ARUP

13 Fitzroy Street
London
W1T 4BQ
United Kingdom

t +44 20 7636 1531
d +44 20 775 4241
f +44 20 775 2121

david.whitaker@arup.com
arup.com

Planning and Public Protection
Culture and Environment
London Borough of Camden
5th Floor
Town Hall Extension (Environment)
Argyle Street
London
WC1H 8EQ

For the attention of Elizabeth Beaumont

20 December 2011

Dear Madam,

53 Fitzroy Park- Audit of Submission Documents

In accordance with your E-mail of instruction dated 24th August, we have carried out an audit of the submission documents associated with planning application 2011/1682/P. Our review was carried out using the criteria in the Basement Impact Assessment process as set out in the document entitled "Camden geological, hydrogeological and hydrological study – Guidance for subterranean development" as published on the LB Camden website under the heading "Subterranean Development Procedures".

We have reviewed the documents listed in your E-mail and others which we downloaded from the Camden Planning website. Principally these documents comprise, on the applicant's side, a site investigation report by RSK, a report by the structural engineers Elliotwood, and letters from Paulex responding to objections; and on the objectors' side various letters and reports from Haycock. A full list of the information provided by Camden to allow this review to be carried out is presented in Appendix A, at the end of this note.

Our report herein has been prepared for the sole use of LB Camden, to assist them in their assessment of this application, and should not be used by other parties for any purpose.

We observe that Camden wide guidance on the acceptable level of impacts on third parties resulting from development is currently ill defined and it would appear to be developing in a manner similar to "case law" development. The issue of what is acceptable damage to a third party property resulting from development is, we believe, not firmly closed out (the rights of one individual versus the rights of another). While it is acknowledged that such issues can be addressed by means of party wall agreements, by recourse to CDM legalisation requiring that development is safe and in the Building Control review process, it is also considered that the scale of likely impact should be revealed at planning stage to allow the planning authorities to assess the greater implications of their decisions.

The assessment provided is based on this stance and the view that it is the role of the borough and its officers to determine what is an acceptable impact on a third party.

Basement impact assessment check criteria:

The "Camden geological, hydrogeological and hydrological study – Guidance for subterranean development" document was published in November 2010. The report was prepared to aid Camden Borough in assessment of subterranean development in the borough in the contexts of individual and multiple developments. Chapter 6 of the report is titled "Basement assessment methodology: basement impact assessment" and includes reference to Camden Development Policy DP27 which requires that basement developments should:

1. maintain the structural stability of the building and neighbouring properties;
2. avoid adversely affecting drainage and run-off or causing other damage to the water environment;
3. avoid cumulative impacts on the structural stability or water environment in the local area.

In your E-mail of 24th August you extended the scope of Requirement 1 above to include the road (Fitzroy Park), as this has been identified by the objectors as being at risk from the proposed development. You have also directed us, in advising on gaps in the information submitted, to distinguish between concerns which the applicant should be required to address *before* grant of planning and those which may be responded to *after* planning consent is granted; in making this assessment we do so as engineering consultants and not planning consultants and our assessment must be read in this light.

The existing building at 53 Fitzroy Park will be demolished as part of the development so Requirement 1 above is considered in relation only to neighbouring properties (and the road). Requirement 3 includes the cumulative impacts of development; the area around 53 Fitzroy Park is not densely populated with recent basements and in the absence of other information it is assumed that cumulative development is not a current consideration at this site.

Prior to reviewing the full set of documentation provided a short assessment of the application has been carried out using information presented in the submission documents and in the objector's submissions together with other relevant external reference information. This assessment is based on the three impact identification sets of questions (Appendices F1, F2 and F3 of the BIA) which are associated with the screening flowcharts for, respectively, surface flow and flooding impacts, subterranean (groundwater) flow impacts, and slope stability impacts.

The following colour scheme (text colour) has been used in the result column in the checklist tables:

Black – proposal acceptable or neutral
Green – advisory – not likely to be significant, but action advised
Red – potentially significant, action advised

Surface flow and flooding flowchart			
	Screening flowchart question	**Potential impact**	**Result**
S1	Is the site within the catchment of the pond chains on Hampstead Heath?	With regard to the pond chains on Hampstead Heath, in particular the bathing ponds, changes in quality would be of concern; in particular the risk of contamination. This may potentially lead to the bathing ponds not attaining the required Bathing Water Directive water quality standards. Any reduction in the surface water inflow to the ponds would reduce the overall flow through the ponds, which in turn could allow an increased build-up of contaminants. Any increase in surface water inflow to the ponds could result in an increase in contaminants (e.g. animal faeces and organic matter) being washed into the ponds. Any increase in surface water inflow to the ponds could also result in an increase in the "normal" volume of water in the ponds. With more water in the ponds on a day-today basis, the available spare capacity in the ponds for receiving storm rainfall would be reduced, thus increasing the risk of the ponds over-topping when, in the event of a storm, that spare capacity is needed. If overtopping were to occur, this could cause inundation of land and properties downstream	Yes. Figures 1A and 1B in the Haycock report dated 15/02/2010 shows that the site is within the catchment of the Bird Sanctuary Pond. This is consistent with Figure 14 in the Camden Geological, Hydrogeological and Hydrological Study report.
S2	As part of the site drainage, will surface water flows (e.g. rainfall and run-off) be materially changed from the existing route?	Basement development may increase the load on the sewer and drainage systems if it leads to increased occupancy of dwellings. In turn this may increase the risk of flooding should the sewer and drainage systems become overwhelmed. Constructing a basement, either beneath or adjacent to an existing building will typically remove the permeable shallow ground that previously occupied the site footprint. This reduces the capacity of the ground to allow rainfall to be stored in the ground (which in essence acts as a natural SUDS, or sustainable urban drainage system). This runoff must then be managed by other means (eg through construction of SUDS), to ensure that it doesn't impact on adjoining properties or downstream watercourses. For sites in the catchments of the pond chains the potential impacts listed above under (1) apply if the resulting changes in drainage affect the flow to the ponds.	Probably not. The new building is not on the line (or route) of a defined drainage channel. It is likely that the principal route of surface water drainage is to the west of the site, where drainage pipes have been identified which run towards a chamber beneath a manhole cover. An outflow pipe from this chamber runs towards the pond in No. 55.
S3	Will the proposed basement development	A change in the in proportion of hard surfaced or paved areas of a property will affect the way in which rainfall and surface water are transmitted away	Probably not. Paulex state that the new building will occupy 22% of the plot

	result in a change in the proportion of hard surfaced / paved areas?	from a property. This includes changes to the surface water received by the underlying aquifers, adjacent properties and nearby watercourses. Changes could result in decreased flow, which may affect ecosystems or reduce amenity, or increased flow which may additionally increase the risk of flooding. For sites in the catchments of the pond chains the potential impacts listed above under (1) apply if the resulting changes affect the flow to the ponds.	compared with the present 12%, which is a doubling of the area of building but the change in the proportion of the plot which is undeveloped 88% to 78%) is unlikely to be significant.
S4	Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	Changes could result in decreased volume, which may affect ecosystems or reduce amenity, or increased flow which may additionally increase the risk of flooding. For sites in the catchments of the pond chains the potential impacts listed above under (1) apply if the resulting changes in drainage affect the flow to the ponds.	Potentially, yes. Capable of mitigation by drainage design. The applicant states that there will be no material change; Haycock say that surface water flows will be changed in both the temporary and permanent case; that the impact of extreme rainfall has not been taken into account in the drainage plans, and that insufficient information has been provided on the proposed drainage.
S5	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	Changes could result in decreased quality, which may affect ecosystems or reduce amenity. For sites in the catchments of the pond chains the potential impacts listed above under (1) apply if the resulting changes affect the quality of flow to the ponds.	Potentially, yes. Capable of mitigation by drainage design.

Subterranean (groundwater) flow flowchart			
	Screening flowchart question	**Potential impact**	**Result**
G1a	Is the site located directly above an aquifer?	Potentially the basement may extend into the underlying aquifer and thus affect the groundwater flow regime.	Disputed. The earlier, GEA, site investigation concluded that the site was underlain by Made Ground over London Clay. Roger Lamb, for the objectors, stated that this interpretation was incorrect, and that the site is underlain by the Claygate Member, which is a Minor Aquifer. The later, RSK, site investigation also concluded that the site is underlain by London Clay.
G1b	Will the proposed basement extend beneath the water table surface?	The groundwater flow regime may be altered by the proposed basement. Changes in flow regime could potentially cause the groundwater level within the zone encompassed by the new flow route to increase or decrease locally. For existing nearby structures then the degree of dampness or seepage may potentially increase as a result of changes in groundwater level.	Disputed. There is no water table as such; rather there may be water under (hydrostatic) pressure within fissures and sandy partings in the clay strata beneath the site. There is also perched water in the Made Ground.
G2	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	The flow from a spring, well or watercourse may increase or decrease if the groundwater flow regime which supports that water feature is affected by a proposed basement. If the flow is diverted, it may result in the groundwater flow finding another location to issue from with new springs forming or old springs being reactivated. A secondary impact is on the quality of the water issuing or abstracted from the spring or water well respectively.	No. The pond at No.55 is a water body not a watercourse.
G3	Is the site within the catchment of the pond chains on Hampstead Heath?	With regard to the pond chains on Hampstead Heath, any reduction in the spring inflow to the ponds would reduce the overall flow through the ponds, which in turn could allow an increased build-up of contaminants. This may potentially lead to the bathing ponds not attaining the required Bathing Water Directive water quality standards	Yes. Figures 1A and 1B in the Haycock report dated 15/02/2010 shows that the site is within the catchment of the Bird Sanctuary Pond. This is consistent with Figure 14 in the Camden Geological, Hydrogeological and Hydrological Study report.

G4	Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	The sealing off of the ground surface by pavements and buildings to rainfall will result in decreased recharge to the underlying ground. In areas underlain by an aquifer, this may impact upon the groundwater flow or levels – this would then have similar impacts to those listed in 1b) and 2). In areas of non-aquifer (i.e. on the London Clay), thismay mean changes in the degree of wetness which in turn may affect stability.	Probably not. The area of the proposed house including the underground elements is similar to that of the existing building.
G5	As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	In areas underlain by an aquifer, this may impact upon the groundwater flow or levels – this would then have similar impacts to those listed in 1b) and 2). In areas of non-aquifer (i.e. on the London Clay), this may mean changes in the degree of wetness which in turn may affect stability.	Probably not, depending on drainage design. The RSK report and Paulex state that the ground is not suitable for soakaways.
G6	Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line.	Groundwater may drain from the pond or spring and flow into the basement/excavation space.	Yes. The basement (pool) will extend to +76.8 mOD (floor level); the bed of the pond at No.55 is at c.+79.3 mOD with the depth of water varying seasonally between 0.15m and 0.75m.

The land stability flowchart			
	Screening flowchart question	**Potential impact**	**Result**
L1	Does the existing site include slopes, natural or manmade, greater than 7°? (approximately 1 in 8)	Local slope instability within the site	Yes. On Figure 16 "Slope Angle Map" in the Camden Geological, Hydrogeological and Hydrological Study report the site is in a location where the slopes are shown as 7° - 10°
L2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7°? (approx 1 in 8)	Local slope instability within and adjoining the site	No.
L3	Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°? (approx 1 in 8)	Slope instability within neighbouring site(s).	Yes. On Figure 16 "Slope Angle Map" in the Camden Geological, Hydrogeological and Hydrological Study report the site is in a location where the slopes are shown as 7° - 10°
L4	Is the site within a wider hillside setting in which the general slope is greater than 7°? (approx 1 in 8)	Potential for a larger slope failure system, including re-activation of a pre-existing slide.	The area of the site is locally between 7° and 10°. albeit not to the extent that the general slope is considered to be at this angle.
L5	Is the London Clay the shallowest strata at the site?	Of the at-surface soil strata present in LB Camden, the London Clay is the most prone to seasonal shrink-swell (subsidence and heave).	This is disputed.
L6	Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained? (Note that consent is required from LB Camden	The soil moisture deficit associated with felled tree will gradually recover. In high plasticity clay soils (such as London Clay) this will lead to gradual swelling of the ground until it reaches a new value. This may reduce the soil strength which could affect the slope stability. Additionally the binding effect of tree roots can have a beneficial effect on stability and the loss of a tree may cause loss of stability.	Not known.

	to undertake work to any tree/s protected by a Tree Protection Order or to tree/s in a Conservation Area if the tree is over certain dimensions).		
L7	Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	Multiple potential impacts depending on the specific setting of the basement development. For example, in terraced properties, the implications of a deepened basement/ foundation system on neighbouring properties should be considered.	Not known.
L8	Is the site within 100m of a watercourse or a potential spring line?	Seasonal springlines and changes to groundwater regimes within slopes can affect slope stability.	No. The pond at No.55 is a water body not a watercourse.
L9	Is the site within an area of previously worked ground?	Previously worked ground may be less homogeneous than natural strata, and may include relatively uncontrolled backfill zones.	Made Ground within the proposed building footprint will be excavated and removed.
L10	(a) Is the site within an aquifer?	Dewatering can cause ground settlement. The zone of settlement will extend for the dewatering zone, and thus could extend beyond a site boundary and affect neighbouring structures. Conversely, an increase in water levels can have a detrimental effect on stability.	Disputed. See G1(a).
	(b) If yes to (a), will the proposed basement extend beneath the water table such that dewatering may be required during construction?		
L11	Is the site within 50m of the Hampstead Heath ponds?	The Panel Engineer for the reservoirs would require details of excavations in the vicinity of the reservoirs.	No.
L12	Is the site within 5m of a highway or pedestrian right of way?	Excavation for a basement may result in damage to the road, pathway or any underground services buried in trenches beneath the road or pathway.	Yes. Fitzroy Park.

L13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Excavation for a basement may result in structural damage to neighbouring properties if there is a significant differential depth between adjacent foundations.	Yes but neighbouring properties are at some distance.
L14	Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	Excavation for a basement may result in damage to the tunnel.	No.

Based on the above the principal matters for consideration are:

1. Surface water and groundwater - **S1, G3, G6**: The site is approximately 100m northeast of and within the catchment of the Bird Sanctuary Pond, and is also about 15m uphill of the pond at No.55 Fitzroy Park. The proposed basement will be lower (by some 2.5m) than the pond at No.55 Fitzroy Park.

2. Slope stability – **L1:** On Figure 16 "Slope Angle Map" in the Camden Geological, Hydrogeological and Hydrological Study report the site is in a location where the slopes are shown as 7° - 10°. The site is also located on or close to the area where the London Clay is buried by the Claygate Beds and where a veneer of head material may cover the site or the area impacted by the proposed development.

   L12: It is proposed that the excavation to form the lower ground slab will extend from the east corner of the building towards the road at an angle of 45°. The edge of the road is some 9m from the base of the slope, which will be 3m high approximately.

In the following sections we consider the information provided and provide our comments, in relation to these principal matters.

Surface water and Groundwater: Much of the argument in the letters and reports of the applicant's consultants (Paulex and RSK) and the objectors' consultants (Haycock, Baynham Meikle and Roger Lamb) concerns the mechanism of replenishment of the pond at No.55 and the Bird Sanctuary pond, and land drainage. In particular, the occurrence of permeable layers and whether they contain groundwater has been a matter of disagreement.

The proposed design for the basement structure includes a 500mm layer of "free draining material" against the horizontal and vertical elements, to provide a passage for subsurface water across the footprint of the new building. The basement will be constructed within a wall of contiguous piles installed around the entire perimeter of the slab; these are intended to provide support to the ground outside while excavation and basement construction is carried out inside. Spaces between the piles will allow the passage of groundwater through this supporting wall. In the permanent case the piles will not be required, but water will be able to flow through the gaps and into the drainage layer adjacent to the structure, around and beneath the building. During construction, subsurface water will be free to enter the excavation and it is proposed to pump this back to the surface and recharge it through a series of land drains downslope of the works.

We will not comment on the question of whether the site is underlain by the Claygate Member above London Clay, or by London Clay directly, because it is the lithology which is important rather than the formation name and there is sufficient borehole information to provide a reasonable characterisation of the material. The evidence from the two geotechnical site investigations carried out on the site does not suggest that there is a distinct aquifer at shallow depth through which significant volumes of groundwater are delivered to the pond in the garden of No. 55. It does, however, show that there is some perched water within the shallow soils at the site and it is likely that there is some drainage of this soil water into the pond. It is possible also that there is some seepage into the pond from groundwater at greater depths, within the London Clay, although it is difficult to see this as accounting for much of the water in the pond.

The land drainage system seems likely to play a more important part in the water balance of the pond than either groundwater or soil water. The RSK site report describes buried pipes leading from a manhole chamber just beyond the western boundary of No. 53 towards the pond, and a pipe running into this chamber from the north (Figure 2 in the RSK report). The 15/02/2010 report by Paulex shows the catchment of the drainage system within which the site is located (Figure 1A). The figure shows that No. 53 is towards the bottom of the catchment, and the principal drainage channel is shown as crossing the site boundary to the west of the house. The position of this channel seems to correspond to the manhole and associated inflow pipe described in the RSK report, although in that report it is described as being outside the garden of No. 53: the site boundary marked on the Haycock figure appears to be incorrect or, alternatively, the boundary in the RSK figure is wrong (this is a detail, probably not of great importance).

Our opinion is that the proposed drainage layer beneath the new underground structure will, if properly designed and constructed, provide sufficient transmissivity to maintain the flow of subsurface water across the building footprint without significant change from the present situation. This is a solution which we know has been employed in other basement developments. The other element of the subsurface works is the contiguous piled retaining wall which is proposed around the entire perimeter of the building: our view is that is that the use of contiguous piles, which are constructed with gaps between adjacent piles, will be a sufficient mitigating measure as far as subsurface water flow is concerned.

There is some lack of clarity in the drainage proposals presented by the applicant, and this has been commented on by the objectors. Our view is that the level of detail which has been provided by the applicant is reasonable for this stage of the design. Constraints upon the disposal of water to soakaway have been demonstrated and appear to have been recognised in the reports by Paulex. We agree with the statements by Paulex (17th June 2011) that the general drainage pattern on the site will not change significantly, and that consequently there will be no significant increase in flood risk or of changed runoff profiles.

Slope Stability: The site is in a location where the slope angle is mapped as 7° - 10°. The maximum stable angle for natural slopes in London Clay is approximately 8° to 10° and for the Claygate Member the maximum stable angle is approximately at 8°. The Camden Geological, Hydrogeological and Hydrological Study report advises that in the areas highlighted in Figure 16, land stability issues should be considered in detail.

The RSK report (Section 4.1.2) concludes that “slope stability issues are unlikely to affect the proposed residential structure, although it may need to be taken into consideration with regard to any landscaping proposals”. There is no other reference to slope stability in the application documents that we have been able to find. Our view is that it is necessary to undertake a preliminary slope stability analysis to assess the impact of excavations within the Made Ground and potentially weak, previously worked ground or to demonstrate that such is not necessary. Any lope stability analyses will need to consider the both planned temporary works slopes and the permanent construction.

Ground movement which might impact on adjacent structures will also require assessment. We can find only one reference to settlement in the submission documents (in Section 11.5 of the RSK report) and this merely notes that the base slab will have to be designed to resist or accommodate heave resulting from ground movement. In our view the scale of the proposed development, together with the proximity of the road and of neighbouring buildings, is such that an assessment of settlement and ground movement which may be caused by the proposed construction ought to have been carried out as part of scheme design either in preliminary of final form. Until the scheme is further developed (wall depths etc) it is not possible to comment in detail on likely or possible ground movements and how these may impact on the adjacent structures. As guidance, we would expect that damage to the neighbouring structure due to the proposed basement construction (assuming well carried out basement design and construction and also assuming the existing building to be in sound structural condition without unusual structural detaining) would be in the very slight or lower category.

Our view of the proposal to form a temporary cut slope at an angle of 45° from the east corner of the excavation towards the road to form the lower ground slab is that while this slope should be stable for a period of perhaps a few months in London Clay, the presence of Made Ground and of fill in the cut face (as shown on the Assumed Sequence of Works drawings in the Structural Engineering Notes), both of which are reported to contain water means, in our view, that the integrity of this slope cannot be assured at this stage. This matter should be considered further and an alternative solution provided, to be employed if conditions prove to be unsuitable for the 45° slope option.

Secondary matters arising from the screening are:

1. Surface water – **S4, S5**: The applicant states that there will be no material change in surface water flows (e.g. rainfall and run-off) in terms of quantity or quality; Haycock say that surface water flows will be changed in both the temporary and permanent case; that the impact of extreme rainfall has not been taken into account in the drainage plans, and that insufficient information has been provided on the proposed drainage.

2. Groundwater – **G1a, G1b**: The basement will be constructed within material with a lithology which is predominantly clay; however, there is disagreement between the applicant and the objectors as to whether the strata belong to the Claygate Member, which is classified by the EA as a minor aquifer and might be expected to have a water table, or to the London Clay, which is a non-aquifer and in which the concept of a water table is not normally applicable.

3. Slope stability – **L5**: Whether the shallowest material belongs to the Claygate Member or to the London Clay is disputed – see previous paragraph.

In the following sections we consider the information provided and provide our comments in relation to these secondary matters.

Surface water: No details of the proposed drainage arrangements have been provided, other than the finding from the site investigation that soakaways will not be effective in at the site. It is not clear either what quantities of runoff will have to be dealt with or what the criteria for drainage design are considered to be.

Groundwater: This concern relates to the potential for the basement to impede the flow of subsurface water and result in raised groundwater levels upstream and lowered levels downstream of the new structure. This can affect soil moisture and cause waterlogging or drying out, and potentially also may affect the stability of existing foundation. The proposal to place a drainage layer beneath the structure appears to us to be sufficient mitigation, as the transmissivity of a 500mm layer of "free draining material" against the horizontal and vertical elements will be at least equivalent to the transmissivity of the ground blocked off.

Additional matters

1. We find that the drawings are not consistent and are not clearly marked with a scale or with dimensions and levels. For example, Drawing 0932-0300-AP-001 Proposed Sections Section 1shows the plant room to the southeast of the swimming pool, whereas the Proposed Plans Basement Plan Drawing 0932-0200-AP-001 shows the plant room as being adjacent to the pool, to the southwest. This makes it difficult to review the proposals; and in fact we are not sure exactly what scheme we are reviewing.
2. The proposed method of dealing with groundwater inflow during construction is to excavate "a suitable sump down the slope to the western edge of the new basement to allow groundwater to be collected and pumped out of the main excavation". This sump appears to be outside the excavation for the basement and outside the contiguous pile wall. Drawing 209483 SK-100-P1 in the Structural Engineering Notes has a rather uncertain line showing the limit of this sump, and a note that there will be a 45° batter on the side of the sump towards the pond in No.55. The sump is not shown in the Elliotwood "Sequence of Construction" slides dated 04-10-10. Our view is that this sump is a risky item of temporary works given the proximity of the pond; it is also quite possible that it will not be effective in collecting water seeping into the far side of the basement excavation. It is also observed that the sump removes a significant area of ground that would have been in balance with the soil on the other side of the basement thereby resulting in an out of balanced basement.
3. None of the exploratory boreholes has extended to the depth (unspecified) of the proposed piles (we would expect that this would be at least 20m). This is perhaps a minor point, but for a project of this scale at this stage we would expect that there would be borehole information to at least the full depth of the proposed permanent works. It is our view that such works will be required to complete a detailed design.

It is considered that the reports presented in support of the planning application are insufficient to the stage of the proposed project in several respects, and we would advise that planning consent should not be given without further information being provided. More work will be required at detailed design to inform the construction process. By way of summary, the key points supporting this conclusion are given as follows:

1. The absence of any assessment of ground movement and settlement, and of consequent potential damage to adjacent structures including the road;
2. The absence of any assessment of the risk of instability of the ground due to the excavation, which should be integrated with the choice of pile length. This is in context of Figure 16 of the BIA which highlight the area as being in an area of heightened slope stability risk (a significant area of where there are slope angles of 7° or greater).
3. The proposed method of controlling groundwater during construction is risky and uncertain to succeed.

I hope that this will assist you in reaching your decision.

Yours faithfully

David Whitaker

Appendix A: Information reviewed.

1. Water Environment Impact Assessment (Paulex environmental consulting January 2011).

2. Site Investigation Report – RSK group (Geotechnical, Hydrogeological and Geoenvironmental Site Investigation) - December 2010 Report). Including:
    - **Appendix A Desk Study Information**
      GroundSure Report and Historical Maps [on CD]
      BGS Borehole Log
    - **Appendix B Fieldwork Records**
      Borehole Records
      Water Monitoring Record Sheets
    - **Appendix C Geotechnical Laboratory Test Records**
      Moisture Content and Plasticity Index of Soil
      Triaxial Test Results
      Particle Size Distribution Results
    - **Appendix D Chemical Laboratory Test Records**
      Chemical Analysis of Soils & Chemical Analysis of Water

3. Consulting Structural and Civil Engineers sequence details & Structural

4. Various drawings of the site, existing and proposed

5. Letter from Paulex environmental consulting (5th & 17th June 2011) in response to the objections and Haycock Associated Report dated 2nd May 2011.

B. Information from the neighbours –

1. Geotechnical comments by Roger Lamb dated 16th February 2011

2. Haycock - Response to Planning Application 2011/1682/P and 2011/1686/C by Dr Haycock for Fitzroy Park Resident Association.