Charlie Ratchford Extra-Care Scheme

Flood Risk Assessment

On behalf of **London Borough of Camden**

Project Ref: 31103| Rev: 1 | Date: February 2015

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-	07/11/14	Draft issued to Design Team	YZ	ET	RP
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Executive Summary

1.1.1 This Flood Risk Assessment (FRA) has been prepared by Peter Brett Associates LLP (PBA) to support a planning application for an extra-care facility on an approximately 1700m^2 site situated in London Borough of Camden (LBC).

1.1.2 The Environment Agency (EA) Flood Zone map shows the site lies within Flood Zone 1 'Low probability', defined as follows:

Flood Zone 1 'Low probability' (less than 1 in 1000 (0.1%) annual probability of fluvial flooding)

1.1.3 In considering the proposals, the following key aspects have been addressed:-

- Vulnerability to flooding from all sources.
- Protection of occupants and users of the new development.
- No increased flood risk to third parties as a result of the development.

1.1.4 Flood risk will be appropriately mitigated through measures including:

- Safe access can be continuously provided to the site; and
- Surface water drainage design strategy has been prepared

1.1.5 As such, the FRA confirms that the development is safe, it does not increase flood risk and does not detrimentally affect third parties, in accordance with the objectives of the NPPF.

1 Introduction

1.1 Scope of Flood Risk Assessment (FRA)

1.1.1 This Flood Risk Assessment (FRA) has been prepared by Peter Brett Associates LLP (PBA), on behalf of London Borough of Camden (LBC), to support a planning application for the development of Charlie Ratchford Extra-Care on an approximately 1700m^2 site in Camden, London to provide a new resource centre and supported accommodation.

1.1.2 The FRA focuses on assessing the practical flood risk issues at the site as follows:

- Identification of all the potential sources of flooding at the site from all sources (i.e. fluvial, tidal, pluvial, groundwater, surface water);
- Assessment of the existing flood risk at the site and the potential impact of the proposals; and
- Consideration of the flood risk implications, taking into account the potential allowance for climate change over the lifetime of the development, and the identification of the measures to mitigate flood risk.

1.1.3 PBA has many years of experience in, amongst other areas, the assessment of flood risk, hydrology, flood defence and river engineering.

1.2 Policy Context

1.2.1 This FRA has been prepared in accordance with the relevant national, regional and local planning policy and statutory authority guidance as follows:

- National policy regarding flood risk as contained within the **National Planning Policy Framework (NPPF)** dated March 2012, issued by Communities and Local Government, and the **online Planning Practice Guidance (PPG)** released in March 2014;
- **London Plan 2011** which provides the 'Spatial Development Strategy' for Greater London, with specific reference to the 'Revised Early Minor Amendments' dated October 2013, which ensure consistency with the NPPF.
- London Borough of Camden **Preliminary Flood Risk Assessment (PFRA)**, dated 05/12/2011;
- London Borough of Camden **Surface Water management Plan (SWMP)**, published in 2013;
- London Borough of Camden **Strategic Flood Risk Assessment (SFRA)** dated July 2014;
- London Borough of Camden **Core Strategy 2010-2025**, adopted on 8 November 2010;
- London Borough of Camden **Development Politicise 2010-2025**, adopted on 8 November 2010;
- London Borough of Camden **Planning Guidance 3 Sustainability**, adopted on 4 September 2013;

1.3 Vulnerability and the NPPF Sequential Test

1.3.1 The NPPF follows a sequential risk-based approach in determining the suitability of land for development in flood risk areas, with the intention of steering all new development to the lowest flood risk areas.

1.3.2 NPPF PPG Table 2 confirms the *'Flood risk vulnerability classification'* of a site, depending upon the proposed usage. This classification is subsequently applied to Table 3 to determine whether:

- The proposed development is suitable for the flood zone in which it is located, and;
- Whether an Exception Test is required for the proposed development.

1.3.3 The proposed development is classed as 'More vulnerable' (*'Buildings used for dwelling houses'*).

1.3.4 All development is appropriate in Flood Zone 1, and since the site is already located in the area at lowest probability of flooding it therefore passes the Sequential Test and does not require the Exception Test.

2 Existing Site and Proposals

2.1 Site Description

2.1.1 The 1700 m^2 site of Charlie Ratchford Extra-Care is located on Crogsland Road, Camden London, centred on OS Grid Reference 528226E 1845045N, approximately 0.9 km northwest of the historical centre of Camdem Town and approximately 1km north-west of Regents Park. See Figure 2.1 below.

Figure 2.1 Site Location Plan

2.1.2 This slightly irregular shaped development is bounded by residential dwellings in the north, Crogsland Road in the east, Haverstock School in the south and west. The principal access onto the site is from Chalk Farm Road.

2.1.3 The site is mainly used for at-grade car parking by the staff of Haverstock School on an area covered by asphalt. A large store used by the school is situated at the site by the gate. A cluster of semi mature trees surrounded by a metal fence is present at the southern part of the site. The rest of the site is covered with scrubs with the remains of the former buildings and slabs locally visible.

2.2 Proposed Development

2.2.1 The development proposals comprise the re-location of the Charlie Ratchford Resource Centre, currently situated on Belmont Street, to the application site on Crogsland Road. The Centre presently provides day care for Camden residents aged 60 and over.

2.2.2 The proposed extra-care development on the application site will comprise a day care centre for the elderly at ground floor level and extra-care residential units on floors 1 to 5..

2.2.3 Details of the proposals by PRP Architects are provided in Appendix D.

2.3 Topography

2.3.1 A topographical survey of the site has been undertaken by Formby Surveys; see drawing ref: 8902_T A1@200 in Appendix B.

2.3.2 The drawing confirms that this site is situated on relatively flat ground with a gentle slope falling towards the southeast. The highest level over the site is 54.42m AOD, located in the area of dense vegetation in the northwest corner of the site.

2.3.3 The ground levels along the Crogsland Road start at 50.65m AOD adjacent to the northeast limit of the site, sloping down to 48.94m AOD adjacent to the southeast limit of the site.

2.4 Geology and Groundwater

2.4.1 Ground investigation has been recently undertaken by PBA; see Phase 1 and Phase 2 Ground Condition Assessment submitted as part of the application.

2.4.2 The investigation revealed that ground conditions typically comprise Made Ground to about 1 and 2 m depth underlain by the London Clay Formation to an investigated depth of 30 m below ground level. Groundwater was found to be between 2 and 4 m below ground level.

2.4.3 The SFRA indicates that no groundwater flooding incidences have occurred near or at the site (see SFRA Figure 4e in Appendix D). The SFRA also reflects that there is no specific indication that the site has suffered any exterior or interior sewer flooding issues (SFRA Figure 5a-5b).

2.4.4 The EA data (Appendix C: Source Protection Zone map) shows that there are no Source Protection Zones (SPZs) close to the site.

2.5 Watercourses and Flood Defences

2.5.1 The nearest watercourse is one of the two branches of the River Fleet, 0.7 km to the east of the site, flowing in a general direction to the southeast towards the River Thames (see SFRA Figure 2 in Appendix D). The River Fleet was culverted in the 1870s during the residential development of the area around the river.

2.5.2 The Regent's Canal was constructed by the mid-1810s and is situated about 0.5 km to the southeast of the site. This flood risk arising from the canal has been identified as low in the Camden Multi-Agency Flood Plan.

2.5.3 There are no flood defence assets at or near the site.

3 Planning Policy and Local Assessments

3.1 National Policy and Guidance

National Planning Policy Framework (NPPF) and accompanying Planning Policy Guidance (PPG)

3.1.1 The National Planning Policy Framework (NPPF) and the accompanying Planning Practice Guidance (PPG) set out the Government's national policy on development and flood risk and seeks to provide clarity on what is required at regional and local levels to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas at highest risk.

3.1.2 The NPPF outlines a risk based approach to the planning process and requires that the Sequential Test is used to guide the decision making process by steering development to areas with the lowest probability of flooding where feasible.

3.1.3 The PPG suggests the implications of developing a site within a certain flood plain. Table 5 of the Technical Guidance to the NPPF states that an increase of 30% over the 1990 peak rainfall intensity should be used as suitable allowance for the potential impact of climate change up to 2115.

3.1.4 This FRA has been prepared in accordance with NPPF. Flood risk to the site from all potential sources has been considered in Section 7 and a strategy for managing surface water runoff from the development is outlined in Section 8.

Flood and Water Management Act (2010)

3.1.5 The Flood and Water Management Act takes forward some of the proposals from three previous strategy documents published by the UK Government - Future Water (2008), Making Space for Water (2008) and the UK Government's response to the Sir Michael Pitt's Review of the summer 2007 floods. In doing so it gives the EA a strategic overview role for flood risk, and gives local authorities responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas.

3.1.6 The Flood and Water Management Act introduced the concept of the Sustainable Drainage Systems (SuDS) Approving Bodies (SABs). Since the Act came into law in 2010, the government has consulted authorities and builders regarding the implementation of SABs. The outcome of the most recent consultation document 'Delivering Sustainable Drainage' (September 2014) proposes a different approach to SuDS implementation. The new proposal no longer intends to create SABs and instead recommends strengthening existing planning policies regarding SuDS.

3.2 Regional Policy and Guidance

London Plan (Revised early minor alterations, 2013)

3.2.1 The London Plan provides a strategic overview of all aspects of planning within the city. Its aim is to provide an integrated approach to development within the city.

3.2.2 Developments all across London should reduce surface water discharge in line with the Sustainable Drainage Hierarchy set out in Policy 5.13 of the draft replacement London Plan:

*3.2.3 ''**Planning decisions***

*3.2.4 **A)** Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:*

1 store rainwater for later use

2 use infiltration techniques, such as porous surfaces in non-clay areas

3 attenuate rainwater in ponds or open water features for gradual release

4 attenuate rainwater by storing in tanks or sealed water features for gradual release

5 discharge rainwater direct to a watercourse

6 discharge rainwater to a surface water sewer/drain

7 discharge rainwater to the combined sewer.

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.''

Greater London Authority (GLA): Sustainable Design and Construction Supplementary Planning Guidance – Mayor of London (2014)

3.2.5 Supplementary Planning Guidance (SPG) produced by the Greater London Authority offers recommendations for developers.

3.2.6 Clauses 3.4.2, 3.4.12 and 3.4.14 set out the expectation of SuDS to be incorporated into the design of new developments to prevent increasing volumes of surface water runoff and reduce flood risk.

3.2.7 Clauses 3.4.8 -3.4.9 stipulate that:

3.2.8 '' Most developments referred to the Mayor have been able to achieve at least 50% attenuation of the site's (prior to re-development) surface water runoff at peak times. This is the minimum expectation from development proposals.

3.2.9 There may be situations where it is not appropriate to discharge at greenfield runoff rates. These include, for example, sites where the calculated greenfield runoff rate is extremely low and the final outfall of a piped system required to achieve this would be prone to blockage. An appropriate minimum discharge rate would be 5 litres per second per outfall.''

3.3 Local Policy and Guidance

Core Strategy Policy CS13 - Tackling climate change through promoting higher environmental standards

3.3.1 This Policy sets out the overall approach to tackling climate change which includes reducing our water consumption and reducing the risk of surface water flooding. It requires minimising the potential for surface water flooding by:

a) *protecting our existing drinking water and foul water infrastructure, including Barrow Hill Reservoir, Hampstead Heath Reservoir, Highgate Reservoir and Kidderpore Reservoir;*

b) *making sure development incorporates efficient water and foul water infrastructure;*

c) *requiring development to avoid harm to the water environment, water quality or drainage systems and prevents or mitigates local surface water and downstream flooding, especially in areas up-hill from, and in, areas known to be at risk from surface water flooding such as South and West Hampstead, Gospel Oak and King's Cross (CS Map 5, Appendix D)*.

Development Policy DP23 - Water

3.3.2 The Policy sets out in further details, requiring developments to reduce water consumption, the pressure on the combined sewer network and the risk of flooding by:

d) *incorporating water efficient features and equipment and capturing, retaining and re-using surface water and grey water on-site;*

e) *limiting the amount and rate of run-off and waste water entering the combined storm water and sewer network through the methods outlined in part a) and other sustainable urban drainage methods to reduce the risk of flooding;*

f) *reducing the pressure placed on the combined storm water and sewer network from foul water and surface water run-off and ensuring developments in the areas identified by the North London Strategic Flood Risk Assessment and shown on Map 2 (Appendix D) as being at risk of surface water flooding are designed to cope with the potential flooding;*

g) *ensuring that developments are assessed for upstream and downstream groundwater flood risks in areas where historic underground streams are known to have been present; and*

h) *encouraging the provision of attractive and efficient water features.*

The LBC SFRA

3.3.3 The SFRA emphasises that suitable surface water mitigation measures are incorporated into any development plans in order to reduce and manage surface water flood risk to, and posed by the proposed development. SuDs is recommended to be an ideal approach, given the following three goals:

i) *Reduce flood risk (to the site and neighbouring areas)*

j) *Reduce pollution; and,*

k) *Provide landscape and wildlife benefits*

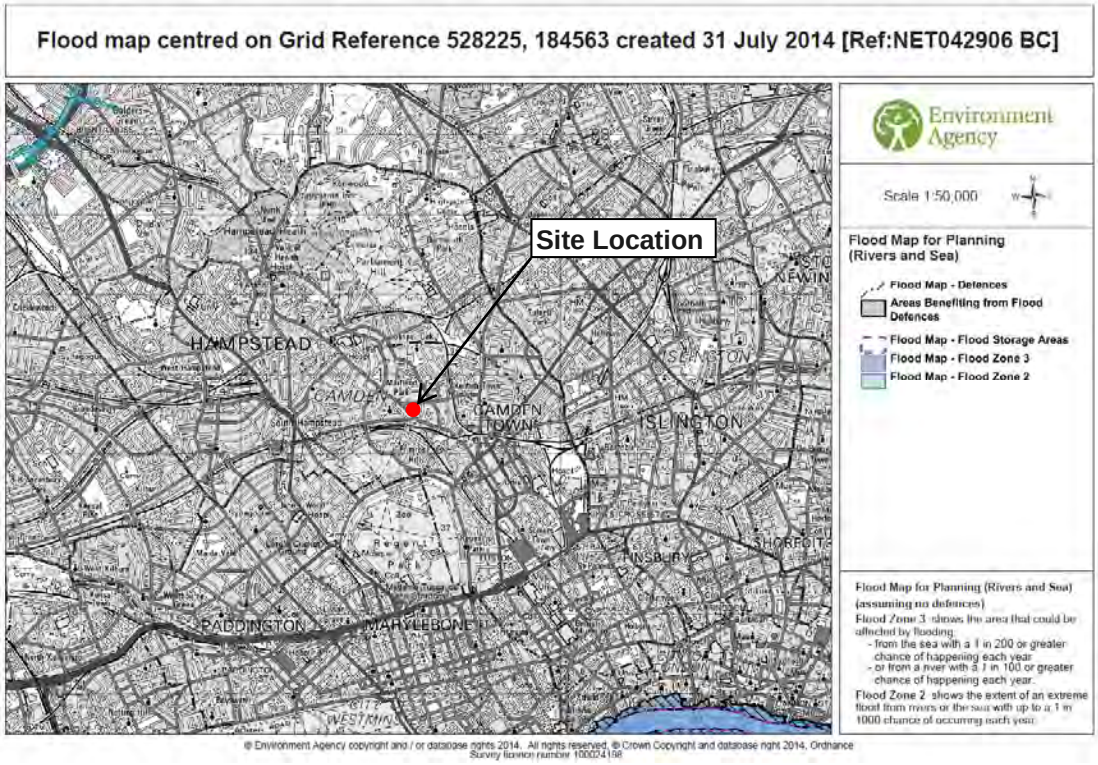
3.3.4 Further guidance is provided in Camden Planning Guidance 3. All developments are expected to manage drainage and surface water on-site or as close to the site as possible, using sustainable drainage systems and the hierarchy set out in the Guidance.

4 Flood Risk

4.1 Environment Agency (EA) Flood Zone Map

4.1.1 The first phase in identifying whether a site is potentially at risk of flooding is to consult the EA's Flood Zone maps. This provides an initial indication of the extent of the Flood Zones, which is refined by the use of a more detailed site-specific level survey and modelled flood levels.

Figure 3.1 EA Flood Zone Map



4.1.2 Figure 3.1 shows the site is in EA Flood Zone 1, which indicates that the site is within the area of 'Low probability' (less than 1 in 1000 (0.1%) annual probability of fluvial flooding.

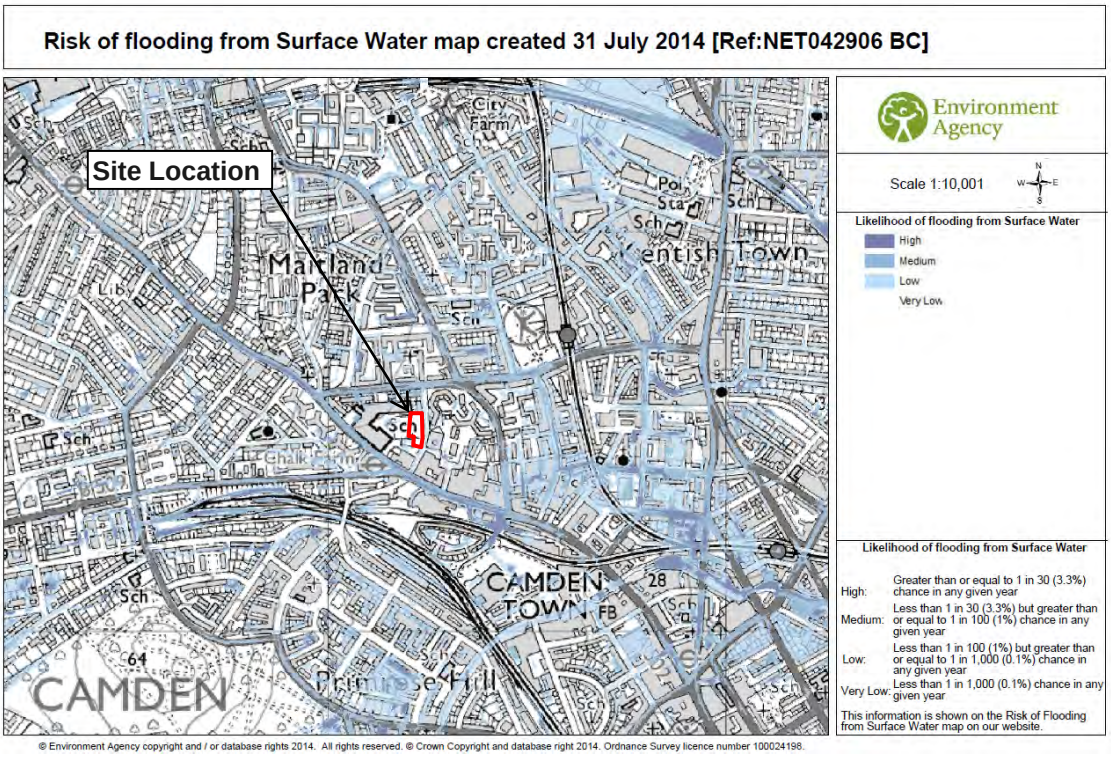
4.2 EA Surface Water Flood Map

4.2.1 The EA surface water flooding maps provide an indication of potential surface water flow routes and surface water flooding on site. This is generated by routing rainwater over a Digital Terrain Modelling (DTM) and is inherently conservative as it ignores the presence of any below ground drainage infrastructure.

4.2.2 As can be seen in Figure 3.2 below, a flow route along Prince of Walse Road enters the residential area and Crogsland Road adjacent to the site, which might cause a 'Low' risk of surface water flooding adjacent to the site, defined as between a 1 in 1000 (0.1%) and 1 in 100 (1%) annual probability of flooding.

4.2.3 The site itself is shown at a 'Very Low' risk of surface water flooding (i.e. less than 1 in 1000 chance in any given year) and the topography of the site would tend to direct potential flow off site towards the Chalk Farm Road via Crogsland Road. A 'Low' to 'Medium' risk of surface water flooding is identified on Chalk Farm Road.

Figure 3.2 EA Risk of Flooding from Surface Water Map

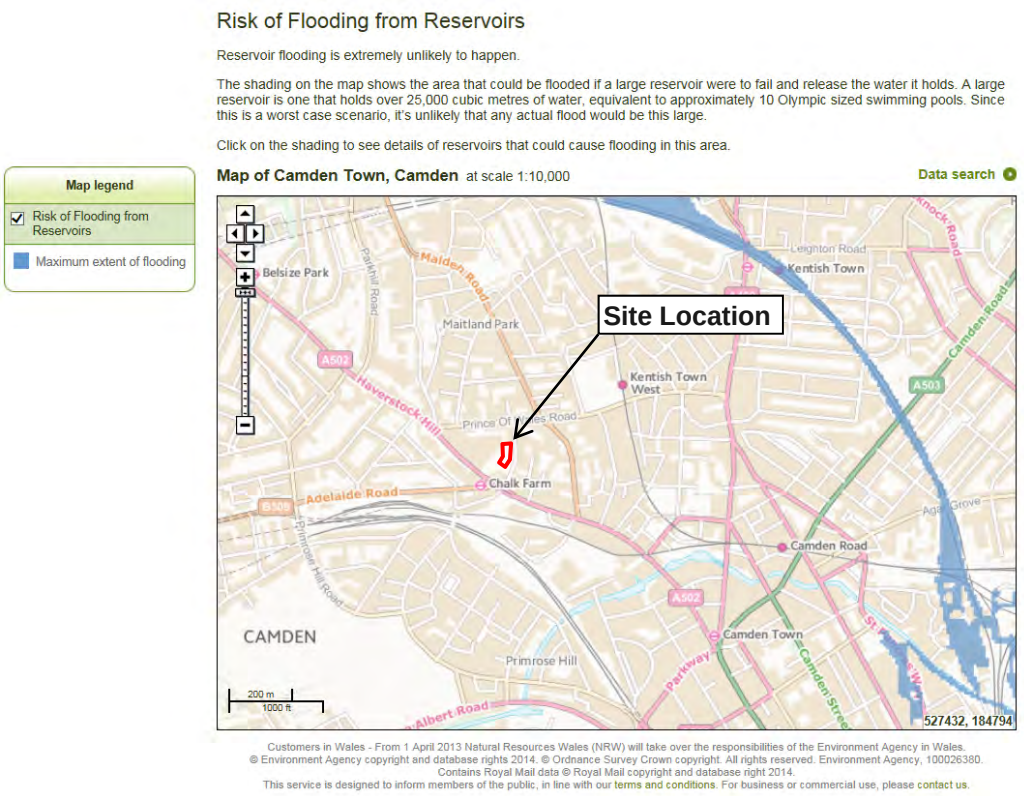


4.3 EA Reservoir Flooding Map

4.3.1 The EA Flood Risk from Reservoir map indicates the residual flood risk from the failure of reservoirs or other 'perched' water bodies above 25,000 m^3 in volume. The presence of legislation (Reservoirs Act 1975) and a rigorous inspection regimen in the UK for large reservoirs means that the likelihood of reservoirs failing through lack of maintenance is considered very small; consequently flooding from reservoirs is considered as residual risk.

4.3.2 The Flood Risk from Reservoirs map from the EA website is shown in Figure 3.3. There are no reservoirs close to the site and the site is at a negligible residual risk of flooding from reservoirs.

Figure 3.3 EA Risk of Flooding from Reservoir Map



4.4 LBC Preliminary Flood Risk Assessment (PFRA)

4.4.1 The PFRA, issued on 5th December 2011 provides a high level overview of significant local flood risk issues from past and future floods, based on readily available and derivable information, including consideration of surface water, groundwater, ordinary watercourses and canals.

4.4.2 This study has not identified any past floods that are considered to have had significant harmful consequences (i.e. memorable past floods or otherwise registered on a national scale, such as the summer 2007 event, even if only occurring over a relatively small area.)

4.4.3 Future flood risk for extreme events is estimated to be high in the LBC as it is anticipated in many highly urbanised areas through the UK. However, it is not possible to determine the impact on the site due to the scale of the studies.

4.5 LBC Surface Water Management Plan (SWMP)

4.5.1 The SWMP completed in July 2011 and published on the website in 2013 considers the flood risk from surface water flooding on a borough-wide scale.

4.5.2 This site is shown to be outside any Local Flood Risk Zones (LFRZ) but within one of the Critical Drainage Areas (CDAs), which are defined in the SWMP as:

"A discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding in one or more Local Flood Risk Zones during severe weather thereby affecting people, property or local infrastructure."

4.5.3 A series of maps indicating potential flows and areas of ponding for a flood event with a 1.33% chance of happening once in any year were provided. Yet, they are not accurate to property level.

4.6 LBC Strategic Flood Risk Assessment (SFRA)

4.6.1 The LBC SFRA (Appendix D) was prepared in July 2014 and provides the most up to date flood risk information on a borough-wide scale.

4.6.2 The SFRA states that although the Borough is entirely within Flood Zone 1 and the risk of flooding from fluvial sources is negligible, there is a risk of flooding from other sources such as surface water, groundwater, sewers and artificial sources such as reservoirs and canals.

4.6.3 The updated Flood Map for Surface Water (uFMfSW), included in the LBC SFRA (SFRA - Figure 3) identifies those areas at risk of surface water flooding during three annual exceedance probability (AEP) events: 1 in 30 year (3.33% AEP), 1 in 100 year (1% AEP) and 1 in 1,000 year (0.1% AEP). The site is shown at a 'Very Low' risk of flooding and the adjacent roads at 'Low' to Medium' risk, which is consistent with the findings given in section 3.2.

4.6.4 The SFRA reveals that the number of properties affected during historic surface water flooding is limited within the LBC and no records are found close to the site (SFRA Figure 3ii in Appendix D). It is also shown that Prince of Wales Road, to the north of the site, has experienced flooding in 2002 flood events. However, the SFRA states that whether an entire street flooding or an isolated section of road flooding is unknown due to the coarse scale of the mapping.

4.6.5 The SFRA maps also reflect that neither groundwater floods nor sewer flooding incidences have occurred near or at the site (SFRA Figure 4e, Figure 5a-5b).

4.7 EA Historic Flooding

4.7.1 The Environment Agency's letter (Appendix C) confirmed that there is no record of fluvial flooding at the side. Groundwater is classified as a "local" flood risk within the LBC. Flooding from other sources is mentioned in above sections 3.6.4 and 3.6.5.

4.8 EA Modelled Flood Data

4.8.1 The Environment Agency has undertaken modelling of surface water flood risk at a national scale and produced mapping identifying those areas at risk of surface water flooding. The latest version of the mapping is referred to as the uFMfSW. The extents are included in the LBC SFRA as mentioned above.

4.9 Impact of Climate Change

4.9.1 In considering flood risk to the site, it is necessary to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures.

4.9.2 The EA's 'Climate Change Allowance for Planners' guidance (which supports the NPPF) provides contingency allowances for potential sea level rise in Table 1, and for potential increases in peak river flow and rainfall intensity in Table 2 (it is noted that these allowances are consistent with the figures previously provided in the PPG and PPS25).

4.9.3 The potential for increased flood probability as the result of possible climate change has been addressed through the use of these climate change allowances in the surface water drainage strategy.

5 Surface Water Management and SuDS

5.1 Existing Drainage Arrangements

5.1.1 The existing site drains surface water through a series of surface water gullies into the underlying Thames Water Utilities Limited (TWUL) sewer network.

5.2 Design Principles for Surface Water Management

5.2.1 Key design principles in the following guidance documents steer the approach to managing surface water runoff at the site:

- The London Plan – Drainage Hierarchy
- LBC – Core Strategy
- LC – Development Policy 23
- Building Regulations hierarchy of drainage (H3);
- CIRIA best practice guidance, including the use of the 'SUDS management train';
- Flood and Water Management Act 2010 (Part 1 – Clause 27 (1));
- Flood and Water Management Act 2010 (Part 1 – Clause 9 (1));

5.3 Planning Policy Requirements

5.3.1 The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface runoff from development sites, and recommends that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development, this being complementary to the control of development within the floodplain.

5.3.2 The Building Regulations Requirement H3 stipulates that rainwater from roofs and paved areas is carried away from the surface to discharge to one of the following, listed in order of priority:

a) an adequate soakaway or some other adequate infiltration system,

b) a watercourse, or where that is not practicable,

c) a sewer.

Consideration of Infiltration Drainage

5.3.3 Based on the aforementioned Building Regulations H3 hierarchy, the preferred method for disposal of surface water from the new development is via infiltration drainage.

5.3.4 However, infiltration drainage is not considered suitable at this location due to the low mass permeability of the underlying soils (see Phase 1 and 2 Ground Condition Assessment, 2014).

Consideration of Discharge to Watercourse

5.3.5 Where infiltration is not appropriate, the next preference in the Building Regulations H3 Hierarchy is discharge to a watercourse.

5.3.6 There are no watercourses in the vicinity of the site (as detailed in Section 2.4, the nearest culverted watercourse is approximately 1 kilometres from the site). As such, discharge of surface water to watercourse is not a feasible option.

Consideration of Discharge to Sewer

5.3.7 Where discharge to watercourse is not appropriate, the next preference in the Building Regulations H3 Hierarchy is discharge to a surface water sewer.

5.3.8 As noted in Section 5.1, a TWUL surface water sewer runs under the highway to the west and north of the site. Discharge to surface water sewer is therefore considered the most appropriate form of disposal of surface water.

5.4 Preliminary Surface Water Drainage Design

5.4.1 The design of the surface water management system is based upon the development proposals reproduced in Appendix B as part of this report and the information assessed so far in this report.

5.4.2 In developing this strategy, the drainage hierarchies promoted by the London Plan and Building Regulations H3.have been assessed in detail as summarised in Tables 5.1 and 5.2 and in the above paragraphs.

5.4.3 The London Plan suggests that development should utilise SuDS unless there are practical reasons for not doing so, and should aim to achieve Greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

Table 5-1: London Plan Hierarchy

Item	Hierarchy	Consideration	Note
1	Store rainwater for later use	*No*	*This will be investigated at detailed design stage.*
2	Use infiltration techniques, such as porous surfaces in non-clay areas	No	*Not incorporated as part of design, although permeable paving is proposed.*
3	Attenuate rainwater in ponds or open water features for gradual release	Yes	*Green roofs have been considered*
4	Attenuate rainwater by storing in tanks or sealed water features for gradual release	No	*This will be investigated at detailed design stage.*
5	Discharge rainwater direct to a watercourse	No	*No nearby watercourses to discharge into*

6	Discharge rainwater to a surface water sewer/drain	No	*No nearby surface and/or foul water to connect into*
7	Discharge rainwater to the combined sewer	Yes	*TWUL combined sewer immediately outside of the site. A minimum of 5l/s proposed to discharge into public sewer.*

Table 5-2: Buildings Regulations H3 Hierarchy

Discharge Measure	Consideration
a) an adequate soakaway or some other adequate infiltration system	Infiltration drainage is not considered suitable at this location due to the low mass permeability of the underlying soils. For the reasons above, soakage has been discounted from the considerations.
b) a watercourse	There are no adjacent watercourses to this development and therefore discounted at this stage of the assessment.
c) a sewer	**This is considered a viable option as there is a combined sewer immediately outside the development site. The drainage in this area is considered critical and therefore the minimum discharge of 5 l/s will be proposed.** **Storm water will require to be attenuated on site prior to discharge into the public sewer. This is thought to minimise the impact of flooding offsite.**

5.4.4 A surface water drainage strategy (Appendix D) has been developed by PBA for the development, including an allowance for the impact of climate change. The controlled discharge is limited to no greater than 5 l/s, which is a notional Greenfield runoff rate and it is the lowest discharge rate practicably achievable from any site. This approach is also supported by Code for Sustainable Homes – Technical Guidance Note 001 – 16th December 2009 and the GLA's SPG on Sustainable Design and Construction.

5.4.5 A combination of SuDs measures (ie, green roof, porous paved construction and deep porous sub-base) will collect surface water and discharge at a controlled rate. In conclusion, the proposed strategy represents a significant reduction in runoff rates from the site.

5.4.6 Should the use of a green roof not considered to be viable at detailed design stage, an alternative solution to provide the required attenuation volume would be to construct an attenuation tank under the footway, discharging to combined sewer system via a surface water pump station.

5.4.7 It is anticipated that the possibility to use water butts and rainwater harvesting tanks will be investigated at detailed design stage in order to reduce potable water consumption. Any additional sustainable devices introduced to the scheme will provide an overall betterment to the storm water management strategy.

5.4.8 A detailed surface water drainage strategy will be developed at the detailed design stage with consideration of the above, but for the purposes of the FRA an outline strategy has been developed to demonstrate it is feasible for the site to meet current national and local policy requirements in relation to attenuation of surface water runoff.

6 Residual Risk

6.1.1 It is difficult to completely guard against flooding since extreme events greater than the design standard event are always possible, however, it is practicable to minimise the risk by allowing a substantial freeboard (safety margin) and by using suitable construction and management techniques.

6.1.2 The site lies within Flood Zone 1 'Low Probability' (less than 1 in 1000 annual probability of river or sea flooding). As such, the flood risk from these sources is considered to be very low.

6.1.3 This FRA has been prepared in accordance with the NPPF and Local Planning Policy. Any recommendations regarding floor levels are based on the relevant British Standards (BS8533), the standing advice provided by the EA or based on common practice.

6.1.4 However, it should be noted that the insurance market applies its own tests to properties in terms of determining premiums and the insurability of properties for flood risk. Those undertaking development in areas which may be at risk of flooding are advised to contact their insurers or the Association of British Insurers (ABI) to seek further guidance prior to commencing development.

6.1.5 PBA do not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

6.1.6 The development will incorporate a surface water drainage strategy, providing on-site attenuation measure (ie, green, porous paved construction, and deep porous sub-base) with controlled discharge to the adjacent TWUL sewer.

6.1.7 It is recommended that ground floor levels will include a suitable freeboard above surrounding ground levels to prevent the egress of surface water during an extreme rainfall event.

6.1.8 In summary, the residual risk is considered acceptable for the lifetime of the development.

7 Conclusion

7.1.1 This Flood Risk Assessment has been prepared to support a planning application for the development of a new a new resource centre and supported accommodation.

7.1.2 The site is shown on the EA Flood Zone map as falling within Flood Zone 1 'Low Probability' (less than 1 in 1000 (0.1%) annual probability of flooding from rivers or the sea).

7.1.3 The proposed 'More vulnerable' development is considered acceptable in Flood Zone 1 and therefore passes the Sequential Test and the Exception Tests are satisfied.

7.1.4 It is recommended that ground floor levels will include a suitable freeboard above surrounding ground levels to prevent the egress of surface water during an extreme rainfall event.

7.1.5 Out outline surface water strategy has been developed as part of this FRA, which restricts the maximum discharge rate from the site to 5 l/s using a combination of SuDS.

7.1.6 In conclusion, the development will be safe and there will be no increase in flood risk elsewhere; thus meeting the requirements of the NPPF.

Appendix A Site Location Plan

Site Location Plan provided by PRP Architect:

- Drawing number: AA4796/1101

Ground Floor Plan

0 10m 20m

REVISED MASSING OPTION

North

Camden

Charlie Ratchford, Extra Care

title	Proposed Ground Floor Plan	drawn	RVP
		checked	CC
		scale	1 : 200
drawing no	AA4796/1101	date	15/08/14

PRP

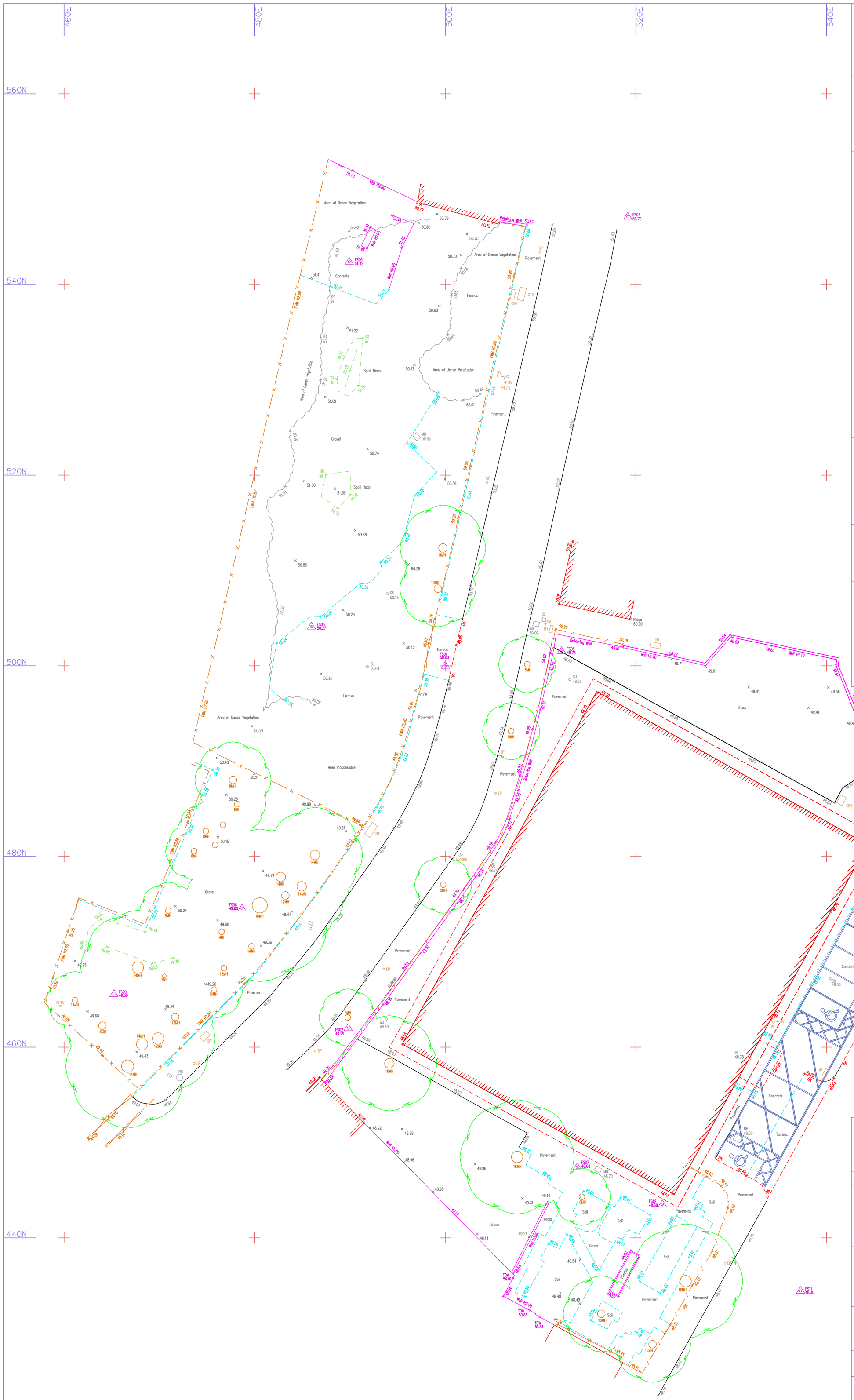
Appendix B Topographic Survey & Proposal Drawings

Topographic Survey provided by Formby Surveys Ltd:

- Drawing number: 8902_T:200:1:1

Proposal Drawings provided by PRP Architects:

- Drawing number: AA4796/1101, AA4796/1102, AA4796/1103, AA4796/SK6001A



A1

This survey has been produced at the survey scale detailed below with its accuracy commensurate with the indicated scale and should only be used for its original intended purpose. Any scalling should only be undertaken using a stable media print produced using the original data The plotted scale may differ (for presentation purposes) from the survey scale.

It is for the use only of the party to whom it has been addressed and no responsibility is accepted to any third party for the whole or part of its contents. This survey has been prepared on the basis that all information and facts, which may affect the survey, have been disclosed to Formby Surveys Ltd by all parties concerned and no liability, nor responsibility can be accepted, unless full disclosure has been made.

All ground features that were visible at the time of the survey have been located, however there may have been items obscured, Pipe sizes and flow direction have been visually assessed from the surface and should be considered as approximate only.

All data remains in the ownership of Formby Surveys Ltd and any discrepancies between this survey and any other information should be reported to Formby Surveys Ltd.

Topographical Legend

(where applicable)

Building
Gate
Hedge
Foliage
Tree
Ø0.35/MS/H6
Dia/Trunk/Ht
NB:Spread & Heights are indicative
Spot Level
50.00
Survey Station
Borehole
Trial Pit
Window Sample
Dynamic Cone Penetrometer
Top of Bank
Bottom of Bank
Contours
25.50
Photo Position
(& orientation)

Abbreviations

(where applicable)

AB	Air Brick	IT	Intercom
AV	Air Valve	JTN	Junction Box
BB	Bellisha Beacon	KL	Keep Left
BC	Building Canopy	KO	Kerb Outlet
BH	Borehole	LP	Lamp Post
BL	Bed Level	MB	Mooring Bollard
BM	Bench Mark	ME	Meter Manhole
BDY	Boundary	MH	Manhole
BO	Bollard	MK	Marker
BS	Bi-Stem (Tree)	MS	Multi-Stem (Tree)
BST	Bus Stop	MY	Mercury Manhole
BT	British Telecom Manhole	NB	Notice Board
C	Crest	NFS(**)	Additional Survey Station
CE	Cat's Eye	NP	Road Name Plate
CCTV	Closed Circuit Television	OB	Out Building
CL	Ceiling Level	OS	Ordnance Survey
CP	Concrete Post	P	Post
CR	Cycle Rack	PB	Post Box
CTV	Cable Television Manhole	PED	Pedestrian Pad
CUL	Culvert	PI	Pipe
DK	Drop Kerb	PM	Parking Meter
DP	Drain Pipe	PO	Post Office Manhole
DPC	Damp Proof Course	PP	Power Point
D	Drain	RE	Rodding Eye
DCP	Dynamic Core Penetrometer	RS	Road Sign
DWB	Dog Waste Bin	RTW	Retaining Wall
EB	Electricity Box	RWP	Rainwater Pipe
EL	Electricity Manhole	SDP	Stand Pipe
EP	Electricity Pole	SK	Soakaway
ER	Earthing Rod	SOF	Soffit Level
FBR	Footbridge	SWMH	Storm Water Manhole
FCL	Fence (Chain Link)	ST	Stop Tap
FFL	Finished Floor Level	SU	Stump (Tree)
FIR	Fence (Iron Railing)	SV	Stop Valve
FL	Floor Level	SVP	Soil Vent Pipe
FWMH	Foul Water Manhole	SW	Storm Water
FP	Flag Pole	SY	Stay (e.g. Pylon, TP)
FPC	Fence (Post & Chain)	TBM	Temporary Benchmark
FPP	Fence (Post & Panel)	TCB	Telephone Call Box
FPR	Fence (Post & Rail)	TH	Threshold Level
FPW	Fence (Post & Wire)	TL	Traffic Light
FSB	Fence (Safety Barrier)	TOW	Top of Wall
FS**	Permanent Survey Station	TP	Telegraph Pole
FW	Foul Water	TPT	Trial Pit
FWM	Fence (Wire Mesh)	TS	Tri-Stem (Tree)
GV	Gas Valve	TSI	Traffic Signal Manhole
GL	Ground Level	UB	Under Beam
GP	Gate Post	UP	Upright
GS	Gravestone	UTR	Unable To Raise
GU	Gully	VP	Vent Pipe
H	Height	WCL	Window Cill Level
HY	Hydrant	WHL	Window Head Level
IC	Inspection Chamber	WL	Wall Level
IS	Information Sign	WM	Water Meter

Survey Control

Station	Easting	Northing	Level
S01	500.000	500.000	50.000
S02	489.815	461.987	49.293
S03	485.957	504.108	50.274
S04	519.154	547.100	50.794
S05	512.202	501.546	48.763
S06	489.927	542.377	51.423
S07	513.849	447.397	48.680
S08	478.671	474.521	49.599
S09	465.236	465.568	49.504
S10	554.867	484.749	48.945
S11	537.287	434.424	48.303
S12	522.784	443.515	48.694

Grid & Datum

Survey Grid: Local Grid ☑ Nat. Grid (OSGB36) ☐ Nat. Grid (Graph. Fit) ☐ Existing Grid ☐

Survey Datum: Local Datum ☑ Nat. Grid (OSGB36) ☐ Nat. Grid (Spot Level) ☐ O.S.B.M. ☐

The survey grid and level datum relate to an arbitrary local grid orientated to north via compass bearing.

General Notes

1. Where manholes / ICs have been lifted they have been annotated as "star-bursts" showing incoming / outgoing pipes and ducts. Drainage runs have not been linked together unless specified at the time of commission.
2. Tree canopies have been "trimmed" for clarity and presentation purposes.
3. All arrows on steps / ramps etc indicate an UP direction unless otherwise stated.
4. Contours are shown on soft detail areas only (where applicable) and annotated at the interval identified above. Hard detail areas may be contoured if specifically requested.
5. Site traffic or obstructions encountered at the time of the survey may have resulted in surface features being omitted.

Rev	Date	Description	CAD

Client

MBS Survey Software

measure+ manage+ deliver+

FormbySurveys

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W www.formbysurveys.com

Topographical Survey

Crogsland Road, Camden
London, NW1 8HF

Plotted Scale: A1@1:200 (NB: Survey Scale: 1:200)

0.0 4.0 8.0 12.0m

Surveyor:	CAD:	Checker:	Rev:
SS	MT	JO	

Date of Issue: June 2014 | FSL Ref No: 8902_T:200:1:1

ISO 9001 REGISTERED FIRM
Certificate Number: GB 20415

Liverpool Chamber of Commerce

fbe Forum for the Built Environment

This drawing has been produced as a guidance for floor to floor heights, ceiling heights and service voids. This is not intended for working drawings.

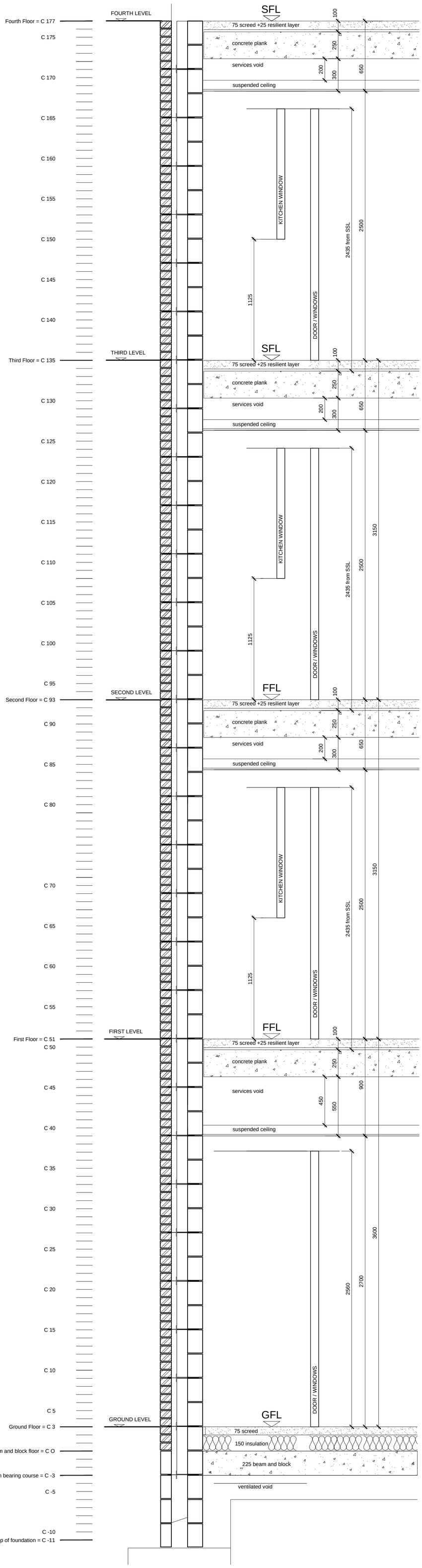
notes

- The contractor is responsible for checking dimensions, tolerances and references. Any discrepancy to be verified with the Architect before proceeding with the works.
- Where an item is covered by drawings to different scales the larger scale drawing is to be worked to.
- Do not scale drawing. Figured dimensions to be worked to in all cases.

CDM Regulations 2007

ALL current drawings and specifications for the project must be read in conjunction with the Designer's Hazard and Environmental Assessment Record.

CDM 2007



15-08-14 A Floor heights increased.

date	rev	revision/author/checker

purpose of issue
Standards for Planning Stage

project
Charlie Ratchford
Extra Care

drawing
Typical Height Rod

drawing no	rev
AA4796/SK6001	A
drawn	checked
scale @ A1 1:20	date 03/07/14

PRP Architects É
Ferry Works
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prp@prparchitects.co.uk

Fourth Floor Plan

Fifth Floor Plan

0 10m 20m

REVISED MASSING OPTION

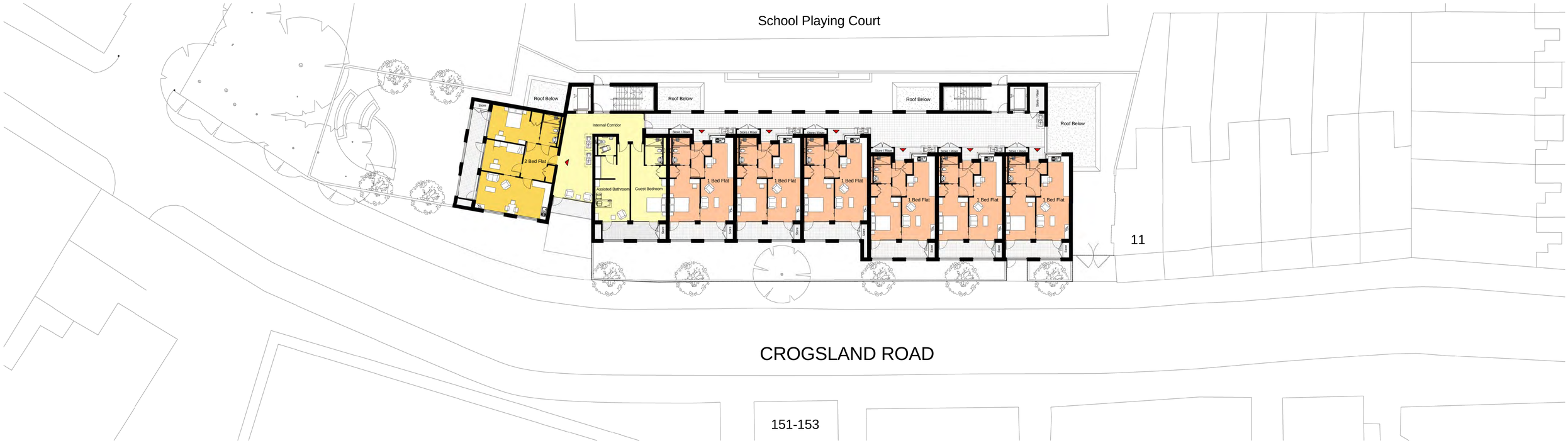
North

Camden

Charlie Ratchford, Extra Care

title	Proposed Fourth, Fifth & Roof Plan	drawn	RVP
		checked	CC
		scale	1 : 200
drawing no	AA4796/1103	date	15/08/14

PRP



First Floor Plan

Second Floor Plan

Third Floor Plan

0 10m 20m

REVISED MASSING OPTION

North

Camden

Charlie Ratchford, Extra Care

title	Proposed First, Second & Third Floor	drawn	RVP
		checked	CC
		scale	1 : 200
drawing no	AA4796/1102	date	15/08/14

PRP

Ground Floor Plan

0 10m 20m

REVISED MASSING OPTION

North

Camden

Charlie Ratchford, Extra Care

title	Proposed Ground Floor Plan	drawn	RVP
		checked	CC
		scale	1 : 200
drawing no	AA4796/1101	date	15/08/14

PRP