

Geo-Environmental Desk Top Study Report

**Egerton Rothesay School,
Durrants Lane
Berkhamstead**

for

**Taylor Wimpey Ltd, Hertfordshire County Council and
Egerton Rothesay School**

March 2008

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WHITE YOUNG GREEN ENVIRONMENTAL LIMITED			
REPORT: A044461/AK/ DTS/March08/V1			
Issue: -		Prepared by: -	
V1	March 08		
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H:\Data\Projects\A044001 - A045000\A044461 Egerton Rothesay School\4004\Repor\AKMARCH08_V1.doc			
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Egerton Rothesay School

Taylor Wimpey Ltd
Hertfordshire County Council
Egerton Rothesay School

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0.0 EXECUTIVE SUMMARY

Current Site Status	<p><i>Location:</i> Durrants Lane, Berkhamstead, HP4 3UJ <i>NGR:</i> 497510, 207890 <i>Area:</i> 14.2HA <i>Topography:</i> The subject site is generally flat apart from at the northern part of the site where the land falls away towards the centre of Berkhamstead. <i>Current Use:</i> The northern area of the subject the site is wooded and currently not in regular use although occasional maintenance works are carried out by Hertfordshire County Council in this area. The remaining areas on the central part of the site are used by Egerton Rothersey School, whilst the southern parts are in agricultural use. <i>Boundaries:</i> The boundary demarcation is by a chain link fence and hedges along the northern, western and eastern site boundaries and with trees and shrubs along the southern boundary. <i>Surrounding Land Use:</i> residential properties situated to the east and north, agricultural land to the south and residential properties and agricultural land to the west.</p>
Site History	<p>The earliest available OS extract (1877-1878) indicates that the subject site was undeveloped agricultural land with an old chalk pit on the northern part of the site and a pond on the central part of the site. Trees were planted on the southern and northern parts of the site between 1898 and 1925. The site remained undeveloped until circa 1960 by which time small buildings had been constructed on the central part of the site. The exact use of these buildings is unknown. Both the old chalk pit and the pond appear to have been infilled circa 1970. The current school was built on the central part of the site between 1970 and 1977.</p>
Geology	<p>The expected natural geological sequence at the site consists of Clay with Flints underlain by the Chalk. Some Made Ground is likely to be present on parts of the site, in particular in the areas of the infilled chalk pit and the pond.</p>
Hydrogeology	<p>Environment Agency classifies the White Chalk as Major Aquifer. The Clay with Flints stratum overlying the Chalk Formation is designated a Minor Aquifer.</p> <p>Some protection against downward migration of any perched groundwater may be afforded to the Chalk aquifer by the overlying low permeability drift deposits (clay with flints), which have typically low permeabilities. However, historical mapping indicates that some of the clay has been removed from northern part of the site for Chalk quarrying.</p> <p>The site lies within the total Source Protection Zone (SPZ 3) associated with groundwater abstractions in the surrounding area.</p>
Hydrology	<p>The River Bulbourne and Grand Union Canal are located approximately 420m and 460m north of the site. The site is not situated in a flood risk area.</p>
Other Issues	<p>A non-operational landfill site has been identified adjacent to the south-western corner of the site. Available information indicates that it was used for disposal of non-hazardous and inert wastes arising from the construction of the adjacent A41 road in the early 1990's.</p> <p>The site is believed to contain remnants of Grims Ditch, a prehistoric monument. As a consequence a full assessment of the site's archaeological potential may be required prior to any development works.</p>
Potential Sources of Contamination	<p>The current land uses are not considered to pose a significant contaminative risk to the site. Only limited historical sources of potential contamination have been identified on and off the site. These include:</p> <p><u>Historical On Site Land Uses</u> – historical sources of potential contamination are limited to materials used to backfill an old chalk pit and a pond. Both were present on the northern part of the site between 1887 and 1960. These are believed to have been infilled some time prior to 1970. The origin and nature of the materials used for infilling the pits are unknown. Heating within the school was historically provided via an oil-fired boiler system which was later replaced with a gas boiler system in the early 1980s. In addition, an electricity sub-station has been present on site at least since 1990's. Accidental spillages</p>

	<p>of fuel oils or PCB-containing oils during maintenance operations may have adversely impacted the ground conditions.</p> <p><u>Landgas</u> infilled areas identified above can potentially act as sources of landgas on the site. This is the case in particular if materials used for infilling contained organic wastes. Breakdown of such waste materials leads to the production of landgas including carbon dioxide and methane. Within enclosed spaces (such as buildings) landgases may cause a risk to human health.</p> <p><u>Adjacent Land Uses</u> – A non-operational landfill site is situated adjacent to the south-western corner of the site. The information provided in the Environmental Data Search and by the Environmental Health Department of Dacorum Borough Council indicate that the landfill site operated in the early 1990's and was used for disposal of inert and non-hazardous wastes arising from the construction of the A41 road.</p> <p><u>Current On Site Uses</u>: The site is currently used as a school. Heating within the building is currently provided by gas-fired boiler with no secondary fuel storage observed on site. Small quantities of chemicals, paints, fuels etc. are stored on site for use within science laboratory and general maintenance purposes.</p>
<p>Initial Ground Contamination Assessment/ Conceptual Site Model</p>	<p><u>Sources</u>: A limited number of potential sources of contamination have been identified on site, though proven sources have not been identified.</p> <p><u>Receptors</u>: The school children, future residential occupiers and the potable groundwater abstraction in the Major Aquifer are considered as sensitive receptors. Other receptors such as underground services and temporary ground workers would also be present.</p> <p><u>Pathways</u>: Considering the limited potential sources within the Made Ground there are potential pathways to the identified receptors e.g. direct dermal contact and ingestion and inhalation of soil dust by current and future users of the site and by migration of contamination to the Major Aquifer via perched groundwater.</p> <p>There are potential source-pathway-receptor linkages notably to the current and future users of the site and Major Aquifer assuming the potential sources are present.</p>
<p>Assessment Conclusions & Recommendations</p>	<p>The overall environmental risk at this site associated with ground contamination in relation to current use and possible future redevelopment, is assessed to be of a Low to Moderate order for the site as a whole, although increased to Moderate relating to the following aspects:</p> <ul style="list-style-type: none"> • Historical infilling of Chalk Pit and the likely preferential pathway established between these materials and the Major Aquifer, and • The presence of a former landfill site immediately adjacent to the south of the site. <p>The following recommendations are proposed with brief objectives:</p> <ul style="list-style-type: none"> • It is recommended that a preliminary intrusive site investigation is undertaken focusing on two localised areas associated with the Chalk Pit and former Landfill site to increase confidence in potential contamination liabilities associated with these historical features. • It is also recommended that once detailed development proposals are finalised the risk assessment is also revised to appraise potential risks future site occupants in the context of the proposed development plans.
<p><i>This sheet is intended as a summary of the assessment of the site in relation to ground contamination. It does not provide a definitive engineering analysis. Further works have been recommended.</i></p>	

1.0 INTRODUCTION

1.1 Instruction

White Young Green Environmental Limited (WYGE) were commissioned by Mr. Jeremy Woolf on behalf of the Taylor Wimpey Ltd, Hertfordshire County Council and Egerton Rothesay School to undertake a ground contamination desk-based assessment of the site Egerton Rothesay School, Durrants Lane, Berkhamstead, HP4 3UJ.

1.2 Scope of Services

The scope of the study was to undertake a desk-based ground conditions assessment with an aim to gain a greater understanding of the ground conditions and potential contamination on site.

In order to achieve the above stated aims and objectives, the following scope of works has been determined: -

- Undertake and record a site visit and walkover (where access is available) including making reference to readily available local information.
- Present a discussion of the current site status and key environmental influences around the site.
- Undertake and present a historical site and area review, primarily referring to old Ordnance Survey Maps but utilising other sources as appropriate and readily available.
- Present a discussion of the general ground and groundwater conditions within the topographical and area context, referring to any accessible local reports.
- Undertake preliminary data searches and if possible telephone consultations with key relevant agencies, including Local Authorities (Environmental Health Officer, Planning Department, and Building Control) and other bodies if deemed relevant. Present data made available within reporting timescale.
- Present a ground contamination assessment discussing the results of the research above not only concerning potential on-site conditions and contamination but also an overview of the potential for migration on or off-site with respect to the surrounding neighbouring sites.
- Present a preliminary conceptual site model and qualitative risk assessment.
- Make recommendations for a characterisation stage of physical investigation and testing, if appropriate.

1.3 Proposed Development

It is understood that the proposed development works is likely to comprise refurbishment or redevelopment of the existing school buildings and construction of up to 300 housing units and new leisure space. More detailed information on the development works is included in the Appendix G. It is noted that detailed development plans were not made available prior to compiling the enclosed assessment.

1.4 Terms and Conditions

The scope of services have been agreed on the basis of our accepted proposal letter (*ref. S02627/rbfeb08propV2- fee proposal.doc*) and provided under our terms and conditions of appointment, and is also subject to the report conditions shown in Appendix A.

2.0 SITE DETAILS

2.1 General

The site and surrounding area reconnaissance was undertaken by Anna Karki of WYGE on 27th February 2008 in the company of the school caretaker, Mr. Barry O'Donnell.

A Site Location Plan and Site Layout Plan are included in Appendix B as SK.01 and SK.02 respectively. Photographs of key site features are included in Appendix D.

2.2 Site Location

The site lies approximately 1km to the north of centre of Berkhamstead in Hertfordshire.

Table 2.2 - Site Location

SITE ADDRESS	Egerton Rothesay School Durrants Lane Berkhamstead Hertfordshire HP4 3UJ
ACCESS DETAILS	Main access is from Durrants Lane
NGR (Approx. Centre of Site)	497510, 207890
SITE AREA (ha)	Approximately 14.2ha

2.3 Site Description and Walkover

The site is 14.2ha and irregular in shape (SK.02). Based upon current land uses, the site can be divided into three areas:

- The northern corner of the site is wooded and is not in active use,
- The central part of the site is currently used by Egerton Rothesay School and associated play areas, and
- The southern part of the site is in agricultural use.

The main access to Egerton Rothesay School is gained via lockable gates from Durrants Lane. An asphalt surfaced staff car park is located to the south of the main entrance. Another pedestrian only access to the school is gained from Ridgeway.

The main school building is a blue and white two-storey building with a flat roof. Apart from classrooms and offices, the school houses a kitchen, small medical room and science laboratory. It is understood that small quantities of chemicals are stored within the science laboratory in a controlled manner.

To the south of the main school building stands a tall, brown brick building, which houses two gas-fired boilers and a water tank. Mr. O'Donnell indicated that the school was heated with oil until circa 1983-1984 before the gas-fired boiler was installed. Other smaller buildings housing classrooms are situated to the north and south of the main building. The school caretaker's house, a brick constructed bungalow, is situated adjacent to the main site entrance. It is understood that small quantities of paints, fuels etc. may be stored on site for maintenance purposes.

An electricity sub-station is situated adjacent to the main entrance. Behind the main school building (to the east) is an asphalt surfaced playground, which is surrounded by a chain-link fence and a large grass covered playing field.

The north-western corner of the site is covered primarily by woodland. Although this area can be accessed from the school's grounds, Mr. O Donnell noted that it is not part of the school and the children are not allowed in this area. He also noted that Hertfordshire County Council undertakes occasional maintenance works in the wood.

The southern part of the site is separated from the rest of the site by a chain link fence but can be accessed from the corner of the Durrants Lane and Shooters Way. This area comprises agricultural fields with a copse in the middle.

2.3.1 Topography

No topographical survey information was available for review as part of this assessment; however, general observations confirm that the site is generally flat apart from at the northern end where the land falls away towards the valley and centre of Berkhamstead.

2.4 Surrounding Land Use

Current surrounding land uses are summarised as follows: -

Table 2.3 – Surrounding Land Uses

Boundary	Description
North	Residential properties
East	Residential properties
West	Durrants Lane, residential properties and agricultural land
South	Shooters Lane and agricultural land

2.5 Environmental Database Search

Information relevant to the site surrounds has been obtained from observations made during a site walkover and an environment database search (refer Appendix E). Relevant information is summarised below, together with selected other information from third party consultations (full consultation details are outlined in 5.0).

2.5.1 Trade Directory Enquiries

The environmental database search identifies four Contemporary Trade Directories Entries within 250m of the site. These are listed below.

Table 2.4 – Contemporary Trade Directories Entries

Name/ Location	Classification	Status	Distance and direction from site boundary
PJB Plumbing and Heating	Boilers – Servicing, Replacement & Repairs	Active	23m E

B Coope	Lawnmowers and Machinery – Sales & Service	Active	54m E
M Chilton	French Polishing	Active	184m E
Haydon Print Solutions Ltd	Printers	Inactive	236m SE

2.5.2 Waste Management

The environmental database search undertaken indicated the following past and current licensed Waste Management, Waste Transfer, Waste Treatment Sites, Local Authority Recorded Landfill Sites and Historical Landfill Sites within 1km of the site boundary: -

Table 2.5 – Licensed Waste Management Facilities

Operator Name	Site Category	Licence No and Status	Approx. distance and direction from site boundary to boundary of landfill polygon or to 250m buffer zone, if not otherwise stated
Hertfordshire County Council	Household, Commercial and Industrial Transfer Station	80288– Modified 27/04/07	414m N

Table 2.6 – Registered Landfill Sites

Name/ License Holder	Site Category	Receiving Waste	License Reference/ No. & Status	Approx. distance and direction from site boundary to boundary of landfill polygon or to 250m buffer zone, if not otherwise stated
John Jones Excavation Ltd	Landfill	Clean, non-hazardous excavation spoil, other similar inert waste, sub/topsoil	92/284 Licence cancelled	0.0m W
K Keogh	Landfill	Clean, non-hazardous excavation spoil, other similar inert waste, sub/topsoil	92/277 Licence cancelled	380m S
Berkhamstead Brick Co Ltd	Landfill	Excavated natural materials, hardcore and rubble, pulp/fibre from paper making	77/023 Licence cancelled	696m NW

Table 2.7 – Registered Waste Transfer Sites

Name/ License Holder	Site Category	Receiving Waste	License Reference/ No. & Status	Approx. distance and direction from site boundary to boundary of landfill polygon or to 250m buffer zone, if not otherwise stated
Hertfordshire County Council	Civic Amenity	Civic Amenity Waste	96/337 Operational	619m N

Table 2.8 – Local Authority Recorded Landfill Sites

Authority	Location	Receiving Waste	License Reference/ No. & Status	Approx. distance and direction from site boundary to boundary of landfill polygon or to 250m buffer zone, if not otherwise stated
Hertfordshire County Council	Rosway Farm, Shooters Way	Not Supplied	529/ Status Unknown	221m W
Hertfordshire County Council	Oakwood, Berkhamstead	Not Supplied	523/ Status Unknown	546m S
Hertfordshire County Council	River Park, Berkhamstead	Not Supplied	457/ Status Unknown	688m NE
Hertfordshire County Council	Maplins Mount, Darrs Lane, Berkhamstead	Not Supplied	558/ Status Unknown	796m NW
Dacorum Borough Council	Shooters Way Berkhamstead	Not Supplied	Not Supplied	938m NW
Hertfordshire County Council	Berkhamstead Brick Works	Not Supplied	18/ Status Unknown	989m NW

Table 2.9 – Historical Landfill Sites

Licence Holder	Location Name	Receiving Waste	Provider Reference	Approx. distance and direction from site boundary to boundary of landfill polygon or to 250m buffer zone, if not otherwise stated
John Jones Excavations Ltd	Shooters Way, Berkhamstead	Deposited Waste	EAHLD09992	5m SW

Licence Holder	Location Name	Receiving Waste	Provider Reference	Approx. distance and direction from site boundary to boundary of landfill polygon or to 250m buffer zone, if not otherwise stated
		included Inert Waste		
Mr K Keogh	Berkhamstead	Deposited Waste included Inert Waste	EAHLD13058	438m S
Berkhamstead Brick Company Limited	Berkhamstead	Deposited Waste included Inert Waste & Industrial Waste	EAHLD09991	693m NW
Not Supplied	Shooters Way, Berkhamstead	Not Supplied	EAHLD12922	693m NW

2.5.3 Industrial Processes

The environmental database search indicated that there is one current **Local Authority Pollution Prevention Control (LAPPC) Authorisations** within 1km of the boundary of the site.

Table 2.8 – Local Authority Pollution Prevention Control Authorisations

Name of Authorised Company	Process Type	Description	Permit Reference and Status	Distance from Site
Cross Oak Service Station Total Convenience Store	Local Authority Air Pollution Control	PG1/14 Petrol Filling Station	Permit Ref: Not Given Status; Authorised	852m E

2.5.4 Health and Safety

The environmental database search reported that at the time of search no sites with the following classifications were within 1km of the site:

- Control of Major Accident Hazardous Sites (COMHA)
- Explosive Sites
- Notification of Installations Handling Hazardous Substances (NIHHS)
- Planning Hazardous Substance Consents
- Planning Hazardous Substance Enforcements

2.5.5 Sites of Ecological and Archaeological Importance

The environmental database search undertaken indicates that the site is situated within *Adopted Greenbelt*. However, the information provided by the client indicates that the subject site is excluded from the Greenbelt under provisions of the adopted Dacorum Borough Council's Local Plan 2004. An area of Outstanding Natural Beauty, Chilterns, has been identified approximately 500m north west of the site.

Information provided by the client indicates that the site is considered to contain remnants of a prehistoric monument, denoted as Grim's Ditch or Grime's Dike.

3.0 SITE HISTORY

3.1 Introduction

The following primary sources were used to research the history of the site and the surrounding area:-

- Available extracts of historical Ordnance Survey (OS) maps.

Copies of all historical Ordnance Survey maps reviewed are included in Appendix C.

3.2 Review of Historical Ordnance Survey Maps

1877 – 1878

The earliest OS extract shows that site comprised agricultural fields with trees growing along the field boundaries. An old chalk pit surrounded by coniferous and non-coniferous trees (annotated as Cox Dell) was situated on the north-western corner of the site. A small circular feature, believed to be a pond, was situated to the south-west of the chalk pit. A well was also present on site.

The site surrounds comprised predominantly undeveloped agricultural land. The current road network was partly established with roads running along the western and southern site boundaries. Unspecified buildings, collectively annotated as Woodcockhill, were located 10m west of the site. Grim's Dike and Brick Field with kilns and clay pits were located 180m and 580m west of the site respectively. A number of old chalk pits is shown to the south-east of the site. Two water bodies, River Bulbourne and the Grand Union Canal were present 420m and 460 north of the site respectively.

1898

A number of non-coniferous trees had been planted in the southern part of the site. The well, identified in the earlier extract, was no longer present.

A lodge had been constructed adjacent to the south-western corner of the site. Several unspecified structures, collectively annotated as Barn Croft, had been built 280m south-east of the site. No other notable changes have been identified in the surrounding area.

1924-1925

The area of trees planted in the southern part of the site is now annotated as plantation. More coniferous trees had been planted in the northern part of the site.

Several buildings, believed to be residential properties, had been constructed to the east and south-east of the site. The brick works previously present to the west of the site is no longer present and associated clay pits appear to have been infilled. Bell Cottage had been constructed approximately 250m west of the site.

1937-1938

Grims Ditch (a prehistoric monument) is shown to run along part of the eastern site boundary. No other significant changes have been identified on the site.

Further residential properties had been constructed to the east and south-east of the site. In addition, three cottages had been built adjacent to the Bell Cottage identified in the earlier extract. These are now collectively annotated as Bell Lane Cottages.

1940-1947 and 1950

No significant changes have been identified on the site or its immediate surrounds.

1960

Small unspecified buildings had been built on the western part of the site. The trees previously surrounding the old chalk pit on the north-western corner of the site had been cleared.

Several new roads had been constructed immediately to the north of the site indicating a potential future development of this area.

1970

Both the old chalk pit and the pond previously present on the site are no longer shown, suggesting that they had been infilled.

An unspecified building and a pond, annotated as St Michael's Croft had been constructed adjacent to the Woodcockhill approximately 50m west of the site.

1977-1987

The site had been developed into a school (annotated as Thomas Bourne Middle School). The main school building was situated on the north-western part of the site with tennis court and playing fields situated to the east of the building.

1993

The school is annotated as Egerton Rothesay School. Electricity sub-station is shown adjacent to the site entrance from the Durrants Lane.

No significant changes have been identified in the surrounding area.

1996, 1999 and 2007

The site continues to be occupied by Egerton Rothesay School. The school building is situated on the north-western part of the site with a tennis court and playing fields situated to the east of the building. The southern part of the site comprises agricultural land with a coppice in the middle. A small plantation of trees is also present on the north-western corner of the site.

The site is bordered by residential properties to the east and north, Shooters Way and agricultural land to the south and to the west, Durrants Lane, agricultural land and residential properties.

3.3 Summary of Historical Information

The earliest available OS extract (1877-1878) indicates that the site was undeveloped agricultural land with an old chalk pit and a pond on the northern part of the site. Trees, both coniferous and non-coniferous, were planted on the southern and northern parts of the site between 1898 and 1925. The site remained undeveloped until circa 1960 by which time small unspecified buildings had been constructed on the north-western part of the site. Both the old chalk pit and the pond appear to have been infilled circa 1970. A school was constructed on the northern part of the site some time between 1970 and 1977.

Since the late 1800's, the surrounding areas have comprised primarily agricultural land and residential properties. No significant industrial land uses have been identified in the immediate vicinity of the site.

4.0 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

4.1 Geology

Details of the geology underlying the site have been obtained from the following sources:-

- 1:50,000 British Geological Survey (BGS) Map, Sheet 238 Aylesbury;
- An environmental database search undertaken for the site;

4.1.1 Made Ground

Historical mapping indicates that an old chalk pit was previously present in the northern part of the site and a pond in the central part of the site. These appear to have been infilled some time prior to 1970. The nature of the infill material is unknown. Some Made Ground may have also been brought to the site during the construction of the school in the 1970's.

4.1.2 Superficial and Solid Geology

Reference to the British Geological Survey Map of Aylesbury (Sheet 238, Scale 1:50,000) indicates the Superficial Geology beneath the site consists of Clay with Flints, which is underlain by the solid geology of the White Chalk.

4.1.3 Radon

Radon is a naturally occurring radioactive gas which may be harmful to human health. Radon is generally released into the atmosphere in areas underlain by granite and limestone. Harmful concentrations of radon may build up if it becomes trapped in an enclosed space such as a building.

The National Radon Protection Board (NRPB) were consulted to determine potential risks associated with Radon in the area. A Radon Risk Report (refer Appendix G) indicates the property does not lie within a Radon-affected area as defined by the Health Protection Agency. Therefore, it is considered unlikely that radon protection measures would not be requested by local authority.

4.2 Hydrogeology

Details of the hydrogeology underlying the site have been obtained from the following: -

- 1:100,000, Groundwater Vulnerability Map of The West London, Sheet 39.
- An environmental database search undertaken for the site;
- The Environment Agency.

4.2.1 Groundwater Classification

The Environment Agency classifies the Chalk as a Major Aquifer (variably permeable).

The Clay with Flints stratum overlying the Chalk Formation is designated a Minor Aquifer.

Some protection against downward migration of any shallow perched groundwater may be afforded to the Chalk aquifer by the overlying lower permeability drift deposits (clay with flints). However, historical mapping indicates that at least some of the clay in the northern part of the site has been removed.

4.2.2 Groundwater Abstractions

According to the environmental database search there are three current licensed groundwater abstractions within 2km of the site boundary including one for potable water supply:

Table 4.1: Groundwater Abstractions

Operator	License Number	Abstraction Use & Rate	Details	Location	Distance & Direction (from site boundary)
British Waterways Board	28/39/28 /0319	Navigation; supply to a canal for through flow 136 3800m ³ yr	Water may be abstracted from a single point.	Northchurch Hertfordshire	806m N
Berkhamsted Laundry Ltd	28/39/28 /0084	Laundry Use 27 276m ³ yr	Water may be abstracted from a single point.	High Street Berkhamsted	819m E
Three Valleys Water Plc	28/39/28 /0335	Potable water supply – direct. 12000m ³ day	Water may be abstracted from a single point	Berkhamsted Pumping Station	1573m E

4.2.3 Discharges to Groundwater

According to environmental database search undertaken there are eleven authorised discharge consent within 1km of the site boundary.

Table 4.2: Discharge Consents

Operator	Location	Discharge Type	Discharge Env/ Receiving Water
Mr and Mrs N Wood	The Evergreens, Shooters Way, Berkhamstead	Sewage Discharges	Upper Chalk
Mr P Dowd	The Larches, Shooters Way,	Sewage Discharges	Chalk

Operator	Location	Discharge Type	Discharge Env/ Receiving Water
	Berkhamstead		
Mr A Jones	The Larches, Shooters Way, Berkhamstead	Sewage Discharges	Chalk
Mr D J Swarbrick	The Larches, Shooters Way, Berkhamstead	Sewage Discharges	Clay with Flints
Mr P Dowd	The Larches, Shooters Way, Berkhamstead	Sewage Discharges	Clay with Flints
Mrs C J Rance	The Larches, Shooters Way, Berkhamstead	Sewage Discharges	Gravel Strata
Hospice St Francis	Shooters Way, Berkhamstead	Sewage Discharges	To Ground via Sub Irrigation
Mr D J and Mrs L G Conley	Leyman House, New Road, Northchurch,	Sewage Discharges	Middle Chalk
Mr D Brightman	Hanburys, Shooters Way, Berkhamstead	Sewage Discharges	Chalk
Mr C D Ball	The Old Orchard, Shooters Way Berkhamstead	Sewage Discharges	Upper Chalk
Mr R J Smith	Hillside, New Road, Northchurch	Sewage Discharges	Middle Chalk

4.2.4 Groundwater Sensitivity

Based on information from:

- The environmental database search;
- The Environment Agency website.

The site is situated within a Groundwater Source Protection Zone 3 (Total Catchment). Source Protection Zones (SPZ) are designated by the Environment Agency to protect potable water abstraction boreholes from potential contamination (refer Table 4.1 above). The SPZ 3 (total catchment) is the total area needed to support removal of water from the borehole and to support any discharge from the borehole.

4.2.5 Groundwater Flow

The groundwater flow within the Major Aquifer is likely to be towards the River Bulbourne in the north.

4.3 Hydrology

Details of the hydrology of the area have been obtained from the following sources: -

- An environmental database search undertaken,
- Observations from a site walkover survey.
- OS plans

4.3.1 Surface Water Drainage

Approximately 90% of the site is covered by grass, agricultural fields or woodland. All these areas appeared to be free draining. The remainder of the land, not occupied by buildings, was covered mainly by asphalt and included the school forecourt and the staff car park. The school and hardstanding areas on site were provided with surface water drainage.

4.3.2 Water Courses

The River Bulbourne is situated approximately 400m north of the site. Gran Union Canal is situated approximately 460m north of the site.

The River Bulbourne has been classified under the Environment Agency's River Quality scheme as of Quality C or 'Fairly Good'. The Environment Agency have classified the River Quality Chemistry in 2004-2006 as Grade C or 'Fairly Good' and the River Biology in 2000 as Grade C or 'Fairly Good'.

The Grand Union Canal has been classified under the Environment Agency's River Quality scheme as of Quality D or 'Fair'. The Environment Agency have classified the River Quality Chemistry in 2004-2006 as Grade E or 'Poor' and the River Biology in 2004 as Grade C or 'Poor'.

Table 4.3: Surface Water Quality

Water Course	Distance and Direction from Site	Distance and Direction to Monitoring Point	Quality Assessment
Bulbourne	400m N	2.2km E	Chemistry – C (Fairly Good 2004-2006) Biology – C (Fairly Good 2003)
Grand Union Canal	460m N	2.0km E	Chemistry – E (Poor 2004-2006) Biology – E (Poor 2004)

4.3.3 Surface Water Abstractions

According to the environmental database search undertaken there are no licensed surface water abstractions within 1km of the site.

4.3.4 Discharges

According to the environmental database search undertaken there are no current authorised surface water discharge consents within 1km of the site.

4.3.5 Flooding

The site is not situated on a floodplain.

4.3.6 Pollution Incidents

According to the environmental database search undertaken, there have been 25 pollution incidents to Controlled Waters within 1km of the site. Details of these incidents can be found below.

Table 4.4: Pollution Incidents to Controlled Waters

Location	Pollutant	Incident Date	Incident Severity	Distance from Site
Brook Street	Storm Sewage	11/03/97	Category 3 – Minor Incident	281m E
Castle Street	Oils - Unknown	07/08/96	Category 3 – Minor Incident	283m E
Brook Lane	Storm Sewage	15/03/97	Category 3 – Minor Incident	286m E
Kite Fields	Storm Sewage	02/04/97	Category 3 – Minor Incident	288m SE
Brook Lane	Storm Sewage	22/03/97	Category 3 – Minor Incident	289m SE
Northbridge Works	Chemicals - Unknown	11/04/89	Category 2 – Significant Incident	494m N
Stonebridge	Storm Sewage	14/11/97	Category 3 – Minor Incident	516m N
Midcot Way	Storm Sewage	20/01/97	Category 3 – Minor Incident	612m N
Riverside Garden	Unknown Sewage	30/09/96	Category 3 – Minor Incident	626m NE
Berkhamsted	Unknown Sewage	01/06/95	Category 3 – Minor Incident	627m NE
Berkhamsted	Unknown Sewage	01/07/91	Category 3 – Minor Incident	651m NE
St Johnswell Lane	Miscellaneous - Unknown	03/05/89	Category 2 – Significant Incident	768m NE
Berkhamsted	Oils - Unknown	11/07/95	Category 3 – Minor Incident	825m E
Locks 50-51 Northchurch	Oils - Unknown	06/05/96	Category 3 – Minor Incident	832m N

Location	Pollutant	Incident Date	Incident Severity	Distance from Site
Berkhamsted	Storm Sewage	09/09/97	Category 3 – Minor Incident	843m NE
Northchurch	Unknown Sewage	31/01/95	Category 3 – Minor Incident	868m NE
Brook Lane	Oils - Unknown	Not Supplied	Category 3 – Minor Incident	882m NE
St Johns Well Berkhamstead	Oils - Unknown	22/02/96	Category 3 – Minor Incident	889m E
Kitefield Berkhamsted	Storm Sewage	16/01/97	Category 3 – Minor Incident	907m N
Mandolins Estate Berkhamsted	Storm Sewage	13/01/97	Category 3 – Minor Incident	910m N
Northchurch	Miscellaneous - Unknown	13/07/94	Category 3 – Minor Incident	914m E
Berkhamsted	Oils - Unknown	01/02/94	Category 3 – Minor Incident	914m E
Berkhamsted	Chemicals - Unknown	01/02/94	Category 3 – Minor Incident	915m E
Park Street	Chemicals - Unknown	04/02/94	Category 3 – Minor Incident	919m E
Upstram Road	Unknown Sewage	03/10/96	Category 3 – Minor Incident	968m N

5.0 CONSULTATIONS

5.1 Environmental Data Search

An environmental data search was undertaken as part of the assessment. This search provided supplementary environmental information for the site and the immediate surrounding area which has been. The results of this search have been referenced throughout the report. Records from the environmental database search are provided in Appendix F.

5.2 Planning Department Dacorum Borough Council

A search of Dacorum Borough Council's online planning portal identified 11 planning applications on the site and 15 applications in the surrounding area between 1990 and 2007. Further details of these applications can be found in Appendix F.

It is considered unlikely that the proposed developments would introduce any new potential sources of contamination to the site.

5.3 Environmental Health Department Dacorum Borough Council

The Environmental Health Department at Dacorum Borough Council was contacted with regard to information pertaining to the site. The following points were noted:

- The site and surrounding sites are not on Dacorum Borough Council's Contaminated Land Register
- Two potentially contaminative features have been identified on or immediately adjacent to the site. Historical maps indicate that there is a possible infilled pond on the eastern edge of the school grounds. Historical maps also show an 'Old Chalk Pit' that may have been infilled, which is located on the northern part of the site. The Council has no records of any ground investigations in the area of these two features or anywhere else on the site or adjacent land.
- Environment Agency records show the presence of a former landfill site approximately 250 meters to the south west of the current school building (Refer entry in Table 2.6 relating to John Jones Excavation Ltd). It is understood that the landfill was used for the disposal of inert waste arising from the construction of the adjacent A41 road in the early 1990's. The site was operated under a Waste Management License issued by the Environment Agency.
- There are no records of pollution incidents or prosecutions on or around the site.
- Fly tipping is a regular occurrence off Shooters Way.
- No records exist of any Pollution Prevention and Control Licenses on or around the site.
- Dacorum Borough Council has no records of buried tanks on site.

6.0 ENVIRONMENTAL ASSESSMENT & CONCEPTUAL SITE MODEL

6.1 Legislation and Assessment Criteria

Part IIA of the Environmental Protection Act (EPA) 1990, which came into force in England on 1 April 2000, introduced a new regulatory regime for the identification and remediation of contaminated land. The regime provides a statutory definition of contaminated land based on the risk of significant harm to human health and the environment, or pollution of controlled waters. By adopting the principles of risk assessment and risk management the intention is to ensure that contaminated land is managed effectively based on its current use and environmental setting.

Part IIA of EPA 1990 was inserted by Section 57 of the Environment Act (EA) 1995. The regime is detailed in DETR circular 01/2006 which includes a statement of government policy, a description of the new regime, the statutory guidance and a guide to the supporting regulations. The Contaminated Land (England) Regulations 2000 deal with particular aspects of the regime including Special Sites, remediation notices, appeals and registers.

Under the regime, land is only defined as contaminated if there is a significant “pollutant linkage”. This requires evidence of the presence of a contaminant **source**, a **pathway** (or pathways) through which contaminants might migrate, and a **receptor** that could be harmed by the contaminant. In addition the type of harm must meet the descriptions of significant harm given in the statutory guidance. A site where a contaminant is causing or is likely to cause pollution of surface water or groundwater (controlled waters) also constitutes contaminated land.

This section of the report provides a qualitative assessment of environmental risks and presents a preliminary conceptual site model.

6.2 Site Contamination Assessment (i.e. Sources)

The following potential contamination sources are considered at the site (in descending order of significance):-

- 1) Historical On-Site Use: historical sources of potential contamination are limited to materials used to backfill an old chalk pit and a pond. Both were present on the northern part of the site between 1887 and 1960. These are believed to have been infilled some time prior to 1970. The origin and nature of the materials used for infilling the pits are unknown. Heating within the school was historically provided via an oil-fired boiler system which was later replaced with a gas boiler system in the early 1980s. In addition, an electricity sub-station has been present on site at least since 1990's. Accidental spillages of fuel oils or PCB-containing oils during maintenance operations may have adversely impacted the ground conditions.
- 2) Landgas; infilled areas identified above can potentially act as sources of landgas on the site. This is the case in particular if materials used for infilling contained organic wastes. Breakdown of such waste materials leads to the production of landgas including carbon dioxide and methane. Within enclosed spaces (such as buildings) landgases may cause a risk to human health.

- 3) **Historical Off Site Use:** A non-operational landfill site is situated adjacent to the south-western corner of the site. The information provided in the Environmental Data Search and by the Environmental Health Department of Dacorum Borough Council indicate that the landfill site operated in the early 1990's and was used for disposal of inert and non-hazardous wastes arising from the construction of the A41 road.
- 4) **Current On Site:** The site is currently used as a school. Heating within the building is currently provided by gas-fired boiler with no secondary fuel storage observed on site. Small quantities of chemicals, paints, fuels etc. are stored on site for use within science laboratory and general maintenance purposes.

6.3 Contamination Pathways

The key environmental pathways and exposure routes by which potentially contaminative substances can reach environmental and human health receptors are currently assessed to comprise:

Direct

- Ingestion/Inhalation of site soils and/or groundwater;
- Dermal contact with soil;
- Ingestion of soil particles;
- Inhalation of gases and vapour/ ingestion of dust.

Indirect

- Vertical and lateral migration of landgas/vapour;
- Vertical and lateral contaminant migration through the Unsaturated Zone;
- Vertical and lateral contaminant migration through the Minor Aquifer and Major Aquifer;
- Overland flow;
- Migration of contamination along buried structures, service conduits or culverts;
- Plant uptake.

6.4 Contamination Receptors

The potential receptors listed below have been identified based on current site use and possible future development of the site:

- Current Site Users
- Future Site Users;
- Future construction/development workers;
- Trespassers
- The River Bulbourne;
- Groundwater and nearby abstractions (including potable supply);
- Adjacent properties and land users;
- Current and Future Buildings and Installations;
- Flora and fauna.

6.5 Qualitative Ground Contamination Risk Assessment

The following discussion of environmental risks is summarised on the Risk Assessment Summary Table below. The source – pathway – receptor linkages are developed around the information presented above and shown graphically in the Conceptual Site Model, (refer Drawing SK.03; Appendix B). Potential risks posed to each of the identified potential receptors are discussed separately and assessed qualitatively using a Low, Moderate or High risk rating.

6.5.1 Current Site Users & Trespassers

The northern part of the site is wooded and is not in active use although occasional maintenance works are carried out by Hertfordshire County Council in this area. Sources of potential contamination identified in this area of the site are limited to the materials used to backfill the former chalk pit. Given that this part of the site is only in intermittent use, the potential risks to maintenance workers and trespassers is considered to be **Low**.

The central area of the site is in use by Egerton Rothesay School. Accidental spillages of fuel oils and PCB-containing oils during maintenance operations may have affected ground conditions locally in the vicinity of the former oil-fired boiler and electricity sub-station, although no observations or records were reviewed to confirm this had occurred. A pond was historically situated near to the existing school building although in-filled during the 1970s with an unknown source. The absence of hardstanding in parts of the school ground provides a pathway for any potential subsurface ground contamination to above ground site users. Given the sensitivity of the receptors using this part of the site, the potential risks to school users from ground contamination impact is assessed as **Low to Moderate**.

The southern part of the site is currently used for agricultural purposes and is in use on an intermittent basis. No significant sources of potential contamination were identified within this plot. As such, the potential risks to users of this are of the site is assessed as **Low**.

6.5.2 Future Construction / Development Workers

Where present, construction workers have the potential to come into contact with potentially contaminated soils and groundwater during the course of their activities. There is also potential that development workers can be affected by the build up of land gases in confined spaces such as trenches and manholes.

Whilst evidence suggests that limited, localised contamination may be present at the site, an appropriate degree of health and safety precautionary measures such as the use personal protective equipment (PPE) will reduce potential exposure risks. With the use of PPE, the risk to construction workers is considered to be **Low**.

6.5.3 Surface Water Receptors

River Bulbourne and the Grand Union Canal run approximately 420m and 460m north of the site respectively. However, given that only limited sources of potential contamination have been identified on the site, it is considered unlikely that these would pose a significant contaminative risk to the surface water bodies at this distance. As such the risk to surface waters is assessed as **Low**.

6.5.4 Major Aquifer

The site is situated within a Source Protection Zone (SPZ 3), reflecting the presence of a sensitive Major Aquifer and potable groundwater abstraction borehole in proximity to the site. The Clay with Flints stratum overlying the Chalk is likely to limit leaching of any potential Made Ground contaminants into the Major Aquifer. However, it is noted that at least some of the clay was removed from the north-western corner of the site during historical chalk extraction activities. This could provide a direct pathway for potentially contaminated leachates to enter the Chalk Aquifer. On this basis, the potential risk to the Major Aquifer is assessed to be **Moderate** locally in the vicinity of the former Chalk Pit, and **Low to Moderate** elsewhere across the site.

6.5.5 Surrounding Land Uses – Risk to Adjoining Land Uses

Sensitive land uses in proximity to the site include residential properties adjacent to the northern, western and eastern site boundaries. As discussed above the site and its surrounding area are underlain by the low permeability drift deposit (clay with flints), which is likely to limit the lateral/vertical migration of any sub-surface contamination present. Given this and the limited number of potential sources of contamination identified on site, the risk to adjacent land uses is considered to be **Low**.

6.5.6 Surrounding Land Uses – Risk from Adjoining Land Uses

A non-operational landfill site is situated adjacent to the south-western corner of the site. Available information suggests that the landfill has received inert and non-hazardous wastes. It is assessed that whilst the landfill appeared to be in use to store inert materials from road construction, and was of recent construction, there remains the potential that some non-hazardous wastes landfilled immediately adjacent to the site may have affected land quality of the site. At this stage, the potential risk from the adjoining landfill site is assessed as **Moderate**.

6.5.7 Current and Future Buildings and Installations

Buildings on the site may be adversely affected by ground contamination. However, research has indicated that limited sources of potential contamination exist on site. As such, the potential risk posed to future buildings and installations from the site is considered to be **Low-Moderate**.

6.5.8 Future Site Users

There are currently firm development plans for the site but it is understood that the proposed future use of the site may include the refurbishment and/or redevelopment of the existing school buildings and construction of up to 300 residential dwellings on the southern and eastern parts of the site. It is possible that residential dwellings may be

provided with private gardens. It is also intended that areas of public open space will be provided on the southern parts of the site.

Residential receptors have the potential to be exposed to ground contamination by both direct and indirect pathways however given the limited and localised nature of potential ground contamination sources identified on site, it is assessed that potential risks to future residential receptors is assessed as **Low to Moderate**, although it is recommended that such risks are further appraised in the context of firm development proposals.

6.5.9 Flora and Fauna

Two coppices are present on site; one on the site northern part of the site and the other on the southern part of the site between the two fields. Ground contamination can have adverse impacts to the flora and fauna on the site, especially in the north-western corner of the site, which was subject to localised historical infilling activities. Given that no obvious vegetation distress was observed during the site walkover visit, the risk to flora and fauna is assessed as **Low to Moderate**.

6.6 Ground Contamination Risk Summary

A summary of the potential environmental risks associated with ground contamination at the site is outlined below:

Table 6.1 – Contamination Risk Summary

Description of Receptor or Source	Risk Rating
Current/ Future Site Users	North: Low Central Low to Moderate South: Low
Future construction/development workers (on the basis of appropriate risk assessment and control measures)	Low
The River Bulbourne and Grand Union Canal	Low
Major Aquifer	Low to Moderate Moderate (locally near Chalk Pit)
Adjacent properties - from site Adjacent properties - To site	Low Moderate
Current and Future Buildings and Installations	Low to Moderate
Flora and fauna.	Low to Moderate
Overall Ground Contamination Risk Rating	Low to Moderate

Therefore, the overall environmental risk at this site associated with ground contamination in relation to current use and possible future redevelopment, is assessed to be of a **Low to Moderate** order for the site as a whole, although increased to Moderate relating to the following aspects:

- Historical infilling of Chalk Pit and the likely preferential pathway established between these materials and the Major Aquifer, and
- The presence of a former landfill site immediately adjacent to the south of the site.

7.0 SUMMARY AND CONCLUSIONS

7.1 Summary of Findings

- The northern part of the site has operated as a school since 1970's prior to which the entire site was mainly undeveloped agricultural land. A chalk pit and pond have also been historically identified on the site. These appear to have been infilled some time prior to 1970. An electricity sub-station has been present on site at least since early 1990's.
- The surrounding areas consisted of mixture of residential properties and agricultural land. A non-operational landfill site has been identified adjacent to the north-western corner of the site. The information provided in the Environmental Data Search and by the Environmental Health Department of Dacorum Borough Council indicates that the landfill operated in the early 1990's and received inert and non-hazardous wastes.
- Current sensitive receptors on and around the site include the current site users (school children in particular) and the deep chalk aquifer and the abstractions from it for drinking water and future site occupiers (it is understood that part of the site will developed for residential housing).

7.2 Conclusions and Recommendations

On review of available information and a site inspection, the overall environmental risk at this site in relation to site ownership and future occupation is assessed to be of a **Low to Moderate** order for the site as a whole, although increased to Moderate relating to a number of aspects including:

- Historical infilling of Chalk Pit and the likely preferential pathway established between these materials and the Major Aquifer, and
- The presence of a former landfill site immediately adjacent to the south of the site.

The following recommendations are proposed with brief objectives:

- It is recommended that a preliminary intrusive site investigation is undertaken focusing on two localised areas associated with the Chalk Pit and former Landfill site to increase confidence in potential contamination liabilities associated with these historical features.
- It is also recommended that once detailed development proposals are finalised the risk assessment is also revised to appraise potential risks future site occupants in the context of the proposed development plans.

APPENDIX A
REPORT CONDITIONS

WHITE YOUNG GREEN ENVIRONMENTAL

APPENDIX A - REPORT CONDITIONS

GROUND CONTAMINATION & GEOTECHNICAL DESK TOP REVIEW

*This report is produced solely for the benefit of **Taylor Wimpey Ltd, Hertfordshire County Council and Egerton Rothesay School** and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.*

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

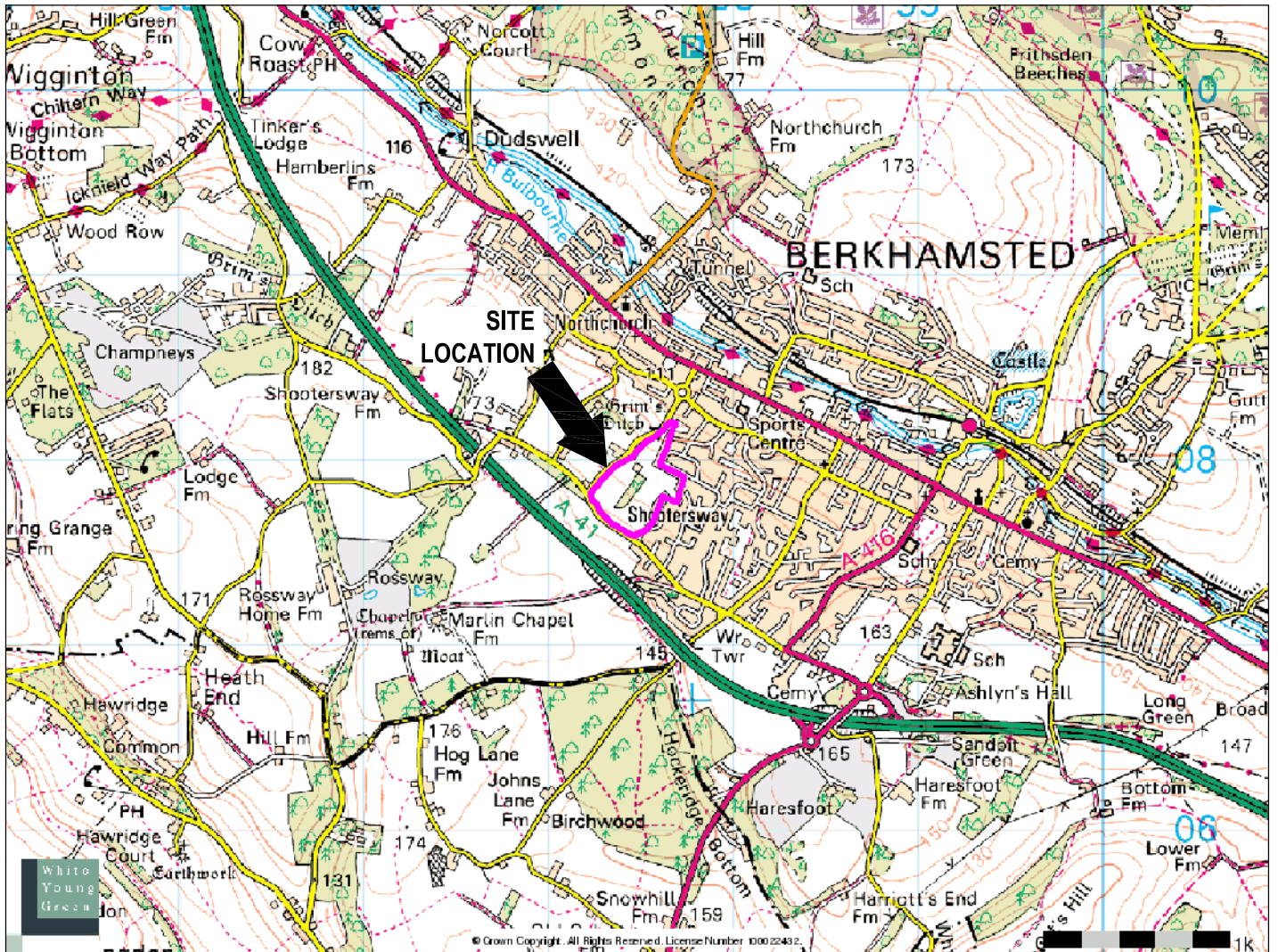
This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYGE. In time improved practices or amended legislation may necessitate a re-assessment.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.

APPENDIX B

FIGURES AND DRAWINGS



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REV	DESCRIPTION	BY	CHK	APP	DATE
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Environmental

PROJECT:
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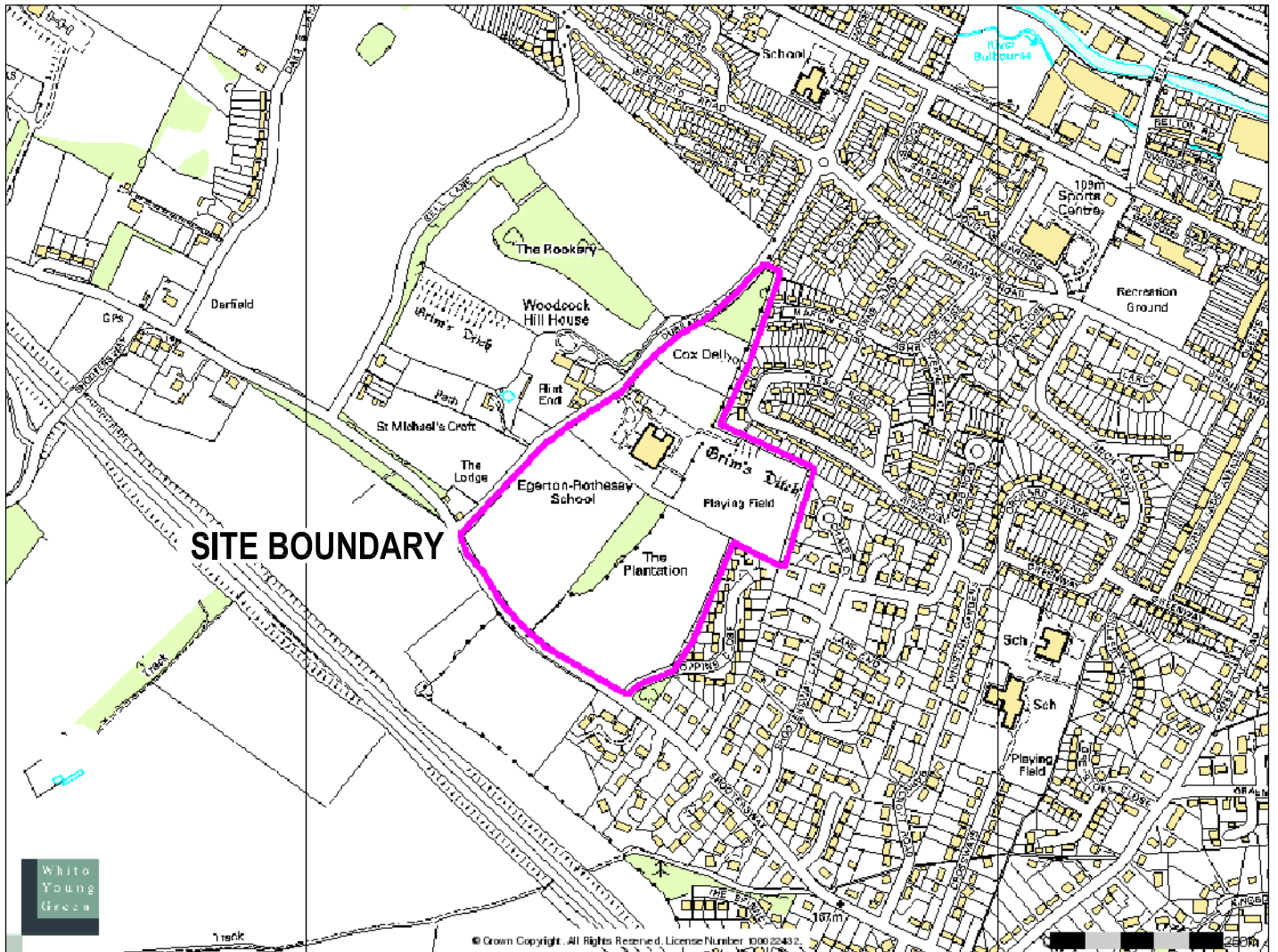
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TAYLOR WIMPEY LTD
HERTFORDSHIRE COUNTY COUNCIL
EGERTON ROTHESAY SCHOOL

DRAWING TITLE:
SITE LOCATION PLAN

SCALE @A4	DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
N.T.S.	S.T.	FEB. 2008	R.B.	FEB. 2008	C.H.	FEB. 2008
A044461	OFFICE	TYPE	DRAWING No.	REVISION		
	40	ENV	SK. 01			

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CLIENT:
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HERTFORDSHIRE COUNTY COUNCIL
EGERTON ROTHESAY SCHOOL

REV	DESCRIPTION	BY	CHK	APP	DATE
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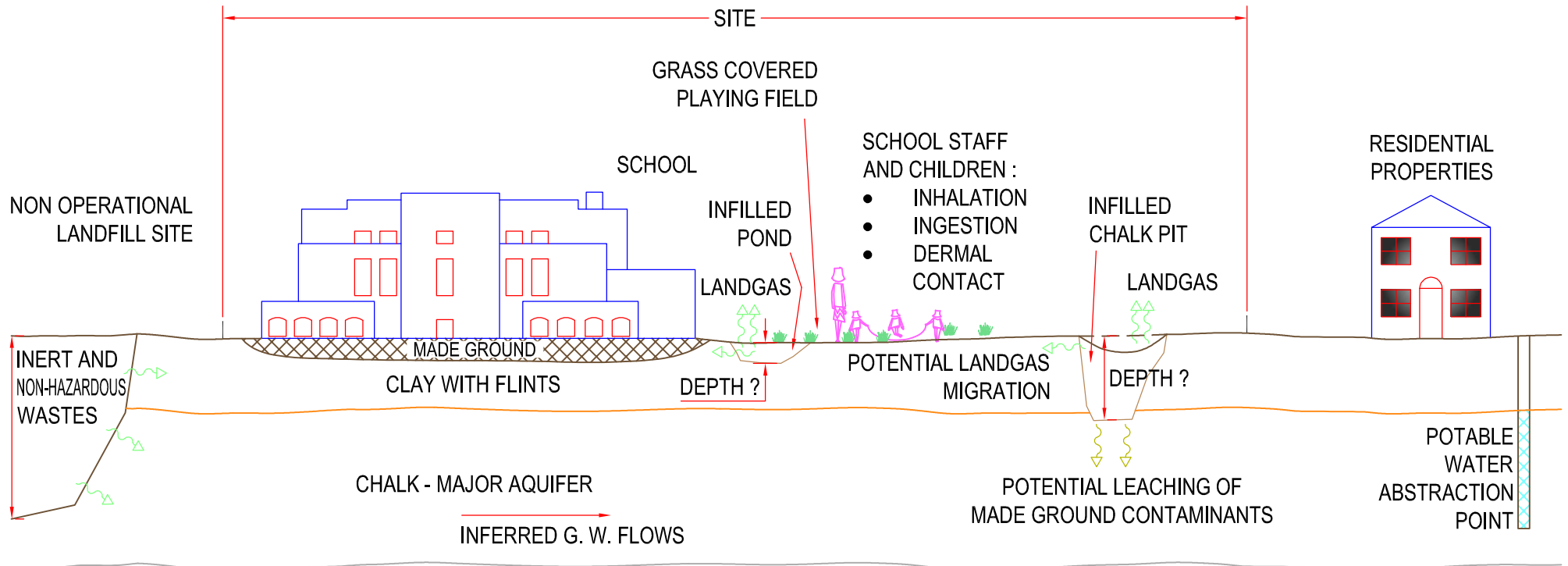
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A044461	OFFICE 40	TYPE ENV	DRAWING No. SK. 02		REVISION	

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SOUTH

NORTH



NOTE :

THICKNESS OF CLAY WITH FLINTS UNKNOWN

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EGERTON ROTHESAY SCHOOL

REV	DESCRIPTION	BY	CHK	APP	DATE
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DRAWING TITLE:
SITE CONCEPTUAL MODEL

SCALE @ A4	DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
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A044461	OFFICE	TYPE	DRAWING No.		REVISION	
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