



**Richard Jackson**  
Engineering Consultants

## SURFACE WATER DISPOSAL STRATEGY

Queenswood School – Sports Hall Extension

Ball Hall Ltd and Queenswood School

June 2017

Project no: 47875

## Document Review Sheet: -

Document prepared by: - *Mark Geddes IENG MICE*  
on behalf of Richard Jackson Ltd

Date: - 12 / 6 / 2017

Document checked by: - *Martin Worth*  
on behalf of Richard Jackson Ltd

Date: - 13 / 6 / 2017

Document Approved by: - *Mark Geddes IEng MICE*  
on behalf of Richard Jackson Ltd

Date: - 13 / 6 / 2017

### Document Status

DRAFT

FINAL

### Revision Status

Issue	Date	Description	Prepared	Checked	Approved

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Title: SURFACE WATER DISPOSAL STRATEGY  
 Project: Queenswood School – Sports Hall Extension  
 Client: Ball Hall Ltd and Queenswood School  
 Project No.: 47875

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## 1. Introduction

- 1.1. Richard Jackson Ltd have been appointed by Ball Hall Ltd and Queenswood School to provide a surface water drainage strategy for a proposed refurbishment and extension of the existing sports hall. The proposals will include the provision of a new link from the existing car park area to the sports hall, removal of some existing buildings and the works to the sports hall itself. The drawings of these proposals are provided in Appendix A.
- 1.2. Hertfordshire County Council in their role as lead local flood authority (LLFA) have been consulted on these proposals and their latest response is in Appendix B. The planning application red line includes large areas of the school campus where no physical works are proposed, yet the LLFA have requested the proposals for surface water drainage include these areas. As there will be not changes to these areas it is not reasonable for the LLFA to request drainage improvements to be made. The drainage for the existing car park, access ways, campus buildings and other areas not directly being altered by these proposals will remain unchanged. The surface water disposal system and its capacity will also remain. The calculations provided only relate to these proposed areas of building.

## 2. Existing Drainage

- 2.1. It is proposed to refurbish and extend the existing sports hall. To facilitate this a number of existing buildings will be removed. The topographical survey in Appendix C has been used to assess the existing impermeable area of the sports hall and the adjacent buildings.

Sports Hall (37.5m x 37.5m)	=	1406m <sup>2</sup>
Buildings to be removed (2 x 17 x 7m)	=	238m <sup>2</sup>
3 x 5.5m	=	<u>16.5m<sup>2</sup></u>
	=	<u>1650m<sup>2</sup></u>

- 2.2. A CCTV survey (Appendix D) of the existing surface water system has been undertaken. This has confirmed that the surface water drainage serving the sports hall connects to a 225mm carrier drain system that flows to the north and outfalls to an existing ditch. the condition of this system is generally good but a number of defects have been revealed that will need to be addressed. The CCTV has confirmed that the school swimming pool building is also served by this system. The swimming pool building is not shown on the topographical survey as its construction was after the survey was carried out.

Swimming Pool 20m x 32m	=	640m <sup>2</sup>
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- 2.3. There are also a number of gullies on the access ways serving this part of the site that connect to the carrier drain. These are not in a position to fully drain the access way which is not kerbed. It is considered that each of the

gullies drains around 50m<sup>2</sup> each which gives a total of 200m. The total drainage area served by the carrier drain is 2463m<sup>2</sup>.

- 2.4. As noted above, the carrier drain has been proven to outfall to an existing ditch to the north of the site. This ditch has a build-up of material in its invert and maintenance works will be required.
- 2.5. The existing peak flow through the SW system using 75mm/hr rainfall rate (para 7.2.3 of HCC Suds Guidance). This gives a peak flow rate of 51 l/s.
- 2.6. The only area served by this system where works are proposed in the sports hall. Using the 75mm/hr rate and an area of 1406m<sup>2</sup> gives a peak flow for the sports hall of 29 l/s. An assessment of the existing drainage using the source control element of micro drainage. These are in Appendix E. The results have a peak runoff rate of 21.5 l/s for a 1 in 1 year 15 minute storm event with no allowance for climate change.

### **3. Proposed Surface Water System**

- 3.1. There are two areas of new construction proposed, the smaller is a new road link and parking which will allow more direct access to the sports hall from the existing car park. This link will be constructed in permeable materials and hence will not change the risk of flooding from the site as a whole.
- 3.2. Richard Jackson Ltd has carried out a site investigation which is in Appendix F. The ground conditions are described as being granular generally with some clay, and hence permeable paving which is only draining its own area will continue to minimise the previous green space it has replaced and no calculations are required. Groundwater was encountered in the investigation at depths ranging from 2.7m BGL to 0.5m BGL where clay was encountered. This higher water is considered to be perched. A previous investigation undertaken in 2009 with a similar scope did not encounter groundwater. The results of this investigation are appended within the RJL investigation.
- 3.3. The sports hall proposals will increase the area of the hall. Prior to the CCTV investigation of the drainage system it was not known that the swimming pool building was drained by this surface water system and a flow control was proposed within this system. A revised proposal has been produced. This is in Appendix G together with Micro drainage Calculations for the 1 in 1 year, 1 in 30 year and 1 in 100 year plus climate change events. The outflow on the revised system has been restricted such that the space available adjacent to the proposed sports hall is used for storage. The depth of water stored in the 1 in 100 year event is 0.351m which gives a freeboard of 125mm to the finished floor level. To ensure that water from the detention basin does not flow towards the sports hall a weir overflow is proposed that will allow water to flow westward to reach lower ground in an exceedance event.



Event	HCC	1 in 1	1 in 30 +CC	1 in 100 +CC
Rainfall (mm)	75	31.5	60.0	78.5
Existing l/s	35	21.3	23.4	30.6
Proposed l/s	20.8	12.8	20.8	20.8

**Table 1: Comparison of existing and proposed outflow rates**

- 3.4. This proposed system allows infiltration during events when water is stored in the detention basin. This effect has been ignored and would improve performance of the system as a whole.
- 3.5. The maintenance of the existing drainage systems and the proposed system will remain the responsibility of the Queenswood School. A proposed maintenance schedule is provided in Appendix H.
- 3.6. The works to facilitate this development will include repairs to the carrier drain system and cleaning of the existing boundary ditch system to ensure that this outfall is free draining.

#### **4. Conclusions**

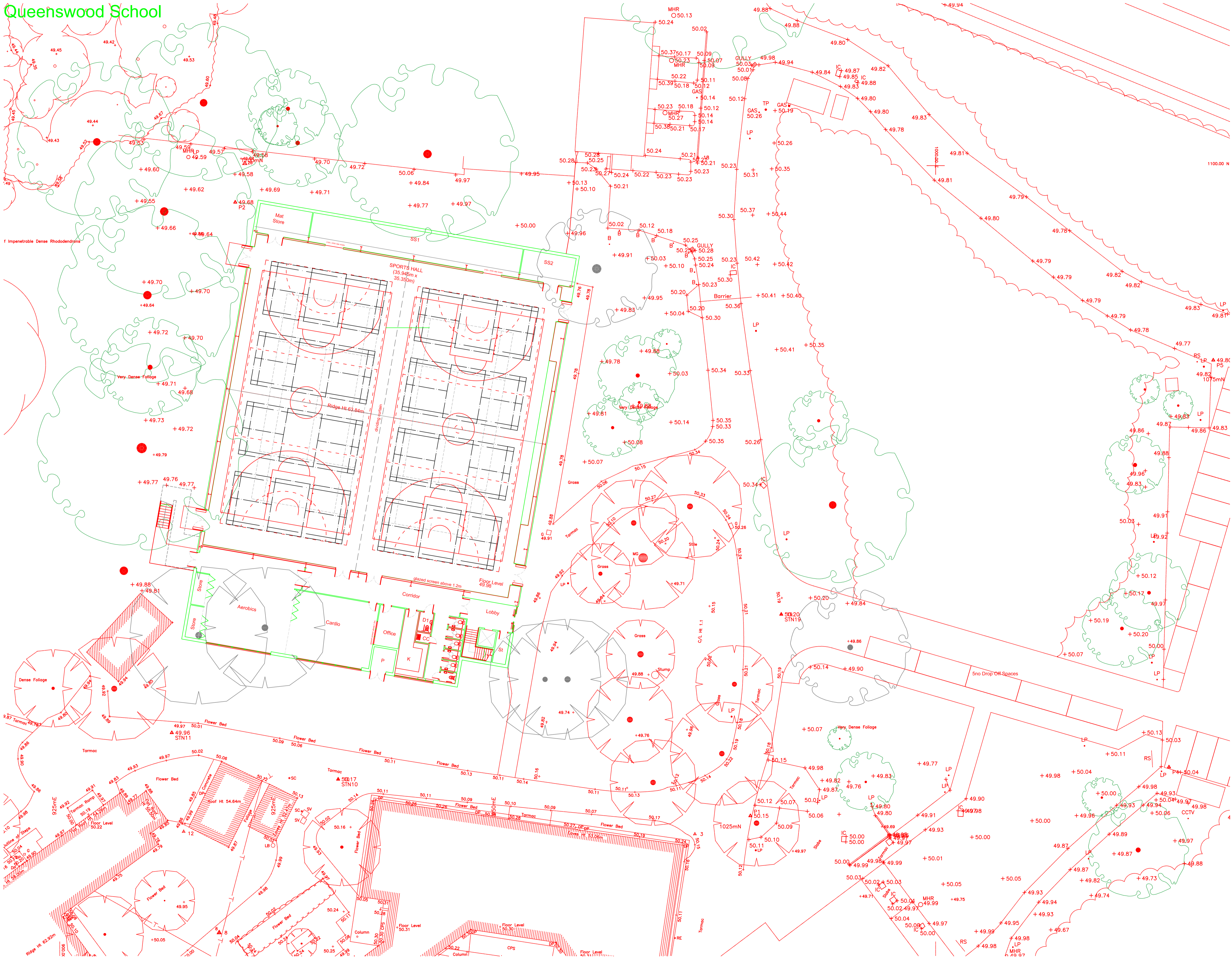
- 4.1. The extension and refurbishment of the existing sports hall at the Queenswood School together with small changes in the provision of parking and access ways will be served by an existing surface water carrier drain that outfalls to the ditch on the campus northern boundary. This system will be repaired where required and the receiving ditch cleansed to allow free flow from the outfall location.
- 4.2. The existing connections from the sports hall will be abandoned and a new system with a flow control restricting flows to 20.8 l/s will be provided. The space available for a detention basin is limited and a pump would not offer a sustainable solution. These proposals address all of the LLFA's remaining connections as raised in their letter of 8<sup>th</sup> May 'Overcoming our objection' paragraphs.
- 4.3. The proposed additional paved area to link the sports hall to the existing car park will be constructed in permeable paving. This will not require any formal drainage as the ground conditions are suited to infiltration generally.

## **Appendix A**

Drawings

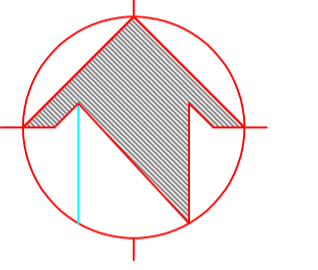


# Queenswood School



NOTES:  
 Do Not Scale. (except for planning submission)  
 Report all discrepancies, errors and omissions.  
 Verify all dimensions on site before commencing any work on site or preparing shop drawings.  
 All materials, components and workmanship are to comply with the relevant British Standards, Codes of Practice, and appropriate manufacturers recommendations that from time to time shall apply.  
 For all specialist work, see relevant drawings.  
 This drawing and design are copyright of Clague LLP  
 Registration number OC335948.

Rev	Date	Description
A	09/01/17	Notes updated



Project Title  
**Proposed New Sports Hall**  
 Queenswood School  
 Shepherds Way  
 Hatfield  
 Hertfordshire  
 AL9 6NS

Drawing Description

## Proposed Site Plan

Scale  
**1:200 @ A1**  
 Date  
**Jan 2017**

Drawn by  
**LB**  
 Checked by

## CLAGUE ARCHITECTS

62 Burgate, Canterbury  
 Kent CT1 2BH 01227 762060  
 1 Kinsbourne Court, Luton Road,  
 Harpenden, Hertfordshire AL5 3BL 01582 765102  
 4th Floor, 99 Charterhouse Street  
 London EC1M 6HR 0203 597 6112

CANTERBURY LONDON HARPENDEN

Drawing Number  
**22968A / 03**  
 Revision  
**A**

# Proposed New Sports Facility



## **Appendix B**

LLFA Response

Environment Director & Chief Executive:  
John Wood



David Elmore  
Welwyn Hatfield Borough Council  
The Campus,  
Welwyn Garden City  
Herts  
AL8 6AE

**Post Point CHN 215**  
**Hertfordshire County Council**  
**County Hall, Pegs Lane**  
**HERTFORD SG13 8DN**

Contact Julia Puton  
Tel 01992 556441  
Email [FRMConsultations@hertfordshire.gov.uk](mailto:FRMConsultations@hertfordshire.gov.uk)

Date 08 May 2017

**RE: 6/2016/2675/MAJ - Queenswood School, Shepherds Way, Brookmans Park, Hatfield, AL9 6NS**

Dear David,

Thank you for your re-consultation in relation to the above planning application for the erection of extension to existing sports hall, re cladding of existing roof and wall, following removal of existing mobile classrooms and increase parking provision from 85 to 102 approximately, at Queenswood School, Shepherds Way, Brookmans Park, Hatfield, AL9 6NS.

We understand this application seeks full planning permission for a major development, and we have assessed the Surface Water Drainage Strategy dated 13 April 2017, submitted in support to this application. However the information provided to date does not provide a suitable basis for an assessment to be made of the flood risks arising from the proposed development.

We therefore object to the grant of planning permission and recommend refusal on this basis for the following reasons.

Details of how surface water arising from a development is to be managed is required under the NPPF for all Major Planning Applications as amended within the NPPG from the 6 April 2015. Therefore for the LLFA to be able to advise the Local Planning Authority that there is no flood risk from surface water an application for full planning permission should include the following:

1. Full drainage strategy which includes a commitment to providing appropriate SuDS in line with the non-statutory national standards, industry best practice and HCC Guidance for SuDS.
2. Updated, detailed calculations for all rainfall return periods up to and including the 1 in 100 year plus climate change event including pre-development greenfield run-off

rates (for brownfield sites we require pre- and post-development run-off rates and volumes).

3. A detailed drainage plan including the location and size of all SuDS features, pipe runs and discharge points. If areas are to be designated for informal flooding these should also be shown on a detailed site plan. It should be noted that the drainage system should be designed to accommodate all surface water up to and including the 1 in 30 year rainfall return period. Please note all drawings to be the final design.
4. Updated, detailed modelled outputs of flood extents and flow paths for a range of return periods up to the 1 in 100 year plus climate change event and exceedance flow paths for surface water for events greater than the 1 in 100 year + climate change.
5. Evidence of ground conditions.
6. Details of any required maintenance of any SuDS features and structures and who will be adopting these features for the lifetime of the development.

### **Overcoming our objection**

1. We acknowledge that the applicant provided drainage strategy for the sports hall area. However, no details have been provided for the car park and the road. The access road should be managed appropriately as it is main access point. If there is no change to the access road, details of existing drainage should be provided.
2. We note that the applicant has provided Micro Drainage calculation. However, all the area inside the red boundary should be included in the calculations and modelling. We note as well that the applicant has proposed to limit the discharge. However, we would expect this limit to be set at the greenfield run-off rate. Where this is not possible a technical justification should be provided and a significant betterment should be proposed.
3. We acknowledge that the applicant has provided a surface water drainage strategy layout with a detention basin and a hydrobrake location. We require a drainage plan for all the development site. We would like to know what the size of proposed detention basin is. We require information about the exact location of the discharge point into the watercourse, what the condition of this watercourse is and if it has the capacity to take the additional flow from the proposed development. As the scheme proposes a detention basin, without information about the discharge point we are not able to establish the feasibility of the proposed drainage strategy.  
The drainage system should be designed to accommodate all surface water up to and including the 1 in 30 year rainfall return period. For the 1 in 100 year rainfall event informal flooding on the development site can occur, however it needs to be shown on a map and it cannot flood the building.
4. We note that the applicant has provided exceedance modelling. However, updated and detailed modelled outputs of flood extents and flow paths for a range of return periods up to the 1 in 100 year plus climate change event and exceedance flow paths for surface water for events greater than the 1 in 100 year + climate change should be provided for the new drainage scheme. Exceedance flow paths should also be



identified on a map for events greater than the 1 in 100 year plus climate change event.

5. We acknowledge that the applicant undertook infiltration tests. However, as a detention basin is proposed, we need to know where boreholes are located and where is the location of the highest groundwater level. We would require information about groundwater levels at the location of the basin.
6. The applicant will need to satisfy the LPA that the proposed drainage scheme can be adopted and maintained for its lifetime by providing a maintenance plan, detailing key operations and management. The maintenance of detention basin structure must be appropriate to prevent the risk of failure or reduction of its capacity.

For further advice on what we expect to be contained within the FRA to support a full planning application, please refer to our Developers Guide and Checklist on our surface water drainage webpage:

<http://www.hertfordshire.gov.uk/services/envplan/water/floods/surfacewaterdrainage/>

### **Informative to the LPA**

We recommend the LPA to obtain a maintenance plan that explains and follows the manufacturer's recommendations for maintenance or that it follows the guidelines explained by The SuDS Manual by CIRIA. A maintenance plan should also include an inspection timetable with long term action plans to be carried out to ensure efficient operation and prevent failure.

The applicant has changed drainage strategy for the proposed development. Without requested details the LLFA cannot with any certainty advise the LPA that the approach to drainage being proposed is acceptable and will effectively manage surface water to the required standards on the development site.

The applicant can overcome our objection by submitting information which covers the deficiencies highlighted above and demonstrates that the development will not increase risk elsewhere and where possible reduces flood risk overall, and gives priority to the use of sustainable drainage methods.

If this cannot be achieved we are likely to maintain our objection to the application.

We ask to be re-consulted when the amended surface drainage assessment will be submitted. We will provide you with bespoke comments within 21 days of receiving formal reconsultation. Our objection will be maintained until an adequate FRA has been submitted.

Yours sincerely,

Julia Puton  
SuDS Officer  
Hertfordshire County Council

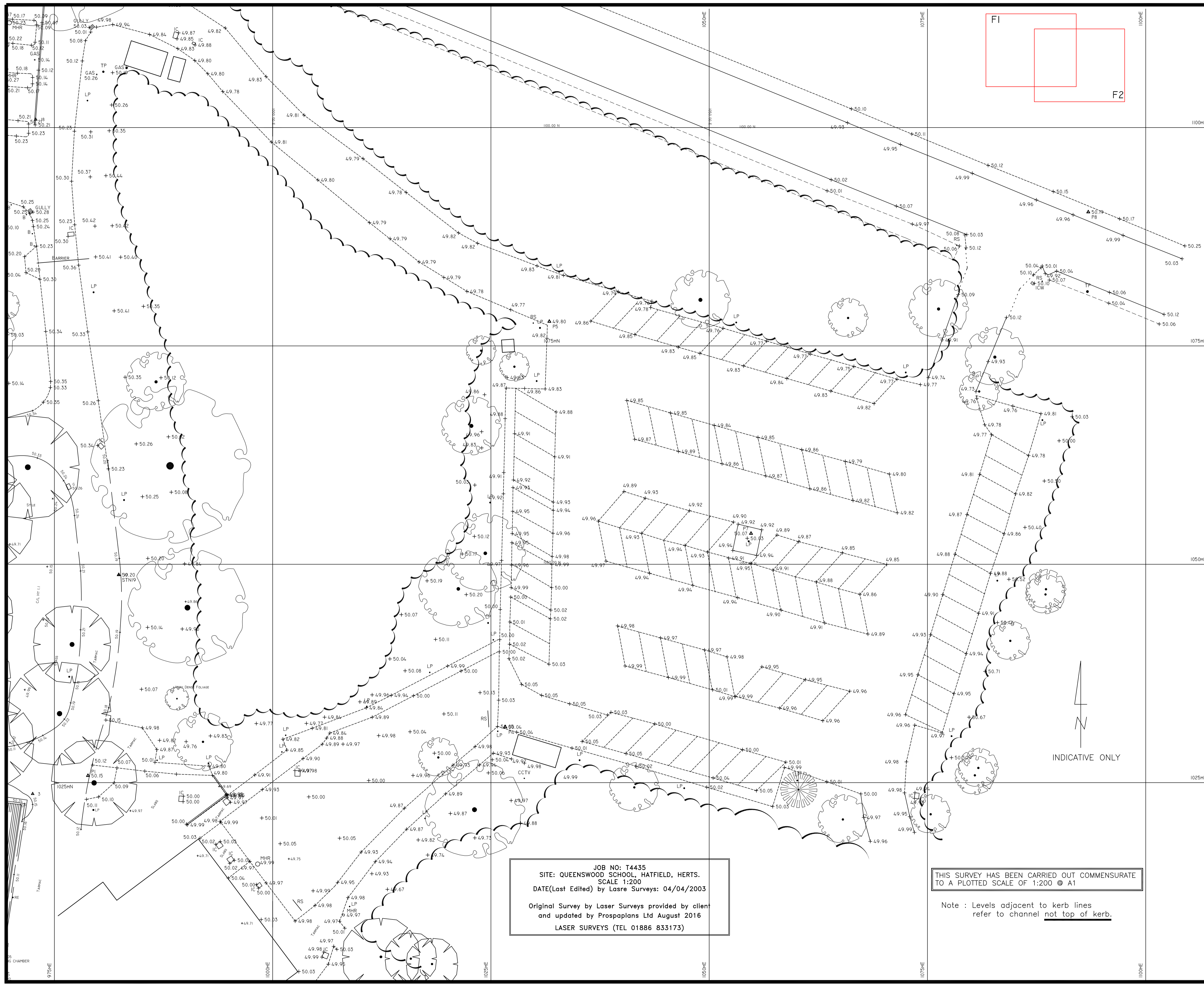
## **Appendix C**

Topographical Survey









DRG NO: PP/3145/QUEENSWOOD/F2

**LEGEND**

- A AREA
- CATV CABLE TV SERVICE COVER
- CF CELLAR FLAP
- CP COAL PLATE
- E ELECTRICITY SUPPLY
- FH FIRE HYDRANT
- IC INSPECTION CHAMBER
- KL LOWERED KERB FOR ACCESS
- LP LAMP POST
- MH MANHOLE
- NP ROAD NAME PLATE
- PL PAVEMENT LIGHT
- RS ROAD SIGN
- STN SURVEY STATION
- T BT SERVICE BOX
- TCB TELEPHONE CALL BOX
- TL TRAFFIC LIGHTS
- TP TELEGRAPH POLE
- UP STEP ARROW
- DN RAMP ARROW
- (D) DEAD OR (P) POLLARDED TREE
- DECIDUOUS TREE (INDIVIDUALLY SHOWN)
- EVERGREEN TREE (INDIVIDUALLY SHOWN)
- TREES (DECIDUOUS) - PART OF A GROUP OF TREES

**STATION CO-ORDINATES**

STATION	TYPE	EASTING	NORTHING	LEVEL

BENCH MARK INFORMATION:  
ALL LEVELS IN METRES TO ORDNANCE SURVEY

LOCAL DATUM AND COORDINATES AS SET ORIGINALLY BY LASER SURVEYS

REV	DRG. AMENDMENTS	BY	DATE

**BALL HALL (PROJECT MANAGEMENT) LTD**

780 THE CRESCENT  
COLCHESTER BUSINESS PARK  
COLCHESTER  
ESSEX CO4 9YQ

**QUEENSWOOD SCHOOL**  
SHEPHERDS WAY  
HATFIELD

TOPOGRAPHICAL SURVEY UPDATE

**PROSPAPLANS LIMITED** Operating to ISO9001:2000

LAND & ENGINEERING SURVEYORS  
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Operating to ISO9001:2000

SCALE: 1:200 @ A1

DATE: Aug 2016

DRAWN BY: R WELTON  
CHECKED BY: G RUTHERFORD

DRG NO: PP/3145/QUEENSWOOD/F2

JOB NO: T4435  
SITE: QUEENSWOOD SCHOOL, HATFIELD, HERTS.  
SCALE 1:200  
DATE(Last Edited) by Lasre Surveys: 04/04/2003

Original Survey by Laser Surveys provided by client  
and updated by Prospaplans Ltd August 2016  
LASER SURVEYS (TEL 01886 833173)

THIS SURVEY HAS BEEN CARRIED OUT COMMENSURATE TO A PLOTTED SCALE OF 1:200 @ A1

Note : Levels adjacent to kerb lines refer to channel not top of kerb.

## **Appendix D**

CCTV Survey



**Draincare Ltd**

37200367 - Queenswood School, Hatfield, AL9 6NS





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## ΣØ / Main sections

Project name : <b>37200367 - Queenswood School, Hat</b>	Project number : <b>37200367</b>	Contact : <b>Emma Doughty</b>	Date : <b>25/05/2017</b>
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Nr.	US MH	DS MH	Date	Road	Tape No.	Material	m	(m)
3	C/Pit1	S1 Br1	25/05/2017	Shepherds Way		Vitrified clay	2.69	2.69
4	C/Pit1	S1 Br1	25/05/2017	Shepherds Way		Vitrified clay	14.94	14.94
6	C/Pit2	S2 Br1	25/05/2017	Shepherds Way		Vitrified clay	31.70	31.70

**Pipe size: CIRCULAR 150/150 = 49.33 m (49.33 m)**

Nr.	US MH	DS MH	Date	Road	Tape No.	Material	m	(m)
1	S1	Ditch	22/05/2017	Shepherds Way		Concrete	14.08	14.08
2	S1	Ditch	25/05/2017	Shepherds Way		Concrete	36.11	36.11
5	S2	S1	25/05/2017	Shepherds Way		Concrete	23.81	23.81
7	S3	S2	25/05/2017	Shepherds Way		Concrete	42.39	42.39

**Pipe size: CIRCULAR 225/225 = 116.39 m (116.39 m)**

**All sections = 165.72 m (165.72 m)**