



## Offsite Culvert – Drainage Report

59-61 Oak Grove,  
Cricklewood,  
London.  
NW2 3LR

10<sup>th</sup> April 2015

Ref: 2/5932.1/Culvert

Prepared on Behalf of:  
Pocket Living, through  
instructions received  
from Hutton Group

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 Oak Grove, Camden, London**

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*Revision* -  
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**Revision List**

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## 1.0 INTRODUCTION & BACKGROUND

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### 1.1 General

- 1.1.1 This report has been prepared on instructions received from Hutton Group at the site meeting of 25<sup>th</sup> November 2014. This report relates to the identification of an old offsite surface water culvert under the Oakdale Motors garage site when constructing the proposed residential development on the vacant block of land at 59-61 Oak Grove, Cricklewood, London, NW2 3LR.
- 1.1.2 This report is prepared solely for the benefit of Pocket Living, including their Funders, through instructions received from Hutton Group. This report may not be assigned without prior written permission from Clancy Consulting.

### 1.2 Report Structure

- 1.2.1 This report has been prepared following a site team meeting (25/11/14). Information from the following sources has been used:
- Site Investigation Report by Soil Consultants Limited
  - Topographical Survey by Murphy
  - Thames Water (TW)
  - Hutton Construction – Principal Contractor
  - Clancy Consulting – Engineers
  - Pocket Living – Developer
  - Tower8 – Employer's Agent
  - Network Rail – Statutory Body and Adjoining Property Owner
- 1.2.2 This report does not detail existing designs and plans for the development as they can be sourced from other drawings and reports.

### 1.3 Existing Site & Ground Conditions

- 1.3.1 The site is approximately 700m<sup>2</sup> in area.
- 1.3.2 The site is bounded to the north by the Oakdale Motors car garage / car servicing centre, to the east by national rail train lines, to the south by a residential property and to the west by Oak Grove.
- 1.3.3 From the Soil Consultants Limited Site Investigation report, the site was found to comprise approximately 0.5m of made ground which sits upon a thick London Clay Layer formation (20m+).
- 1.3.4 It is understood that the existing ground was saturated during the site investigation. At the time of the investigation it was concluded the reason for the saturation was because of the heavy downpour of rain being soaked into the Made Ground. The clay soils beneath act like a barrier and prevent water from seeping away quickly.

1.3.5 Since the exposure of the culvert, it has become apparent that the culvert has been leaking water and, due to its close proximity, the escaping water has been leaking onto the Pocket Living development site, as the escaping water finds its natural draining course.

#### **1.4 Construction Works to Date and Antecedent History**

1.4.1 Construction works on foundations and substructure have commenced to the new residential development.

1.4.2 The following is a general summary of programmed construction works completed up to the site meeting date of 25<sup>th</sup> November 2014:

- Site Strip
- Construction of piles
- Construction of ground beam foundations
- Partial construction of ground floor supporting blockwork
- Partial installation of beam and block floor
- Installation of some below slab foul drainage runs and incoming services provisions

1.4.3 On undertaking the site reduced dig and excavations, initially the excavation sides about the site were found by Hutton Group to be relatively stable.

1.4.4 The ground bearing slab for the Car Garage has been noted to extend out into the Pocket site and it had been agreed as part of the Party Wall Award that this trespassing slab can be cut back. Beneath the slab was a clay layer which originally remained stable (Refer picture 1).

1.4.5 However, during the four to five weeks leading up to the meeting of 25<sup>th</sup> November 2014 more regular periods of rainfall were experienced on site. During this period, the works on site had continued with the excavation of foundations near to Oakdale Motors flank wall. During the groundworks near to the flank wall, the ground, which was saturated, slipped exposing the leaking culvert (Refer picture 2). It is considered that the ground which slumped had been saturated due to the leaking of the culvert. This is likely to be exacerbated by the water pressure within the culvert having built up, its original designed route appearing to have been historically blocked by the vehicle service pit constructed in the building currently occupied by Oakdale Motors.

1.4.6 The culvert is shown on the historic maps as running under the adjacent Oakdale Motors property and does not encroach onto the Pocket Living development site.

1.4.7 It was only after the undertaking of excavation works on site that the culvert was found to be leaking by Hutton Group and that the leak was prevalent with water from the culvert crossing over the party wall line from the Oakdale Motors site onto the Pocket Living site. (Refer picture 4).

- 1.4.8 Following the initial discovery of the culvert, Hutton Group had contacted Clancy and requested a site visit to inspect the site conditions found and recommend remedial works thereto. Clancy undertook this visit on 24<sup>th</sup> October 2014 and found the garage slab to be cantilevering over the culvert as a result of the failure of a small width of soil support along the party wall line. Clancy recommended that the support conditions to the slab should be reinstated and recommended that the sides of the excavation be shuttered and the void left by the thin failure of support soil be replaced with concrete.
- 1.4.9 Network Rail was notified about the concrete backfill works taking place against the brick culvert by the Pocket Living site development team. In this respect it is understood that the concrete backfill works were commenced but then interrupted whilst Network Rail's formal agreement was obtained. Network Rail's subsequent email to Clancy Consulting of 28<sup>th</sup> November 2015 indicates their agreement to the proposed ground reinstatement works, including concrete backfill adjacent to the brick culvert.
- 1.4.10 Hutton Group subsequently commenced these works working from front to rear, in two sections, and has estimated that approximately 8.0m of concrete backfill was needed along the edge of the slab. A small hole in the soffit of the brick culvert was exposed towards the rear of the site during the construction work as a result of water flowing from the culvert pushing away adjacent soil. Following the slab edge underpinning works being undertaken along the existing party wall line, Hutton Group advised that this small hole in the culvert had become the natural path for which the water was escaping from the brick culvert onto the Pocket Living development site. In an effort to complete the support works to the slab edge, and in turn protect the works generally where water is escaping from the brick culvert towards the Pocket Living development site, it was recommended that the remaining exposed side of the culvert be similarly backfilled with concrete. It was recommended that a small piece of waterproofing membrane [Volclay sheeting or similar] be locally placed across the hole before shuttering the ground face on the party wall line and backfilling with concrete. The waterproofing membrane was provided to prevent concrete entering the brick culvert.
- 1.4.11 Due to the quantity of water entering the site from the uncovered culvert, Hutton Group had commenced dewatering of the site to enable the works to continue using pumps. The sump pumps have been used continuously since the 14<sup>th</sup> November 2014 (Refer picture 3).
- 1.4.12 The following summarises the un-programmed out of scope works that are being undertaken to date:
- Concrete backfill beneath the car garage slab to replace support lost by the collapse of the existing ground – works now completed.
  - Pumping of the surface water escaping from the brick culvert away from the works to allow foundation construction works to progress.

Hutton Group has advised that the items described above have caused delay to the programme.

- 1.4.13 From investigations undertaken so far, and the evidence shown on the historical maps, it appears that the brick culvert does not continue to the front of the garage site and appears to stop about half way along the garage party wall, the ground being relatively 'dry' in this area with no water being seen to escape. Water has only been seen to escape the culvert before the garage serving pit.

## **1.5 Existing Culvert**

- 1.5.1 The culvert crosses beneath the railway line embankment and enters the adjoining garage property, just beyond the boundary of the development site. Clancy have been advised that, following meetings between Pocket Living and Barnet Council, Barnet Council have advised that the owner of the culvert in the location of the identified leak occurring, is the owner of the site currently occupied by Oakdale Motors, and that they have a "riparian ownership". It is Clancy's understanding that as riparian owners, the owners of the Oakdale Motors site are therefore required to ensure that the water flows across their site without obstruction or pollution from the upstream landowner site to the downstream land owner site; this would include without obstruction of flow caused by the collapse off the culvert.
- 1.5.2 To date, no further intrusive investigations of the brick culvert have taken place, by Hutton Group or Pocket Living, as the culvert is on the adjoining owners land.
- 1.5.3 The catchment area of the brick culvert is unknown and appears to pick up surface water only.
- 1.5.4 The condition of the brick culvert prior to construction works on the development site cannot be ascertained. It has been subsequently found that the adjoining Oakdale Motors car garage has a servicing pit that has been constructed through the line of the culvert. It is believed that this servicing pit has interrupted the culvert and as such the culvert is no longer carrying out its original design intent.
- 1.5.5 Record survey plans available do historically indicate the previous presence of a culvert beyond the development site boundary running parallel to the site boundary within the adjacent car garage building site. However, it is not possible to determine when the culvert route was interrupted by the construction of the servicing pit within the car garage building.
- 1.5.6 It cannot be determined at this stage how much run off from this culvert has historically entered the Pocket Living development site and the existing natural flow paths is also currently unknown. However, original site investigations works indicated that the ground within the Pocket Living development site was saturated. The cause of the saturation was generally assumed to relate to the day[s] of particularly heavy rainfall experienced at the time of the investigation. Following the discovery of the leaking culvert it is now believed that this is also a further potential reason for the saturation of the ground, with any water leaking from the culvert into the adjacent ground and acting as a potential soakaway of currently unknown infiltration rate.



## 2.0 CONCLUSIONS AND RECOMMENDATIONS

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### 2.1 Conclusions / Recommendations

- 2.1.1 The current existence of the brick culvert on the adjoining owners land was not known until a thin section of ground along the party wall line fell away into the Pocket Living development site exposing the outside of the brick culvert wall.
- 2.1.2 There is water, believed to be surface water run-off, discharging through the brick culvert. Following the reduced dig excavations to the Pocket Living development site, water has been found to be escaping through existing defects to the brick culvert, including specifically the culvert wall on the Oakdale Motors site, causing the subsequent saturated ground to slump onto the Pocket Living development site.
- 2.1.3 It was immediately recommended that the unsupported edge of the garage slab be backfilled with concrete. The purpose of reinstating with the concrete backfill is to underpin the edge of the garage slab, which spans over the brick culvert, thus returning similar slab support conditions to those previous to the culvert being identified. These works should be seen as a precautionary exercise of re-supporting the existing slab edge. The last section of concrete backfill, local to the main identified culvert leak, was installed in order to try and prevent water entering the Pocket Living development site from the identified main culvert leak location. Following the completion of these works Hutton Group have advised that water was still leaking from the culvert, around the concrete backfill, and seeping onto the Pocket Living development site.
- 2.1.4 The brick culvert is not shown on the TW asset maps. Pocket Living has notified the Local Authorities of both Barnet and Camden to advise them of the brick culvert which is local to the statutory boundary between the two Local Authorities; although understood to be on the Barnet Council side. Network Rail have also been made aware of this culvert matter arising.
- 2.1.5 Clancy understand that following a meeting between Pocket and Barnet Council, Barnet Council have indicated the culvert belongs to the owner of the site currently occupied by Oakdale Motors and that Pocket should pursue these owners to make sure that the culvert water occurring is not diverted onto Pocket's site.
- 2.1.6 On the basis that the culvert is dis-used, but there is still surface water run-off finding a route along it, a solution needs to be found to deal with this run-off. Pocket Living / Hutton Group are in no position to carry out works to the brick culvert itself as it is not on their land, it being fully on the neighbours land.
- 2.1.7 The responsibilities for any works to the culvert appear to lie with the adjoining 'riparian' owners of the Oakdale Motors garage site. The following options should be considered by the riparian owners of the brick culvert:
- 2.1.7.1 As the brick culvert is still actively discharging water run-off, the riparian owners need to identify a method of reintroducing this old drain line, possibly, and subject to their further investigations, by reinstating the culvert.
- 2.1.7.2 Permanent piped discharge into a public sewer. From experience, Clancy believe Thames Water is very unlikely to accept any potential natural land drainage into their sewer systems and therefore this option does not appear to be a viable permanent option to the riparian owners.



- 2.1.7.3 If the brick culvert is found to be abandoned and acting as a sump / land drain to ground about it upstream of the garage site, the pipe could be plugged with concrete forcing ground water along different natural paths. This would need permission of the culvert owner, Network Rail, and potentially the Local Authority and Environment Agency, at the very least.
- 2.1.8 From the Pocket Living site development's perspective, Pocket Living should notify, and it is understood have notified, the owners of the Oakdale Motors garage site and state that due to defective plant on their site, water is flooding the development site. Protection measures to the Pocket Living site have been considered by Clancy and the following comments are made:
- 2.1.8.1 In theory a soakaway could be constructed within the external areas to the rear of the site. Any soakaway would need to be at least 5m from any structure, which is likely to include the Network Rail retaining wall making this unfeasible. In addition, the amount of natural run-off into the brick culvert and onto the development site is unknown and it will be difficult to provide an accurate assessment now. The infiltration rate into the ground, due to its' clayey nature, has been proven to be poor and so the effectiveness of such works is considered dubious even if a location was agreed with Network Rail. This matter is further exacerbated by potential groundwater run-off from the railway embankment, leading to the possibility that the soakaway acts as a land drain to the higher level railway embankment.
- 2.1.8.2 The concrete backfill / brick culvert surround could be extended, effectively damming water from the Pocket Living side of the party wall line boundary. Whilst this may assist in limiting the water onto the Pocket Living development site, it may not solve the long term problem. This is due to the number of unknowns relating to the brick culvert and the area it is draining.
- 2.1.8.3 The rear paving could be provided with a threshold level french drain, effectively picking up any surface level rainwater run-off, should this occur, that may run above the external finished paving levels and therefore assist in preventing any potential surface level flooding to the new Pocket residential properties.

## **APPENDIX A**

### **Photographs**



**Photo 1**



**Photo 2**



**Photo 3**





**Photo 4**