BASEMENT IMPACT ASSESSMENT

for

HOUSING AT MANSFIELD BOWLING CLUB

CROFTDOWN ROAD

LONDON NW5 1EP

by

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Document Control

Revision	Date	Status
01	30 October 2012	Initial Issue
02	27 November 2012	Clubhouse sedum roof added

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1. INTRODUCTION

This Basement Impact Assessment, BIA, has been prepared in support of the planning application for a residential development in the grounds of Mansfield Bowling Club, Croftdown Road, NW5. This BIA, has been prepared in accordance with LB of Camden CPG4, Basements and Lightwells and the Camden Geological, Hydrogeological and Hydrological Study, CGHHS.

CPG4 screening questions are presented in Appendix 1, survey photographs in Appendix 2 and a Site Location Plan and drawings of the Proposed Development are presented in Appendix 3.

1.1 BIA Stages

A Stage 1 Screening has been completed, utilising the questions in CPG4, and these are presented in Appendix 1. An additional question, GW1B, has been added to the Groundwater screen set relating to water issues rather than water table.

The screening has been used to define the Stage 2 Scope of the Assessment.

As part of the Stage 3 site investigations and study, a site inspection was completed on 12 March and a walk passed of the neighbouring houses on Dartmouth Park Avenue, Laurier Road and York Rise on 8 November 2012. The desk top research included:

i. published geology,
ii. aquifer classification,
iii. flood data
iv. slope gradients from the topographical survey.
v. Northern Line alignment from London Underground

As discussed in Section 3.3, the geotechnical site investigation will be left until later in the design process.

The Stage 4 Impact Assessment of the scheme is presented in Sections 3 to 6.

2. EXISTING SITE AND PROPOSED DEVELOPMENT

For the purposes of this assessment, Croftdown Road is taken to the north with York Rise to the west, Dartmouth Park Avenue to the east and Laurier Road to the south.

2.1 Existing Site and Current Buildings

Mansfield Bowling Club site is a backlands development with access to the western end of the site from Croftdown Road. The ground rises to the north. The site is surrounded by the rear gardens to the houses on the neighbouring streets. As a generalisation, these are shrubs and hedges to the eastern and northern boundaries with more formal fences to the southern and western boundaries.

The clubhouse is approximately 30m long by 15m wide, framed in steel, located in the south-western quadrant of the site. The bowling green enclosure is approximately 40m long by 35m wide extending to the east of the clubhouse across the remainder of the southern half of the site. It is understood that the clubhouse and indoor bowling green enclosure were constructed some 40 years ago.

Externally to the west and south of the clubhouse and indoor bowling green buildings is a car park with access from Croftdown Road. On the northern half of the site is an outdoor bowling green to the west and two clay tennis courts to the east. To the eastern, rear, end of the indoor bowling green is a small triangular overgrown thicket.

Since the ground rises to the north, the tennis courts and outdoor bowling green are approximately 1.2m above the ground floor of the club. In forming the green and courts it is likely that the buildings are cut 0.6m into the natural slope with the excavated material used to form the plateau of the external playing areas.

Public Sewers
There is a main Victorian brick sewer that snakes across the site. It commences in Dartmouth Park to the east, entering the site from the rear garden to No 48 Laurier Road before clipping the corner of the indoor bowling green and looping around beneath the outdoor bowling green and western car park to discharge down between Nos 40 and 42 York Rise to the west. The brick sewer is 1.1m x 0.8m. The depth varies between approximately 3m and 4.5m. The main sewer has a feed draining down the rear of the gardens to the houses on Dartmouth Park Avenue and this enters the site to the south of the tennis courts to join the main run

London Underground Tunnels
The Northern Line between Tufnell Park and Archway is located beneath Junction Road 400m to the east.

2.2 Topography and Levels

The site is on the slopes to the Thames basin dropping from Highgate towards Camden Town; the natural gradient is from north to south.

The northern boundary to the site is at +53.5m OD with the back of the pavement along Croftdown Road rising locally to 54.0m OD. The outdoor bowling green is at +53.0m OD and the tennis courts are at +52.7m OD. The clubhouse is at +51.7m OD and the low point of the car park at the access off Croftdown Road is at +51.0m OD. The access road itself drops with the junction on Croftdown Road being +50.7m OD.

This means that the level difference of 2m occurs on a distance of 100m, giving an average gradient of 1 in 50.

There are more significant slopes to the properties along Dartmouth Park Avenue where the gradient to the gardens are typically 1 in 9.

York Rise has a level of + 49.9m OD and is hence over 1m below the Bowling Club car park.

2.3 Trees

Along the eastern boundary beside the tennis courts are three sycamores, 8m high, and a group of lime trees to the south behind the indoor bowling green ranging up to 12m high. Between the tennis courts and the indoor bowling green are a further lime tree with a maximum height of 15m.

An arboricultural survey has been completed on these trees and they will all be kept with appropriate root, trunk and canopy protection measures .

2.4 Proposed Scheme

It is proposed to construct eight semi detached houses on the current tennis courts with the outdoor bowling green becoming a publicly accessible landscaped open space. Access to the houses will be from the north west corner of the site off Croftdown Road.

The houses will have basements, extending out front and rear as lightwells. The houses will have green roofs.

The terraces will be located 5m from the eastern boundary to the rear gardens along Dartmouth Park Avenue and 6m from the northern boundary. There is a cycle store between the terraces along the eastern

boundary, but this will be a single storey, without a basement, and its shallow foundations will not impact on the surrounding rear gardens. The nearest building will be the indoor bowling green which is 5m away.

2.5 Basement and Foundations

Basement
The basements to each terrace will be constructed as a concrete box approximately 15m wide by 27m long overall. The basement storey will be 3.1m deep meaning that the excavation will be just under 4m deep.

Foundations
It is envisaged that the foundations will be integrated with the basement box as a concrete raft 3.5m deep.

3 GROUNDWATER FLOW

3.1 Stage 1 Screening

GW1 The site is not on an aquifer. CGHH Fig 8 shows the site is founded on London Clay as a non productive strata.

GW1A London Clay is an impermeable stratum and there is not a free water surface within the London Clay. The basement will not extend beneath the water table.

GW1B There may be water issues to the base of any made ground on top of the London Clay and also with the more permeable fissured or claystone layers within the clay. These do not constitute a continuous subterranean flow or water table.

GW2 There are no water courses or water features in the immediate vicinity of the site. CGHH Fig 11, Watercourses, shows that the tributary of the Fleet from the Highgate Ponds is in the valley between Highgate Road and York Rise, some 120m to the south west of the new houses.

There are no springs in the area

GW3 CGHH Fig 14, Hampstead Heath Catchment, shows that the Hampstead Ponds catchment is 0.7km to the west of the site.

GW4 The current tennis courts are clay and are hence quasi impermeable. Its drainage will be maintained for the housing scheme. The overall impermeable area will however increase with the access road and car parking. This will be offset by the adoption of SUDs based principles including:

a. green roofs to the houses
b. sedum roof to the refurbished clubhouse
c. porous/permeable parking spaces.

GW5 The current surface water drains will be maintained. With the proposed green roof, the attenuation of the discharge to the ground will be increased.

GW6 CGHH Fig 12, Surface water features, shows that the nearest water features are the Highgate Ponds, 0.7km to the west of the site.

3.2 Stage 2 Scoping

- Possible water issues on top of the London Clay or in Claystone bands within the clay itself.
- The impervious area will be increased

3.3 Stage 3 Study and Site Investigation

London Clay is an impervious layer which is classified as an unproductive stratum and means that there are no groundwater flows across the site. The properties of London Clay are well understood with published data. In hydrogeological terms, the site does not have the challenges of the Claygate beds to the Hampstead Ponds catchment nor the alluvial deposits of the Thames basin to the south of the Borough.

As an impervious layer there is no water table with a pheratic surface within the London Clay. The claystone bands within the London Clay can be water bearing but these are minor issues and do not constitute a continuous subterranean flow or water table. There is also the possibility of minor issues and seepages on top of the London Clay but given that up the slope are gardens, these will be dissipated and attenuated and hence will not be significant.

The proposed foundation, utilising a concrete box is a robust solution which is easy to construct. If it is found that water issues are significant, an intercepting drain will be constructed around the perimeter of the excavation.

Consequently a site investigation is not particularly informative to the Groundwater aspects of the Basement Impact Assessment and can be sensibly left to the later stages of the design process. This is discussed in more detail in Section 4.3.

3.4 Stage 4 Impact Assessment

Groundwater Flow
London Clay is impervious and there is no groundwater flow within it.

Water Issues and Seepages
There is the possibility of water issues and seepages to the top of the London Clay or fissured or claystone layers within it. These will affect the waterproofing details and construction techniques that need to be adopted but will not effect the chosen concrete box solution.

4 GROUND STABILITY

4.1 Stage 1 Screening

Stab1. The average gradient across the site is 1 in 50. CGHH Fig 16, Slope Angle Map, shows that the slopes on this part of Dartmouth Park are less than 7^{o} [1 in 8].

The maximum slope to the gardens to the houses along Dartmouth Park Avenue is 1 in 9.

Stab2. There will be no significant remodelling of the slopes

Stab3. CGHH Fig 10, Topographical Map shows that the contours on this part of Dartmouth Park are all < 1 in 8

Stab4. The site topographical survey shows that the level difference across the site is from a high point of +53.5m to a low point of +51.5, a fall of 2.0m in 100m giving a gradient of 1 in 50.

Stab5. Whilst the site is founded on London Clay, the slopes to the surrounding area are all < 1 in 8

Stab6. Houses are located in the previous tennis courts and the trees along boundary and between the houses and the indoor bowling green will be maintained. No trees will be removed.

Stab7. The current clubhouse and indoor bowling green were constructed over 40 years ago and have not suffered any significant movement.

Stab8. There are no water courses or water features in the immediate vicinity of the site.

Stab9. The site is landlocked, being surrounded on all sides by the rear gardens to established houses. There are no level changes across the boundaries and whilst there has been some levelling in forming the tennis courts and bowling green, there is no evidence of any workings on the site.

Stab10A CGHH Fig 8 shows the site is founded on London Clay as a non productive stratum

Stab10. B The site is not on an aquifer

Stab11. The site is 0.7km to the east of Highgate Pond No.1

Stab12. There are no adopted roads on the site. The private parking and circulation area are 7m from the basements.

Stab13. The new houses are more than 5m from the indoor bowling green as the nearest building.

Stab14. The Northern Line tunnels are beneath Junction Road, 0.4km to the east of the site.

4.2 Stage 2 Scoping

- The site is found on London Clay

4.3 Stage 3 Study and Site Investigation

Condition of Surrounding Properties
From the eastern boundary, a visual assessment was made of the rear of the houses along Dartmouth Park Avenue and Laurier Road. The houses are four storey to the rear and there is no evidence that these are exhibiting any significant movement or structural distress. Photos 1 to 2. The fronts of these houses were assessed along their road frontages from the pavement and again there is no evidence of any significant movement or structural distress. Photo 3.

Land Stability
Both the site walkover and the records in CGHHS show that there are no problems of land stability in the vicinity of the site.

Whilst the site is founded on London Clay, the slope angle on the site is generally 1 in 50 and ground stability is not an issue.

Given the slope of the rear gardens to Dartmouth Park Avenue, the base of the slope along the eastern boundary was examined and there were no signs of any slippage.

Future Site Investigation
Before construction can commence a site investigation will be required to establish:

i. The depth of any made ground mantle and any perched water table on top of the London Clay;
ii. The strength/depth profile of the London Clay for the design of the concrete box;
iii. Any water bearing issues within the London Clay
iv. The root action of the trees along the eastern boundary

The proposed foundation, utilising a concrete box is a buildable, robust solution and it is not envisaged that any of the above parameters will affect the choice of foundation. If it is found that water issues are significant an intercepting drain will be constructed around the perimeter of the excavation. Consequently a site

investigation is not informative to the Basement Impact Assessment and can be sensibly left to the later stages of the design process. The advantages of leaving the site investigation until later are:

i. Greater certainty in the design solution.
ii. Greater certainty on the loads on the foundations

4.4 Stage 4 Impact Assessment

Stability of Adjacent Buildings
There is no movement in the adjoining houses along Dartmouth Park Avenue and Laurier Road. The buildings are remote from the basement excavation and their structural integrity will not been compromised.

The nearest building will be the indoor bowling green which is 5m from the basement

Land Stability
The existing gradients are all shallower than 1 in 8 and there are no land slippage or ground stability problems within or adjacent to the site.

Slope Stability
There are no slopes being introduced in the scheme.

Ground Movement
The basement excavation will extend to a depth of some 4m below ground level so the reduction in load on the underlying ground will be around 70kN/m^2. The self weight of the structure will be in the order of 45kN/m^2. With occupation the total load will be nearer 60kN/m^2. Hence there will be no long term ground movement.

Trees
Measures will be adopted to protect the roots, trunk and canopy of the trees near the houses.

Adjoining Foundations
The indoor bowling green is 1m lower than the new houses. This has a large span lightweight steel truss supported on pad footings which are 1m deep. This means that the basement excavation will be some 2m below the indoor bowling green foundations, but at 5m clearance the existing foundations will not be affected.

Highways
The terraces are remote from the Public Highway. They are some 7m from the private access road and parking and will not need to be designed for highway loadings.

5 SURFACE FLOW AND FLOODING

5.1 Stage 1 Screening

Flood1. The site is not within Hampstead Ponds Catchment

Flood2. There are no material changes in surface water flows

Flood3. The impervious area will be increased, but see GW4 for an amplification of the SUDs based principles which will be adopted to offset this.

Flood4. There will be no changes in flow rate onto neighbouring land

Flood5. There will be no changes in quality of water discharge

Flood6. Floods in Camden [2003] records that York Rise flooded in 1975, but this is over 1m below the site south western boundary and over 2.5m below the proposed houses.

5.2 Stage 2 Scoping

There are no scoping issues.

5.3 Stage 3 Study and Site Investigation

Flooding in Camden, 2003, was used in the screening.

5.4 Stage 4 Impact Assessment

The records show that York Rise, at a level of +49.9m OD, flooded in 1975 whereas Croftdown Road at +50.5m OD did not. York Rise is over 1m below the southern car parking area to the Bowling Club and over 2.5m below the proposed houses. It is not considered that there are any surface water flow or flooding issues with the houses.

6 ADDITIONAL IMPACT ASSESSMENTS

6.1 Construction Plan

Access is from a new junction on Croftdown Road which will be used during the construction phase for both material deliveries and muck away.

Remote from any trees, the excavation for the basements will be in open cut, battered back to ground level. Where there is a need to protect tree roots, sheet trenching will be used.

6.2 Sustainable Construction

The inclusion of a green roof to the houses and a sedum roof to the clubhouse will mean that the surface water flows will be attenuated.

6.3 Amenity and Landscape

The amenity will be improved with the current bowling green becoming a garden, as a publically accessible landscaped open space which will extend to the western end of the clubhouse.

There will also be green roofs to the houses and a sedum roof to the refurbished clubhouse.

6.4 Lightwells

The lightwells are local to the houses and do not impact on the neighbours.

6.5 Third Party Considerations and Impact on Neighbours

The rear gardens to the surrounding properties acts as a buffer and there will not be a significant impact on these.

The greatest impact during construction will be on Croftdown Road with construction traffic utilising the new access to the site.

6.6 Cumulative Impacts

The environmental setting is such that the impacts of the proposed scheme are minimal and as such there is no cumulative impact.

7 SUMMARY

The site is founded on London Clay as a stable impervious layer and the gradient of the ground is such that there are no problems of ground stability or surface water flooding. This means that there are no concerns with the environmental setting of the site.

The excavation of the new basement will use established techniques and there is sufficient clearance to existing buildings or the site boundary to ensure that the excavation can be battered back.

There is nothing in this BIA to suggest that the construction of a basement at Mansfield Bowling Club will have a detrimental impact on the site or neighbouring sites.

Appendix 1: CPG4 Stage 1 Screening

Basement Impact Assessment to CPG4
Stage 1 Screening

Screen	Response	Amplification
Subterranean (groundwater) flow		
GW2. Is the site founded on an aquifer	No	CGHH Fig 8, Aquifer Designation Map, shows the site is founded on London Clay as a non productive stratum
GW1AWill the basement extend beneath the water table	No	There is not a free water surface within the London Clay. Any water issues within the London Clay will be associated with the more permeable fissured or claystone layers, as minor perched tables, but these do not constitute a continuous subterranean flow or water table.
GW1BWill the basement encounter water issues	Possible	There may be water issues on top of the London Clay and with the more permeable fissured or claystone layers within it. These do not constitute a continuous subterranean flow or water table.
GW3. Is the site within 100m of a watercourse	No	CGHH Fig 11, Watercourses, shows that the tributary of the Fleet from the Highgate Ponds is in the valley between Highgate Road and York Rise, some 120m to the south west of the new houses. There are no springs in the area
GW4. Is the site within Hampstead Ponds catchment	No	CGHH Fig 14, Hampstead Heath Catchment, shows that the Hampstead Ponds catchment is 0.7km to the west of the site
GW5. Will proportions of impermeable areas change	Yes	The current tennis courts are impermeable and their drainage will be maintained for the housing scheme. The overall impermeable area will however increase with the access road and car parking. This will be offset by the adoption of SUDs based principles including: a. green roofs to the houses b. porous/permeable parking spaces.
GW6. Will more surface water discharge to ground	No	The current surface water drains will be maintained and with the greater impervious area, the net discharge to ground will tend to decrease.
GW7. Is the lowest excavation lower than any nearby water feature.	No	CGHH Fig 12, Surface water features, shows that the nearest water features are the Highgate Ponds, 0.7km to the west of the site.
Ground stability		
Stab1. Are existing slopes > 1 in 8	No	CGHH Fig 16, Slope Angle Map, shows that the slopes on this part of Dartmouth Park are less than 7^{o} [1 in 8]. The maximum slope to the gardens to the houses along Dartmouth Park Avenue is 1 in 9.
Stab2. Will remodelled slopes be > 1 in 8	No	There will be no significant remodelling of the slopes
Stab3. Does neighbouring land slope > 1 in 8	No	CGHH Fig 10, Topographical Map shows that the contours on this part of Dartmouth Park are all < 1 in 8
Stab4. Is site on hillside with slope > 1 in 8	No	The site topographical survey shows that the level difference across the site is from a high point of +53.5m to a low point of +51.5, a fall of 2.0m in 100m giving a gradient of 1 in 50.

Screen	Response	Amplification
Stab5. Is the site founded on London Clay	Yes	Whilst the site is founded on London Clay, the slopes to the surrounding area are all < 1 in 8
Stab6. Will any trees be felled	No	Houses are located in previous tennis courts and the trees along boundary and the tree between the proposed houses and the indoor bowling green building will be maintained
Stab7. Is there a history of seasonal movement	No	The current clubhouse and indoor bowling green were constructed over 40 years ago and have not suffered any significant movement.
Stab8. Is the site within 100m of watercourse or spring	No	See answer to GW2.
Stab9. Is the site on worked ground	No	The site is landlocked, being surrounded on all sides by the rear gardens to established houses. There are no level changes across the boundaries and whilst there has been some levelling in forming the tennis courts and bowling green, there is no evidence of any workings on the site.
Stab10A Is the site on an aquifer	No	CGHH Fig 8 shows the site is founded on London Clay as a non productive stratum
Stab10. B If so will excavation be below water table	No	See amplification to GW1A
Stab11. Is the site within 50m of Hampstead Ponds	No	The site is 0.7km to the east of Highgate Pond No.1
Stab12. Is site within 5m of highway	No	There are no adopted roads on the site. The private parking and circulation area are 7m from the basements.
Stab13. Will the basement increase the differential depth of foundations relative to adjoining properties	No	The new houses are more than 5m from the enclosed bowling green as the nearest building.
Stab14. Is the site over tunnels	No	The Northern Line tunnels are beneath Junction Road, 0.4km to the east of the site.
Surface Water and Flooding		
Flood7. Is site within Hampstead Ponds Catchment	No	
Flood8. Material changes in surface water flows	None	
Flood9. Changes in impervious area	Yes	See answer to GW4
Flood10. Changes in flow rate onto neighbouring land	No	
Flood11. Changes in quality of water discharge	No	
Flood12. Is site in area of risk from surface water flooding	No	Floods in Camden [2003] records that York Rise flooded in 1975, but this is between 0.5m and 2m below the site south western boundary

Stage 2 Scoping

The key areas that need further investigation and clarification are:

- The site is found on London Clay
- The impervious area will increase

Appendix 2: Site Photographs

Photo 1 Rear gardens of houses to Dartmouth Park Avenue
Note 1 No evidence of movement in rear elevations

Photo 2 Rear gardens of houses to Dartmouth Park Avenue
Note 1 No evidence of movement to rear elevations

Photo 3 Front elevation of houses on Dartmouth Park Avenue
Note 1 No signs of movement.

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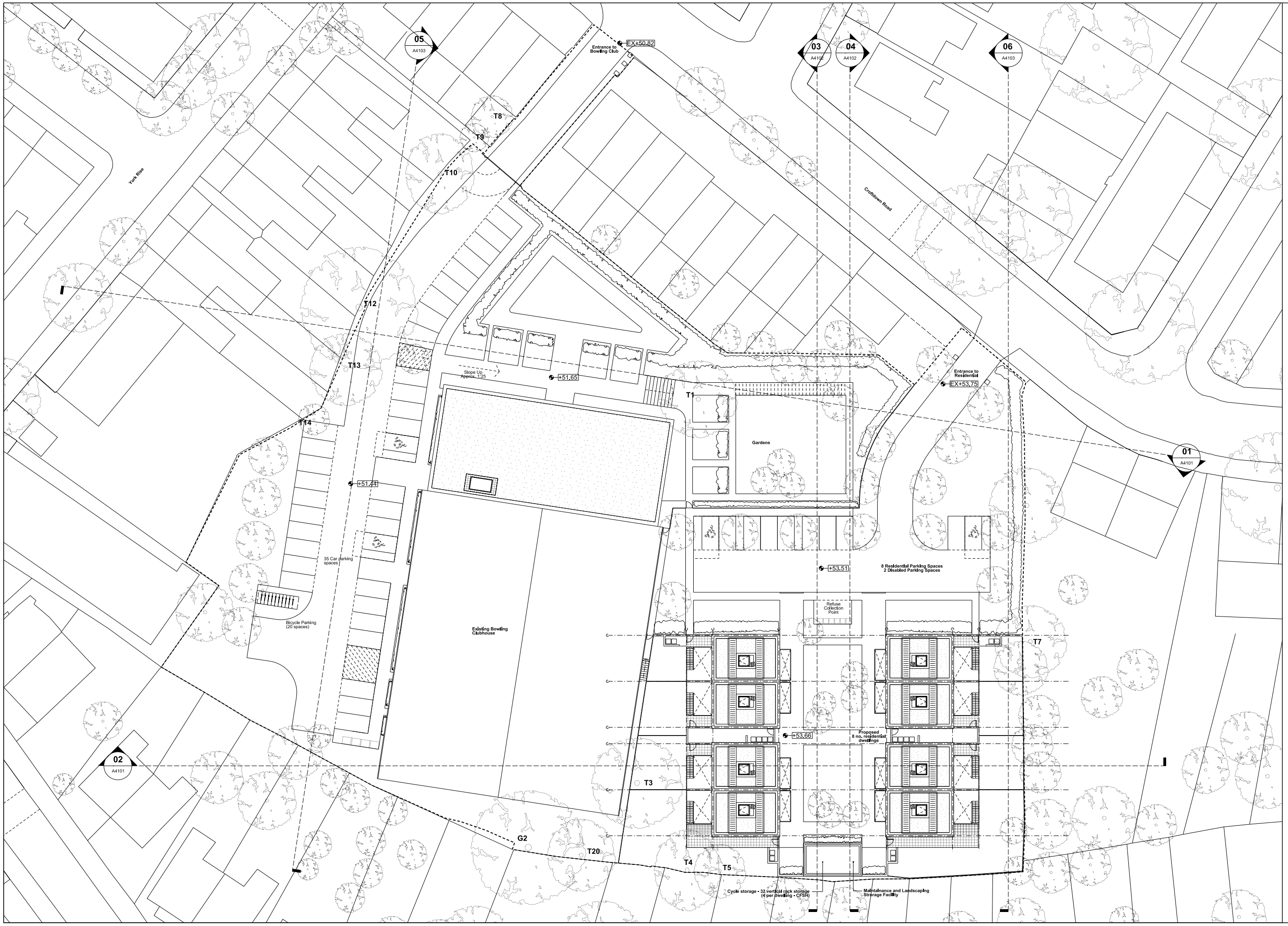
Appendix 3: Site Location Plan



General Notes:

G1 All dimensions to be checked on site — EX:605

G2 All Levels are above ordnance datum (AOD)
New Levels are shown thus: +20.345
Existing Levels are shown thus: EX+20.345
Retained Existing Levels: EX+20.345

G3 Any discrepancies between drawings to be reported to the Architect Immediately.

G4 Use figured dimensions only: Do not scale from drawings. IF IN DOUBT, ASK.

G5 Refer to Structural Engineers drawings for all structural and services information.

G6 Arboricultural Survey information from James Blake Associates Tree Constraint Plan (drawing ref: JBA 11/103 TS01/2, dated: Nov 2011, recieved: 27/04/2012) and Arboricultural Constraints Report (document ref: JBA 11/103 AR01, dated: 16/11/2011, recieved: 27/04/2012).

G7 Existing topographical survey information and heights of surrounding buildings from Survey Solutions Topographical Survey (drawing ref: 11111se-01/2 REV A, survey date: 27/03/2012, issued; 08/10/2012).

Existing Mansfield Bowling Clubhouse survey information from Survey Solutions Measured Building Survey Floor Plans (drawing ref: 11111 se-03 REV C,survey date: 12/04/2012, issued: 08/10/2012), Measured Building Survey Elevations (drawing ref: 11111 se-04 REV C,survey date: 12/04/2012, issued: 08/10/2012), Measured Building Survey Reflected Ceiling Plans (drawing ref: 11111 se-05 REV C,survey date: 12/04/2012, Issued: 08/10/2012).

Planning Application

Work Package	Cost Check	Info/Briefing	Tender	Contract	Construction
-					

Date	Ref.	Revision	Approved By
06.07.2012	A	Residential Plan	ST
26.07.2012	B	Tennis Courts revised, landscaped area added and residential site plan moved to avoid root protection area.	ST
02.08.2012	C	Revised Turning Circle	ST
20.08.2012	D	Revised Landscaping and Residential Layout	ST
16.10.2012	E	Issued under Memo. 0040; Boundary Update (Ref emails 9,10,12 + 10,10,12 from Generator)	ST
30.10.2012	F	Issue for Information to Townshend Landscape Architects	ST
01.11.2012	G	Revised bin store location	ST
05.11.2012	H	Revised Club House parking	ST
05.11.2012	J	Revised Club House parking	ST

Date	Ref.	Revision	Approved By
07.11.2012	K	Revised Landscaping	ST
09.11.2012	L	Issued under Memo0042: Draft Planning Documents Issue for comments	ST
14.11.2012	M	Issued under Memo0043: Planning Application	ST

Project: Mansfield Bowling Club

Subject: Proposed Site Plan With Boundary

Architects: Hopkins Architects Partnership LLP
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T: 020 7724 1751 E: mail@hopkins.co.uk

Sort Code	Drawing Number	Rev.
A/MBC	3101	M

Date 14.11.2012 Scale 1:250 at A1