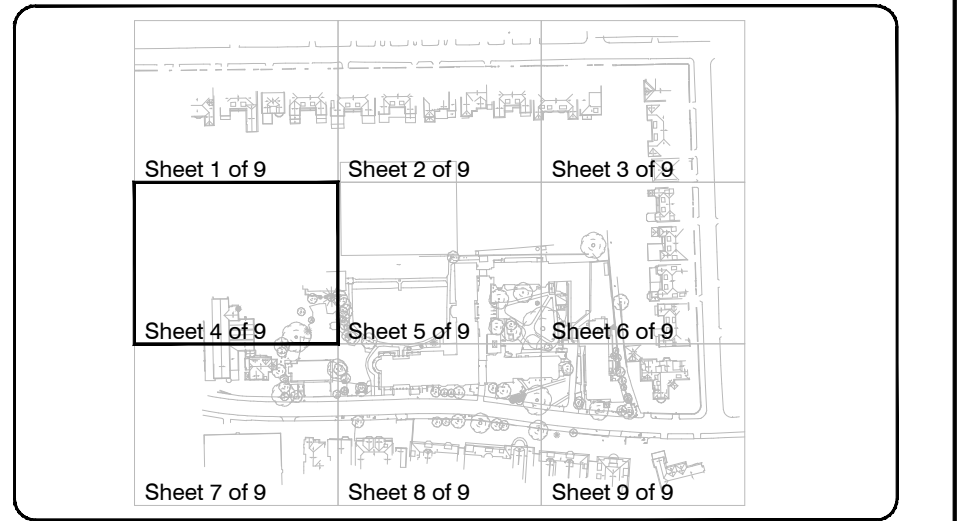
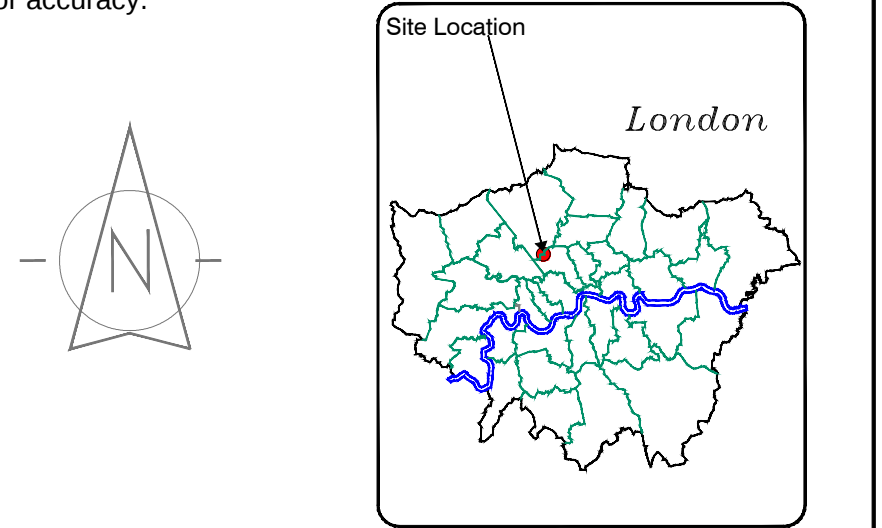
FWAY Fair Way
GREEN Green
TBOX Tee Box

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Surveyed by: MS-GB	Date: 14/07/2014-18/03/2015	Datum: 05GB
Drawn by: MSRB	Date: 15/07/2014-25/03/2015	Grid System: 05GB
Checked by: TMD-MM	Date: 16/07/2014-27-03-2015	
Revisions		
No	Date	Description
A	16/07/2014	PROVISIONAL ISSUE
B	07/10/2014	Extension of the area, ROL rods, Correction of the reservoir outline, building names added
C	25/03/2015	Survey back of Chapel
D	08/04/2015	Vegetation at back of Chapel added
E	15/04/2015	Additional levels at back of Chapel added



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Email: london@murphysurveys.co.uk

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Client :	
Mount Anvil	
Project :	
Kidderpore Avenue	
Date :	Scale :
15/04/2015	1:100 @ A0
Description :	
Topographic Survey	
Drawing Number :	
MSL9992-T-RevE-04	
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LEGEND
Street Furniture & Services

GA Gas	VE Valve	OB Bollard
GY Gully	VS Stop Valve	BS Bush Sooter
HC Hydraulic	SV Stop Valve	
HT Hot	TV Top of Valve	GATE
IC Inspection Cover	AV Air Valve	LS Lamp Stand
KC Cable Tray (Electricity)	DUCT Duct	POB Phone Box
KCT Cable Tray (Telecoms)	FFFC Fiber Optic	POLE Pole
MC Circular Manhole	FOF Fiber Optic	SGN Sign
MS Manhole Square	ST Telegraph Pole	GSN Waste Bin
FM Four Manhole	STAY Stay for pole	TL Traffic Light
MSL Surface Water MH	OH Over Head Wires	TRF Traffic Cabinet
WM Water Main	EXB EXB	Electricity Cabinet
	PS	Road Sign

Natural Features

+ 5.12	Natural Surface		Tree Coniferous
20	Contour lines		Tree Deciduous
+ 5.12	Bottom of Slope		Treeline
+ 5.12	Top of Slope		Bush
LAKE 5.12	Lake Line	* TOT 5.12	Top of Tree
POND 5.12	Pond Line		Hedge Line
5.12	River		Scrub
STRM 5.12	Stream		Overshoot
WATER 5.12	Water Level		Invert Level

Built Features

Roads & Road Markings

	Building		Survey Station		Ceiling Level
	Wall	+ S.12	Hard Surface		Floor Height
	Edge of Road	FL	Floor Level		False Ceiling Height
	Footpath	APEX	Apex Height		Beam Height
	Kerb (bottom)	EAVES	Eaves Height		Door Height
	Kerb, (top)	PARAPET	Parapet Height		Height to Cill
	Crash Barrier	SOFFIT	Underside of Soffit		Height
	Railway	+ S.12	Top of Wall Level		Air Conditioner
	Line of Fence		Step Level		Arrow Point Condition
	Concrete Base		Land Drain		Sloping Ceiling
	Surface Change				Fire Door

Internal Survey Features

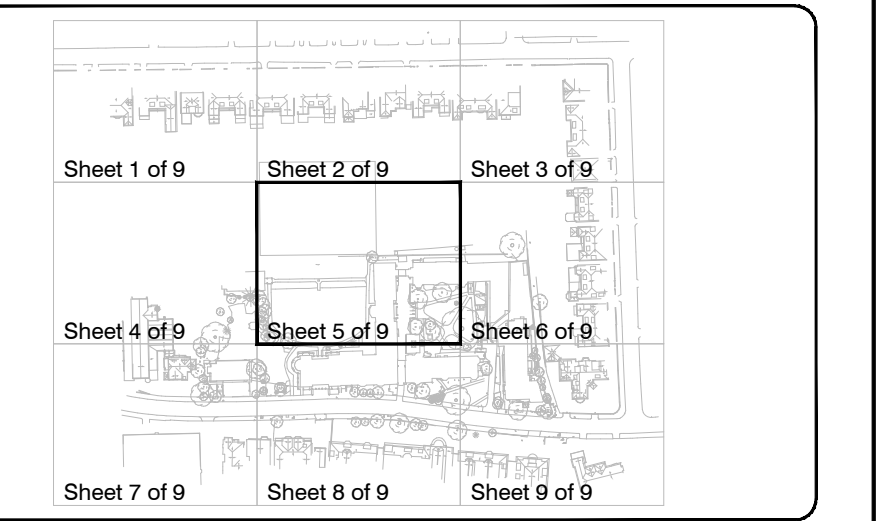
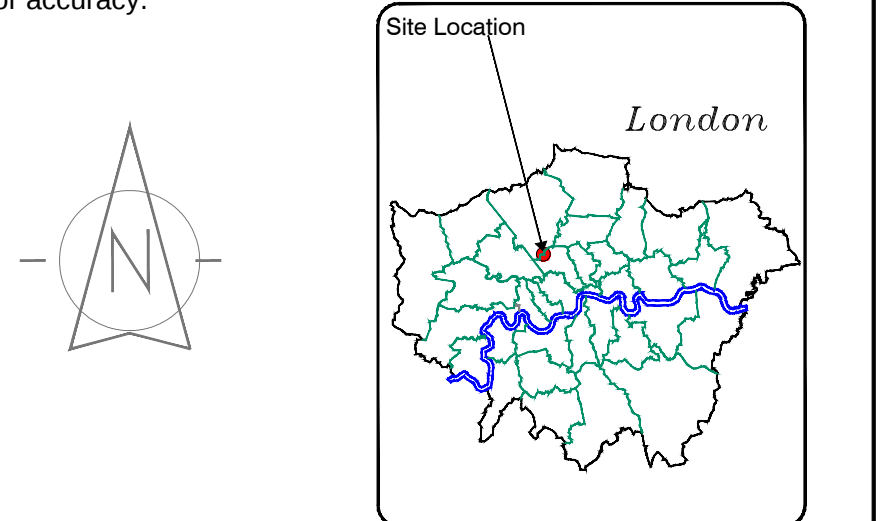
-  Floor Level
-  Ceiling Height
-  False Ceiling Height
-  Beam Height
-  Door Height
-  Floor to Cill
-  Cill to Head
-  Height
-  Air Conditioner
-  Arrows Point Up
-  Sloping Ceiling
-  Fire Door

Golf

Fair Way
 Green
 Tee Box

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Surveyed by: MS-GB		Date: 14/07/2014-18/03/2015	Datum: OSGB
Drawn by: MS-GB		Date: 15/07/2014-25/03/2015	Grid System: OSGB
Checked by: TMD-MM		Date: 18/07/2014-27/03/2015	
Revisions			
No	Date	Description	
A	16/07/2014	PROVISIONAL ISSUE	
B	07/10/2014	Extension of the area, ROL roofs. Correction of the reservoir outline, building names added	
C	25/03/2015	Survey back of Chapel	
D	08/04/2015	Vegetation at back of Chapel added	
E	15/04/2015	Additional levels at back of Chapel added	



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Phone: (+44) 020 3178 8644
Email: london@murphysurveys.co.uk

www.murphysurveys.co.uk

Client : _____

Mount Anvil
Project : Kidderpore Avenue

Date : 15/04/2015	Scale : 1:100 @ A0
Description : Topographic Survey	

Drawing Number : MSL9992-T-RevE-05

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LEGEND

Street Furniture & Services

- Gas Valve
- Gully
- Fire Hydrant
- Inspection Cover
- (Cable TV) Electricity
- (Telecoms)
- Circular Manhole
- Manhole Square
- Foul Manhole
- Surface Water MH
- Water Main
- Valve
- Stop Cock
- Stop Valve
- Top of Pipe
- Air Valve
- Duct
- Fiber Optic
- Electricity Pole
- Telegraph Pole
- Stay for pole
- Over Head Wires
- Electricity Cabinet
- Bollard
- Bus Shelter
- Gate
- Lamp Stand
- Pole
- Sign
- Waste Bin
- Traffic Light
- Traffic Cabinet
- Road Sign

- ### Natural Features
- Natural Surface
 - Contour lines
 - Bottom of Slope
 - Top of Slope
 - Lake Line
 - Pond Line
 - River
 - Stream
 - Water Level
 - Tree Coniferous
 - Tree Deciduous
 - Treeline
 - Bush
 - Top of Tree
 - Hedge Line
 - Scrub
 - Overgrowth
 - Invert Level

- ### Built Features
- #### Roads & Road Markings
- Building
 - Wall
 - Edge of Road
 - Footpath
 - Kerb (bottom)
 - Kerb, (top)
 - Crash Barrier
 - Railway
 - Line of Fence
 - Concrete Base
 - Surface Change
 - Survey Station
 - Hard Surface
 - Floor Level
 - Apex Height
 - Eaves Height
 - Parapet Height
 - Underside of Soffit
 - Top of Wall Level
 - Step Level
 - Land Drain
 - Floor Level
 - Ceiling Height
 - Falls Ceiling Height
 - Beam Height
 - Door Height
 - Prior to Call
 - Call to Head
 - Height
 - Air Conditioner
 - Arrows Point Up
 - Sloping Ceiling
 - Fire Door
- ### Golf
- Fair Way
 - Green
 - Tee Box

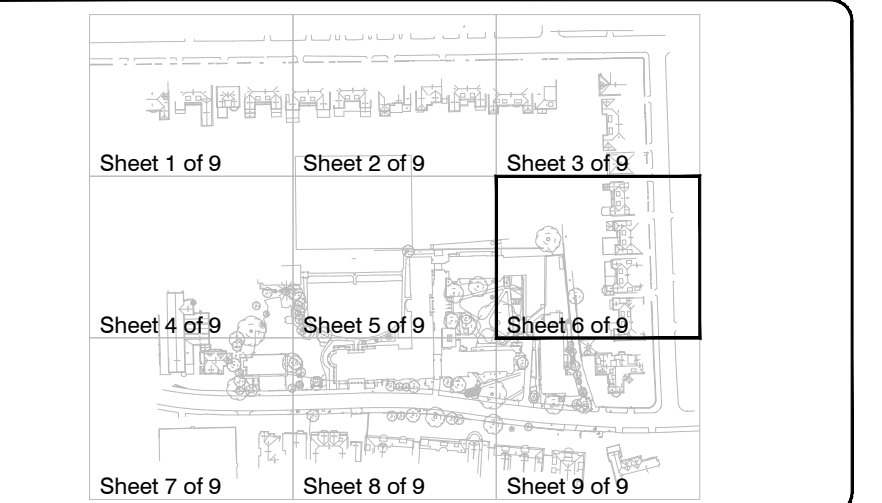
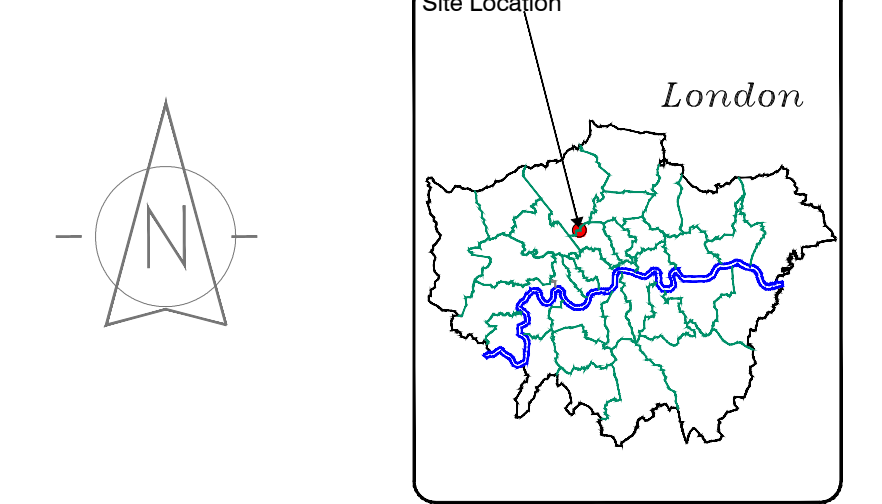
- ### Internal Survey Features
- Floor Level
 - Ceiling Height
 - Falls Ceiling Height
 - Beam Height
 - Door Height
 - Prior to Call
 - Call to Head
 - Height
 - Air Conditioner
 - Arrows Point Up
 - Sloping Ceiling
 - Fire Door

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No	Date	Description
A	10/07/2014	PROVISIONAL ISSUE
B	07/10/2014	Extension of the area, ROL, north, Correction of the reservoir outline, building names added
C	20/03/2015	Survey back of Chapel
D	08/04/2015	Vegetation at back of Chapel added
E	15/04/2015	Additional levels at back of Chapel added



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Email: london@murphysurveys.co.uk

www.murphysurveys.co.uk

Client: Mount Anvil
Project: Kidderpore Avenue
Date: 15/04/2015 Scale: 1:100 @ A0
Description: Topographic Survey
Drawing Number: MSL9992-T-RevE-06
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- LEGEND**
Street Furniture & Services
- Gas Valve
 - Gully
 - Fire Hydrant
 - Inspection Cover
 - (Cable TV) Electricity
 - (Telecoms)
 - Circular Manhole
 - Manhole Square
 - Foul Manhole
 - Surface Water MH
 - Water Main
 - Valve
 - Stop Cock
 - Stop Valve
 - Top of Pipe
 - Air Valve
 - Duct
 - Fiber Optic
 - Electricity Pole
 - Telegraph Pole
 - Stay for pole
 - Over Head Wires
 - Electricity Cabinet
 - Bollard
 - Bus Shelter
 - Gate
 - Lamp Stand
 - Phone Box
 - Pole
 - Sign
 - Waste Bin
 - Traffic Light
 - Traffic Cabinet
 - Road Sign

- Natural Features**
- Natural Surface
 - Contour lines
 - Bottom of Slope
 - Top of Slope
 - Lake Line
 - Pond Line
 - River
 - Stream
 - Water Level
 - Tree Coniferous
 - Tree Deciduous
 - Treeline
 - Bush
 - Top of Tree
 - Hedge Line
 - Scrub
 - Overgrowth
 - Invert Level

- Built Features**
Roads & Road Markings
- Building
 - Wall
 - Edge of Road
 - Footpath
 - Kerb (bottom)
 - Kerb, (top)
 - Crash Barrier
 - Railway
 - Line of Fence
 - Concrete Base
 - Surface Change
 - Survey Station
 - Hard Surface
 - Floor Level
 - Apex Height
 - Eaves Height
 - Parapet Height
 - Underside of Soffit
 - Top of Wall Level
 - Step Level
 - Land Drain
 - Floor Level
 - Ceiling Height
 - Falls Ceiling Height
 - Beam Height
 - Door Height
 - Floor to Ceiling
 - Height
 - AC
 - Arrows Point Up
 - Sloping Ceiling
 - Fire Door

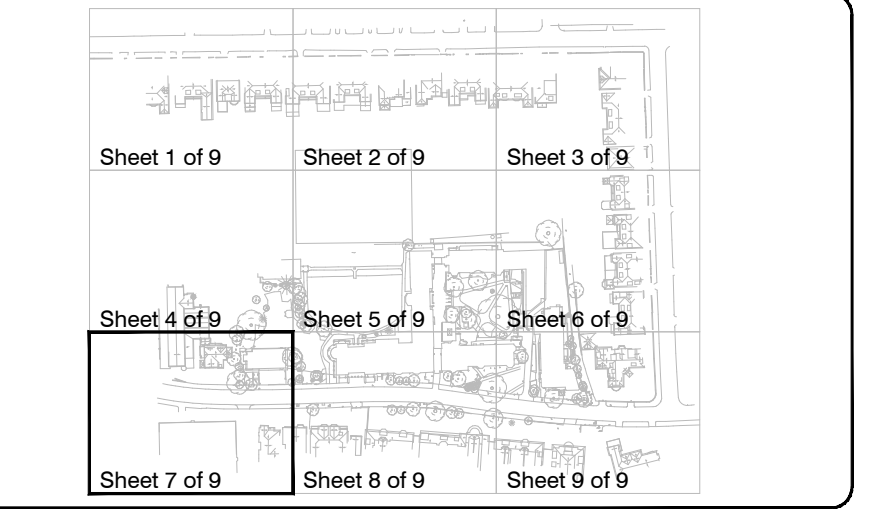
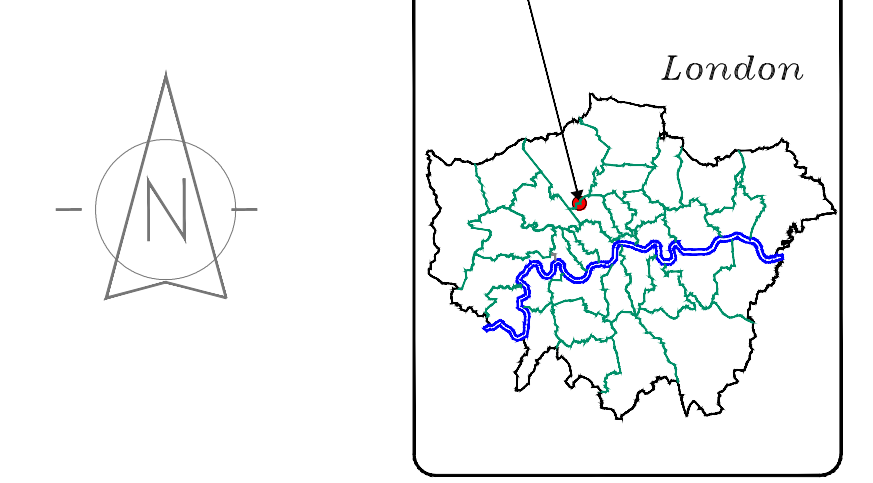
- Internal Survey Features**
- Floor Level
 - Ceiling Height
 - Falls Ceiling Height
 - Beam Height
 - Door Height
 - Floor to Ceiling
 - Height
 - AC
 - Arrows Point Up
 - Sloping Ceiling
 - Fire Door

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Surveyed by : MS-GB	Date : 14/07/2014-18/03/2015	Datum : OSGB
Drawn by : MS-RB	Date : 15/07/2014-25/03/2015	Grid System : OSGB
Checked by : TMD-MM	Date : 16/07/2014-27-03-2015	
Revisions		
No	Date	Description
A	18/07/2014	PROVISIONAL ISSUE
B	07/10/2014	Extension of the area, ROL, roads, Correction of the reservoir outline, building names added
C	25/03/2015	Survey back of Chapel
D	08/04/2015	Vegetation at back of Chapel added
E	15/04/2015	Additional levels at back of Chapel added



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Setting Out, As-Built Surveys, Hydrographic Surveys, Laser Mapping
Pipeline Surveys, Services Location, Ground Penetrating Radar,
Laser Scanning, Aerial Photography

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Phone: (+44) 020 3178 6644
Email: london@murphysurveys.co.uk

Client : Mount Anvil

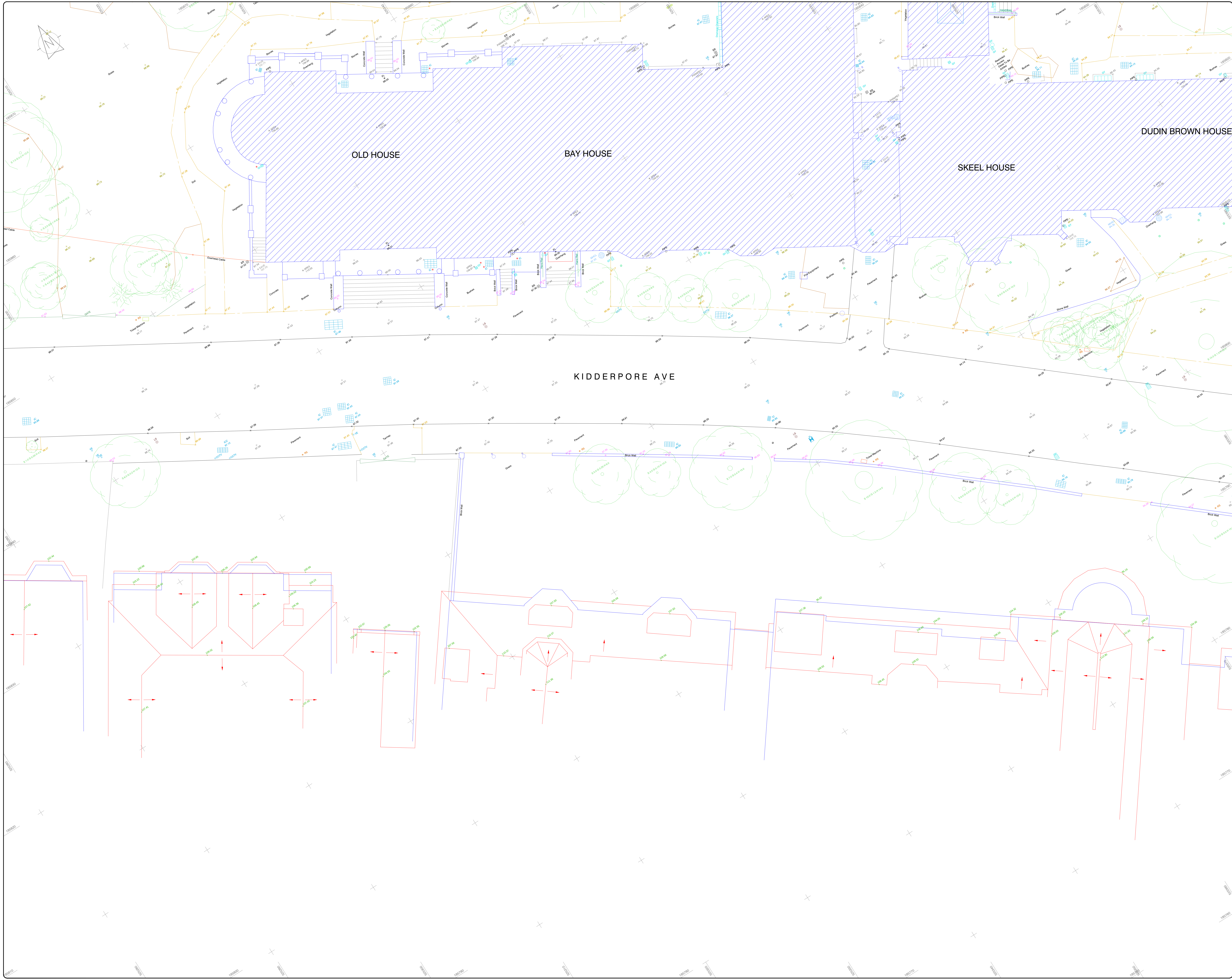
Project : Kiddyerpore Avenue

Date : 15/04/2015 Scale : 1:100 @ A0

Description : Topographic Survey

Drawing Number : MSL9992-T-RevE-07

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LEGEND
Street Furniture & Services

- Gas Valve, Gully, Fire Hydrant, Inspection Cover, (Cable TV) (Electricity) (Telecoms), Circular Manhole, Manhole Square, Foul Manhole, Surface Water MH, Water Main, Valve, Stop Cock, Stop Valve, Top of Pipe, Air Valve, Duct, Telegraph Pole, Electricity Pole, Stay for pole, Over Head Wires, Electricity Cabinet, Bollard, Bus Shelter, Gate, Lamp Stand, Pole, Sign, Waste Bin, Traffic Light, Road Sign

Natural Features

- Natural Surface, Contour lines, Bottom of Slope, Top of Slope, Lake Line, Pond Line, River, Stream, Water Level, Tree Coniferous, Tree Deciduous, Treeline, Bush, Top of Tree, Hedge Line, Scrub, Overgrowth, Invert Level

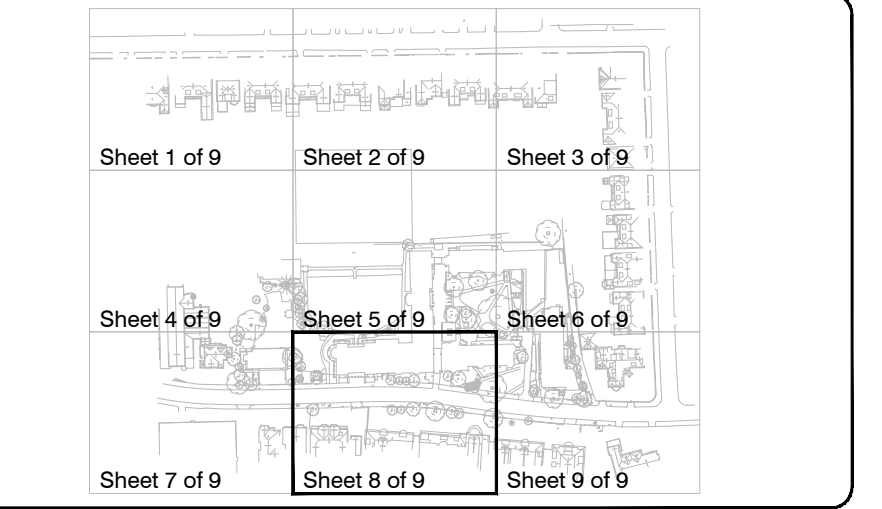
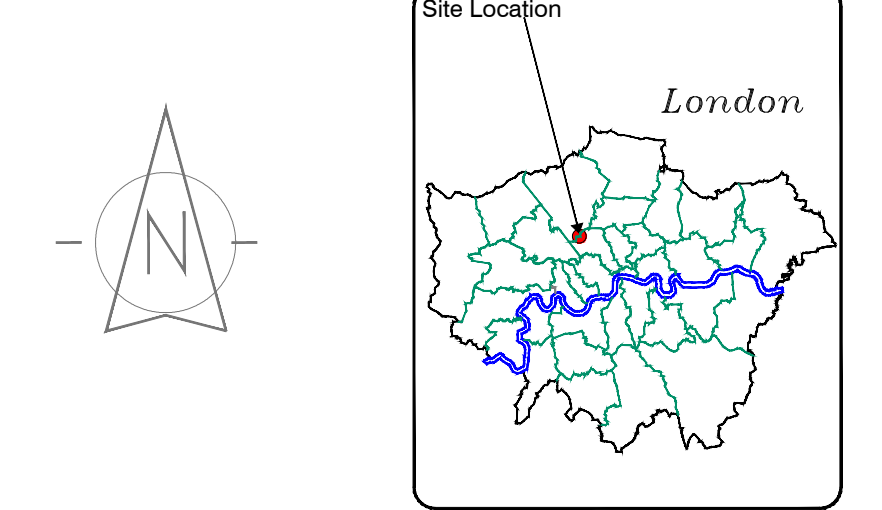
Built Features
Roads & Road Markings

- Building, Wall, Edge of Road, Footpath, Kerb (bottom), Kerb (top), Crash Barrier, Railway, Line of Fence, Concrete Base, Surface Change, Survey Station, Hard Surface, Floor Level, Apex Height, Eaves Height, Parapet Height, Underside of Soffit, Top of Wall Level, Step Level, Land Drain, Floor Level, Ceiling Height, Falls Ceiling Height, Beam Height, Door Height, Floor to Call, Height, Air Conditioner, Arrows Point Up, Sloping Ceiling, Fire Door

Golf

- Fair Way, Green, Tee Box

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Surveyed by : MS-GB	Date : 14/07/2014-18/03/2015	Datum : OSGB
Drawn by : MS-RB	Date : 15/07/2014-25/03/2015	Grid System : OSGB
Checked by : TMD-MM	Date : 16/07/2014-27-03-2015	
Revisions		
No	Date	Description
A	18/07/2014	PROVISIONAL ISSUE
B	07/10/2014	Extension of the area, ROL, roots, Correction of the reservoir outline, building names added
C	25/03/2015	Survey back of Chapel
D	08/04/2015	Vegetation at back of Chapel added
E	15/04/2015	Additional levels at back of Chapel added



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Client : Mount Anvil

Project : Kidderpore Avenue

Date : 15/04/2015 Scale : 1:100 @ A0

Description : Topographic Survey

Drawing Number : MSL9992-T-RevE-08

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