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**SHEPHERDS SPRING SCHOOL AND
ANDOVER EDUCATION CENTRE
ANDOVER, HAMPSHIRE
SP10 5PA**

**REPORT
ON THE GROUND INVESTIGATION**

Report No. LW21195 August 2010

Report prepared for the benefit of:

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The Castle
Winchester
Hampshire
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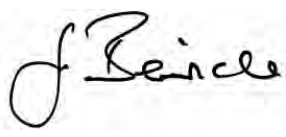
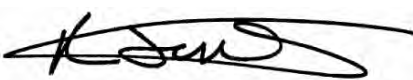

Company Registration Number
242 6786



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FACTUAL REPORT	
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1. INTRODUCTION

It is proposed to redevelop land located to the north of Shepherds Spring School and Andover Education Centre, Smannell Road, Andover, including the construction of soakaways. At the time of the investigation specific details regarding the proposed development were not available.

Ashdown Site Investigation Limited was commissioned to carry out a ground investigation of the Site by the:

Geotechnics Group
Environment Department
Hampshire County Council
The Castle
Winchester
Hampshire
SO23 8UD

The scope of the investigation, designed by Hampshire County Council, and information relating to the Geotechnical Work Package was received from the client on the 28th June 2010. Subsequently a purchase order (No. 9002223841) for the works was received, dated 16th July. The information provided by Hampshire County Council pertaining to the project is presented in Appendix C.

The purpose of the works was to:

- i. investigate ground and shallow groundwater conditions prevailing at the site;
- ii. undertake preliminary contamination testing; and
- iii. provide information to assist others in undertaking design of soakaways.

The analysis and discussions contained in this report are based on the ground conditions encountered during the site work together with the findings from a programme of laboratory analyses. The possibility of a variation in ground and groundwater conditions away from the positions investigated should not be overlooked. Groundwater conditions can vary both seasonally and due to other effects.

The investigation was undertaken and the report prepared for Hampshire County Council and their consultant partners. It is noted that the investigation was undertaken specifically for the proposed development identified in the Geotechnical Work Package and the recommendations given may not be appropriate to alternative schemes. The copyright for the report and licence for use shall remain vested in Ashdown Site Investigation Limited (the Company) who disclaim all responsibility or liability (whether at common law or under the express or implied terms of the Contract between the Company and the Client) for any loss or damage of whatever nature in the event that this report is relied on by a third party, or is issued in circumstances or for projects for which it was not originally commissioned, or where the exploratory hole records and test results contained therein are interpreted by anyone other than the Company.

2. FACTUAL REPORT

2.1 Site Details

The Site was visited by Ashdown Site Investigation Ltd on the 2nd July 2010 in order to ascertain Site conditions in advance of the ground investigation works.

The Site comprises a rectangular shaped plot of land located at Smannell Road, Andover, Hampshire, and is centred on the approximate Ordnance Survey national grid reference SU 366 470. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

2.1.1 Site History

An examination of historical Ordnance Survey maps (provided by Hampshire County Council) was undertaken to determine the history of the site and surrounding areas. It is noted that each map presents information applicable at the time of the survey (or revision date) and may be subject to surveying and cartographic errors and/or advances. Revisions to maps are made at irregular intervals and it is possible that significant developments may have taken place on or within the vicinity of the Site that have not been revealed by the maps.

Epoch 1 1843 – 1893: The Site comprised open fields, with a road running in a north-south direction immediately to the west.

Epoch 2 1891 – 1912: No significant changes.

Epoch 3 1904 – 1939: No significant changes.

Epoch 4 1919 – 1943: No significant changes.

2.1.2 Walkover Survey

The Site, formerly part of Shepherds Spring School was located just north of the main school buildings.

The Site was bounded by residential properties to the north and east, by Newbury Road to the west and by the Shepherds Spring School and Andover Education Centre and Smannell Road to the south. Access to the Site was from Smannell Road via an access road through the School grounds.

An overgrown playing field covered the majority of the site. Smaller tarmac surfaced areas, formerly used as sports courts, were located in the south western corner. The latter was currently being used for Site offices and parking.

Mature trees and hedgerows marked the eastern and parts of the southern and western field boundaries. Further trees and bushes were noted to the west and

north. The southern boundaries were marked by heras fencing and wooden hoarding.

2.2 Geology Hydrogeology and Hydrology

2.2.1 *Expected Geology*

The stratigraphic succession that may be anticipated to underlie the Site has been established by inspection of the British Geological Survey 1:50,000 series scale map Sheet 283 (Andover) and 1:5,000 scale map data supplied by Hampshire County Council. Reference has also been made to the British Geological Survey lexicon of named rock units. The expected geological sequence is presented in the following table.

Table 1. Anticipated Geological Strata

Type	Stratum	Age
Bedrock Geology	White Chalk Subgroup	Cretaceous

White Chalk Subgroup

The White Chalk Subgroup (Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation- undifferentiated) comprises a weak, white chalk locally with flint bands together with scattered nodular flints. It may be expected to have a deeply convoluted upper surface as a result of solution weathering. The presence of cavities in the chalk is very rare and solution features, if present, can be expected to be infilled with Quaternary deposits such as Head deposits. The infill material may be significantly weaker than the surrounding chalk.

2.2.2 *Hydrogeology*

Groundwater Vulnerability & Aquifer Classification

On the 1st April 2010 the Environment Agency implemented new aquifer designations that are consistent with the Water Framework Directive. These designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems.

The aquifer designation data is based on geological mapping provided by the British Geological Survey. Reference has been made to Aquifer Designation Maps available on the Environment Agency website (<http://www.environment-agency.gov.uk>).

The White Chalk Subgroup beneath the Site is classified as a Principal aquifer. Principal Aquifers comprise deposits that have high intergranular and/or fracture

permeability, usually providing a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers.

Source Protection Zones (SPZs)

The Site lies within an Environment Agency Source Protection Zone I (Inner Source Protection Zone) with regard to the protection of the quality of groundwater that is abstracted for potable supply.

2.2.3 Hydrology

The data indicates that there are no surface water features, main rivers, or Environment Agency information on river quality within 250m of the Site.

The Site lies 170m from an Environment Agency Zone 2 floodplain.

A Zone 2 designation indicates that the Site could be affected by an extreme flood event. The risk of these outlying flood zones being affected by a major flood is considered to be greater than 0.1% (1 in 1000) in any year.

2.3 Ground Investigation

2.3.1 Introduction

The ground investigation comprised the excavation of mechanically dug trial pits. The fieldwork was carried out on 7th July 2010. The exploratory hole locations are shown on the Site Plan (Figure 2).

Descriptions of the strata encountered and comments on groundwater conditions are shown in the exploratory hole records given in Appendix A. Notes to assist in the interpretation of the records are also contained in the appendix.

2.3.2 Methodology

2.3.2.1 Trial Pits

Three trial pits (designated TP1 to TP3) were dug by mechanical excavator to depths of between 3.0m and 4.0m below ground level. The pits were unsupported and were logged from the surface.

2.3.3 *Sampling*

Disturbed samples of soil were taken at the depths shown in the exploratory hole records and collected in either plastic bags or amber jars fitted with gas tight lids. On collection amber jars were stored in cool boxes with cooling blocks to maintain temperatures below 4°C and transferred to refrigerators upon return to the office until forwarded to the external accredited laboratory.

2.3.4 *In Situ Testing*

The depths of in situ testing, together with the test results, are given on the exploratory hole records or are summarised separately in Appendix A. Notes providing additional information on the tests that were performed are also included in Appendix A.

Perth Penetrometer Tests

Perth penetrometer tests were undertaken in both the coarse grained soils and the cohesive soils, confirming a high percentage of coarse grains, encountered in the trial pits. Perth Penetrometer testing was carried out in accordance with Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes; no equivalent European or British Standard having been published to date.

Undrained Shear Strength

Due to the high content of coarse grains in the cohesive soils encountered it was not possible to carry out in-situ undrained shear strength determinations with either a hand held shear vane or a hand penetrometer.

California Bearing Ratio Tests

In situ testing using a hand-held Farnell cone penetrometer was conducted at shallow depths within each trial pit.

Soakage Testing

Falling head soakage testing was carried out in each trial pit within the White Chalk Subgroup. The tests were carried out in general accordance with Building Research Establishment (BRE) Digest 365 (1991), other than the pits were filled only once rather than the 3 times suggested by the digest.

It is noted that due to the very slow discharge rate achieved within the test pits it was not possible to repeat soakage tests within the single day of site works and as such only a single fill was undertaken at each of the test positions.

2.4 Laboratory testing

Laboratory testing was scheduled by Ashdown Site Investigation Ltd and approved by Hampshire County Council. Results from the laboratory tests are provided in Appendix B.

2.4.1 Geotechnical Testing

Geotechnical testing was undertaken by Ashdown Site Investigation Ltd in accordance with the methods given in BS1377:1990 Parts 1 to 8 'Methods of test for soils for civil engineering purposes'. Notes to assist with the interpretation of the tests are contained within Appendix B.

The types and numbers of tests carried out are detailed in the following table.

Table 2. Geotechnical testing

Type of test	No. of samples tested
Moisture Content	15
Saturated Moisture Content	2
Atterberg Limits	4
Particle Size Distribution	1
BRE SD1 suite	2

2.4.2 Chemical Testing

Chemical testing of selected samples was undertaken by a laboratory with recognised (UKAS and MCERTS) accreditation for quality control.

The types and numbers of tests undertaken are detailed in the following table.

Table 3. Chemical testing

Determinand	No. of soil samples tested
Arsenic	2
Cadmium	2
Chromium	2
Lead	2
Mercury	2
Nickel	2
Copper	2
Zinc	2
Selenium	2

Determinand	No. of soil samples tested
Hexavalent Chromium	2
Water Soluble Boron	2
pH	2
Total Sulphate	2
Total Cyanide	2
Free Cyanide	2
Sulphide	2
Total Sulphur	2
Thiocyanate	2
Total Monohydric Phenols	2
Ammonium	2
Total Extractable Petroleum Hydrocarbons	2
Speciated PAH	2
Asbestos	2

2.5 Ground Conditions

2.5.1 Stratigraphy

2.5.1.1 Surface Covering

Each of the trial pits encountered a surface covering of topsoil 100mm thick.

2.5.1.2 Made Ground

Made ground was not recorded in the trial pits.

2.5.1.3 Head

Underlying the surfacing, the investigation progressed into undisturbed silty sandy, and in some cases clayey, flint gravels and gravelly sandy clay deposits, with varying quantities of flint gravel.

These soils were present to depths of between 1.30m and 1.50m below ground level and are judged to represent Head deposits commonly found overlying the Chalk strata.

2.5.1.4 White Chalk Subgroup

Beneath the Head deposits were structureless chalk deposits containing occasional flints.

These soils are considered to be representative of the White Chalk Subgroup soils indicated on the published geology map.

2.5.2 Stability and Groundwater Conditions

Each of the exploratory holes was recorded as being dry and stable during the course of the investigation.

3. SOAKAGE TESTS

In situ soakage testing was undertaken in each of trial pits within the White Chalk Subgroup deposits.

During the soakage tests very low rates of infiltration were recorded in each of the trial pits: a fall in the water level of only 170mm over a 4 hour period, 400mm over 3 hours and 220mm over 2 hours in trial pits TP1, TP2 and TP3, respectively.

The test results indicate that the underlying structureless chalk has a low infiltration rate, probably due to the high content of fines (silt). It is noted that infiltration into the chalk is usually by fissure flow.

In view of the limited infiltration achieved during the soakage tests it was not possible to calculate the infiltration rates using the standard methodology contained in BRE 365 'Soakaway Design'. Instead estimates of the soil infiltration rates have been made by dividing the quantity of water lost by the average surface area of the trial pit in contact with water during the test and the test duration in seconds.

The following infiltration rates were derived from the tests.

$$\text{TP1} \quad f = 1.4 \times 10^{-6} \text{ m/s}$$

$$\text{TP2} \quad f = 3.4 \times 10^{-6} \text{ m/s}$$

$$\text{TP3} \quad f = 3.3 \times 10^{-6} \text{ m/s}$$

The value 'f' is equivalent to the soil infiltration coefficient 'q' quoted in the Construction Industry Research and Information Association (CIRIA) Report 156.

Wherever soakage into open water courses or existing public storm water drainage systems is proposed, the Environment Agency and Local Authority respectively must be consulted in relation to consent for discharge of water from rooftops, areas of hardstanding and roadways.

4. CONTAMINATION TEST RESULTS

A full Phase 1 and Phase 2 contamination assessment of the Site was beyond the brief of this investigation, however limited contamination testing was undertaken on selected samples.

At the request of Hampshire County Council, two soil samples were tested for a range of commonly occurring contaminants. The levels of contaminants determined are not considered to be significantly elevated and do not exceed typical residential Soil Screen Values and Generic Assessment Criteria.

Ashdown Site Investigation Limited
August 2010

APPENDIX A

Exploratory Hole Notes

In Situ Testing Notes

Exploratory Hole Records

Summary of in situ Farnell Cone Penetrometer
(CBR) Test Results

Summary of Trial Pit Falling Head Soakage
Test Results

NOTES FOR THE INTERPRETATION OF EXPLORATORY HOLE RECORDS

1 Symbols and abbreviations

Samples

U	'Undisturbed' Sample: - also known as 'U100' or 'U4' - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
Uo	Sample not obtained.
U*	Full penetration of sample not obtained.
U**	Full penetration obtained but limited sample recovered.
Pi	Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D	Disturbed Sample.
R	Root Sample.
B	Bulk Disturbed Sample.
W	Water Sample.
J	Jar Sample (sample taken in amber glass jar fitted with gas tight lid)
T	Tub Sample
E	Environmental Suite (including a jar sample, tub sample and vial sample)

In situ Testing

S	Standard penetration test (SPT): In the borehole record the depth of the test is that at the start of the normal 450mm penetration, the number of blows to achieve the standard penetration of 300mm (the 'N' value) is shown after the test index letter, but the seating blows through the initial 150mm penetration are not reported unless the full penetration of 450mm cannot be achieved. In the latter case, the symbols below are added to the test index letter:-
S*	Seating blows only
S**	Blow count includes seating blows
S++	No penetration
So	'Split spoon' SPT sampler sank under its own weight. The test is usually completed when the number of blows reaches 50 (25 blows for seating count). The depths of both the top and bottom of the test drive are shown in the sample column on the Borehole Record. If a sample is not recovered in the sampler, a disturbed sample is over the depth of the test as boring continues.
C	Standard Penetration Test (SPT) conducted usually in coarse grained soils or weak rocks using the same procedure as for the SPT but with a 50mm diameter, 60° apex solid cone fitted in place of the sampler. Variations in test results are indicated by the same symbols as for the SPT (above).
V	Shear Vane Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
H	Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
P	Perth Penetrometer Test: See Insitu Testing Notes in Appendix C for full description. Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column. In sand the number of blows is approximately equivalent to the SPT "N" value.

2 Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1:2002) and Part 2 Principles of classification (BS EN 14688-2:2004).

Fine Grained Soils

The consistency of fine grained soils given in the report is based on visual inspection of the samples and the strength is based on results of in situ and/or laboratory undrained shear strength tests when carried out.

The consistency is determined on the following basis:

Consistency	Manual Test
Very Soft	Soil exudes between fingers when squeezed in hand
Soft	Soils can be moulded by light finger pressure
Firm	Cannot be moulded by finger but rolled to 3mm threads without breaking/crumbling
Stiff	Crumbles/breaks when rolled to 3mm thick threads but can be moulded into a lump again
Very Stiff	Cannot be moulded and crumbles under pressure, can be indented by thumbnail

Based on BS EN ISO 14688-1:2002

The terms used for the designation of the undrained shear strength are as follows:

Undrained Shear Strength	
Extremely to Very Low	<20 kPa
Low	20-40 kPa
Medium	40-75 kPa
High	75-150 kPa
Very High	150-300 kPa
Extremely high	300-600 kPa

Based on BS EN ISO 14688-2:2004

Note: The undrained shear strength of the soils is measured either by laboratory testing or in the field using hand penetrometer or shear vane.

It is recognised that any coarse grained soil that has in excess of approximately 35% fine grained soil (clay and silt) can often be expected to behave as a fine grained soil despite the dominance of coarse grained material within the soil mass. To reflect this, it is the soil type that dominates the behaviour of the soil mass that appears on the exploratory hole records.

Coarse Grained Soils

The relative densities of coarse grained soils (sand and gravel) given in the report are based on field estimations and the results of the Standard Penetration Test (SPT) and equivalent correlation from other testing. The classification in terms of "N" Values is as follows:

SPT 'N' Value	Relative Density
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
Greater than 50	Very Dense

3 **Rock Description**

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1:2003).

The description of rock mass includes the type of rock, structure, discontinuities and weathering.

The unconfined compressive strength of rock material is determined on the following basis:

Term	Field Identification	Unconfined Compressive Strength (MPa)
Extremely Weak	Indented by thumbnail	Less than 1
Very Weak	Crumbles under firm blows with point of geological hammer, peeled by pocket knife	1 to 5
Weak	Peeled by pocket knife with difficulty, shallow indentations made by firm blow with geological hammer	5 to 25
Medium Strong	Cannot be peeled or scraped with knife, can be fractured with single firm blow of geological hammer	25 to 50
Strong	Requires more than one blow of geological hammer to fracture	50 to 100
Very Strong	Requires many blows of geological hammer to fracture it	100 to 250
Extremely Strong	Can only be chipped with geological hammer	Greater than 250

The terms describing discontinuity and bedding spacing are as follows:

Bedding Thickness

Very Thick	>2000mm
Thick	2000-600mm
Medium	600-200mm
Thin	200-60mm
Very Thin	60-20mm
Thickly Laminated	20-6mm
Thinly Laminated	<6mm

Discontinuity Spacing

Very Wide	>2000mm
Wide	2000-600mm
Medium	600-200mm
Close	200-60mm
Very Close	60-20mm
Extremely Close	<20mm

Chalk

Chalk description is based on BS EN ISO 14688 and BS EN ISO 14689. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk. See additional chalk classification notes.

IN-SITU TESTING NOTES

1 Standard Penetration Testing

Standard penetration testing (SPT) is carried out within a cased cable percussion borehole. The test is performed using either a split spoon (barrel) sampler in finer grained deposits, or, in coarser grained soils or weak rocks, using a 50mm diameter, 60° apex solid cone fitted in place of the sampler.

The sampler is driven into the deposits at the base of the borehole by means of a 63.5kg hammer falling freely through 760mm.

In the borehole record the depth of the test is that at the start of the normal 450mm penetration, the number of blows to achieve the standard penetration of 300mm (the "N" value) is shown after the test index letter, but the seating blows through the initial 150mm penetration are not reported unless the full penetration of 450mm cannot be achieved.

(BS EN ISO 22476-3:2005, Geotechnical investigation and testing – Field Testing, Part 3)

2 Dynamic Probe Testing

The DPH (heavy) dynamic probing rig drives a 32mm diameter rod with a 15cm² area, 90° end cone into the ground by means of a 50kg hammer which falls freely through a distance of 0.5m. The number of blows per 100mm penetration (N_{100}) is recorded.

The DPSH (super heavy) dynamic probing rig drives a 35mm diameter rod with a 20cm² area, 90° end cone into the ground by means of a 63.5kg hammer that falls freely through a distance of 0.75m. The number of blows per 100mm penetration (N_{100}) is recorded. The results can provide a useful indication of the relative strength of the material. The dynamic probing is carried out in accordance with BS EN ISO 22476-2:2005.

A tentative correlation with the Standard Penetration Test (SPT) N value can be made summing three consecutive the N_{100} blow counts.

3 Perth Penetrometer Test

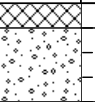
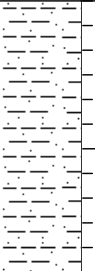
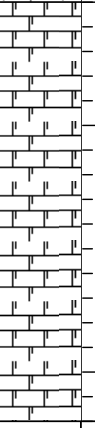
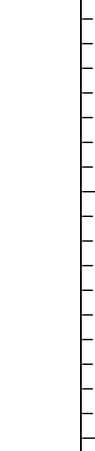
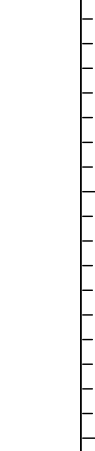
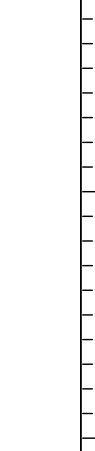
In this test a hardened stainless steel rod is driven into the deposit by a 9.5kg sliding hammer falling freely through 600mm. After an initial penetration of 150mm the number of blows required to drive the rod a further 300mm is recorded. In sand the Perth blow count gives a close correlation to the "N-value" that could be expected from a standard penetration test (SPT) made in similar materials. The results are less reliable in coarser grained materials but can give an indication of their engineering properties. The perth penetrometer test is carried out in accordance with the Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes, there is no European equivalent code.

4 Undrained Shear Strength

Undrained shear strength determinations are made in situ within the fine grained soils using a Geonor hand shear vane or (usually in the case of window sampler boreholes) a hand penetrometer. The test records the undrained shear strength (cohesion) in kN/m². The shear vane records a maximum shear strength of 130kN/m² and the hand penetrometer records a maximum shear strength of 250kN/m². (BS EN 1997-2:2007 Annex I)

3 California Bearing Ratio Test

In this test a hand held Farnell cone penetrometer apparatus is pushed into the deposits for the estimation of the California bearing ratio of the subgrade (for use in pavement design). The test equipment is design for the estimation of the bearing ratio of fine grained soils (clay and silt) only and is unsuitable for use in coarse grained soils and rock.





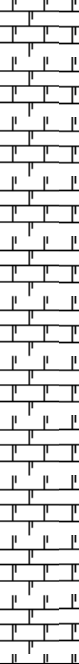
Samples and Testing			Strata			
Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.10	Topsoil.
J B P	0.05 0.15 0.15	0.60	60		0.40	Light orange grey sandy silty fine to coarse GRAVEL of flint. (Head)
J D	0.50					Orange brown slightly gravelly slightly silty sandy CLAY with iron staining. Gravel is fine to coarse flint. Sand is fine. (Head)
J D	1.00				1.50	Structureless CHALK composed of clayey gravelly silt. Gravel is weak low to medium density off white. Matrix is light brown. With occasional cobbles of flint. (White Chalk Subgroup, Grade Dm)
D	1.60					becoming composed of silty gravel (Grade Dc) with depth.
D	2.20					
D	3.10				3.20	
						End of Pit

Remarks:
 Trial pit dry and stable on completion.

Excavation Method: JCB

Dimensions: 2.9m x 0.6m

Made By: SS

Samples and Testing			Strata			
Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.10	Topsoil.
J D B P	0.20 0.20	0.65	74		0.50	Brown slightly gravelly silty CLAY. Gravel is fine to coarse flint and occasional chalk. (Head) becoming gravelly with cobbles of flint below 0.2m depth.
J D	0.50					Orange brown gravelly CLAY. Gravel is fine to coarse of chalk and flint. With occasional cobbles of chalk. (Head)
D	1.00				1.30	stratum continuing to 2.3m depth at eastern end of pit.
D	1.50					Structureless CHALK composed of gravelly silt. Gravel is weak low to medium density off white. Matrix is off white/ cream. With occasional cobbles of flint. (White Chalk Subgroup, Grade Dm)
						becoming composed of silty gravel (Grade Dc) with depth.
						with occasional clasts of moderately weak high density chalk below 2.6m depth.
D	3.00					
D	3.20					with some orange yellow staining below 3.2m depth.
D	4.00				4.00	
						End of Pit

Remarks:
 Trial pit dry and stable on completion.

Excavation Method: JCB

Dimensions: 3.0m x 0.65m

Made By: SS



GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF


Trial Pit No.: TP3

Site Name: Shepherd Spring School and Andover Education Centre

Job No.: LW21195

Start Date: 07/07/2010

End Date: 07/07/2010

Samples and Testing			Strata			
Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
J P B J D	0.05 0.15 0.20 0.30	0.60	47		0.10	Topsoil. Orange brown sandy very gravelly CLAY. Sand is fine. Gravel is fine to coarse flint. (Head)
D	1.00				1.40	
D	1.50					Structureless CHALK composed of gravelly silt. Gravel is weak low to medium density off white with orange staining. Matrix is light brown grey. With occasional cobbles of flint. (White Chalk Subgroup, Grade Dm) becoming composed of silty gravel (Grade Dc) with depth.
D	2.60					
D	2.90				3.00	
						End of Pit

Remarks:
Trial pit dry and stable on completion.

Excavation Method: JCB

Dimensions: 2.5m x 0.6m

Made By: SS

ASHDOWN SITE INVESTIGATION LIMITED

Site: Shepherds Spring School and Andover Education Centre

Report No.: LW21195

Sheet No.: 1 of 1

SUMMARY OF IN SITU FARNELL CONE PENETROMETER (CBR) TEST RESULTS

BH/ TP No.	Depth m	Moisture Content %	Classification	CBR Values			Cone Depth
				Test 1 %	Test 2 %	Test 3 %	
TP1	0.15			>10	>10	>10	Base of pit.
TP2	0.20			>10	>10	>10	Base of pit.
TP3	0.20			>10	>10	>10	Base of pit.

ASHDOWN SITE INVESTIGATION LIMITED

Site: Shepherds Spring School and Andover Education Centre	Report No.: LW21195
	Sheet No.: 1 of 1

SUMMARY OF TRIAL PIT FALLING HEAD SOAKAGE TEST RESULTS

Trial Pit TP1	
Time (mins)	Depth to water (m)
0	1.65
0.5	1.65
1	1.66
1.5	1.66
2	1.66
2.5	1.66
3	1.66
4	1.67
5	1.67
6	1.67
8	1.68
10	1.68
12	1.68
14	1.69
16	1.69
21	1.70
25	1.71
30	1.71
40	1.72
73	1.76
90	1.76
150	1.77
180	1.79
210	1.80
240	1.82

Pit Length - 2.90m
Pit Width - 0.60m
Pit Depth - 3.20m

Trial Pit TP2	
Time (mins)	Depth to water (m)
0	2.00
1	2.01
2	2.01
3	2.02
4	2.03
5	2.04
6	2.05
7	2.05
8	2.06
9	2.06
10	2.08
15	2.09
20	2.11
25	2.13
30	2.14
40	2.17
50	2.18
60	2.20
90	2.26
120	2.27
150	2.35
180	2.40

Pit Length - 3.00m
Pit Width - 0.65m
Pit Depth - 4.00m

Trial Pit TP3	
Time (mins)	Depth to water (m)
0	1.70
1	1.70
2	1.70
3	1.70
4	1.71
6	1.71
7	1.71
9	1.72
10	1.73
15	1.76
20	1.76
25	1.78
30	1.79
40	1.82
50	1.84
73	1.89
90	1.92
120	1.92

Pit Length - 2.50m
Pit Width - 0.60m
Pit Depth - 3.00m

APPENDIX B

Geotechnical Laboratory Testing Notes

Geotechnical Test Results

Contamination Test Results

GEOTECHNICAL LABORATORY TESTING NOTES

1 Index Tests

Index (Atterberg Limit) tests are undertaken on samples of fine grained soils provide the primary information for the classification of fine grained soils.

Fine grained soil is tested to determine its liquid and plastic limits, which are moisture contents that define boundaries between material consistency states. These tests are used to evaluate indices used for soil identification and to help determine the shrinkage and swelling characteristics of the soil under conditions of changing moisture content. The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

The consistency index is derived from the Index Tests and is summarized in the following table. These divisions may be approximate, particularly for low plasticity soils.

Consistency	Consistency Index
Very Soft	<0.25
Soft	0.25 to 0.50
Firm	0.50 to 0.75
Stiff	0.75 to 1.00
Very Stiff	>1.00

Based on BN EN ISO 14688-2:2004

2 Particle Size Distribution Tests

Sieve analyses are carried out soil samples to establish their particle size distribution that can assist in the assessment of the permeability and classification of granular soils.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

3 Natural Moisture/ Saturated Moisture Content Determination of Chalk

The results of natural moisture or saturated moisture content tests of disturbed samples of chalk are used to assist in the classification of the chalk to determine key geotechnical parameters of strength, density and crushing properties.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

4 Soil Suction Testing

Soil suction tests are undertaken for the determination of the state of desiccation in clay soils.

The testing is carried out in accordance with the Building Research Establishment Information Paper IP4/93, dated February 1993.

5 Triaxial Compression Tests

Undrained triaxial compression tests are carried out on undisturbed samples of cohesive soil in order to assist in the determination of the undrained shear strength of the soil. The results of moisture content and density determinations are also included.

The tests are carried out in accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

6 Shear Vane and Hand Penetrometer Testing

Undisturbed samples are tested in the laboratory using a Geonor Hand Shear Vane for the determination of their undrained shear strength.

The vane tests are carried out in general accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

7 One Dimensional Consolidation Tests

One-dimensional consolidation tests are performed on undisturbed soil samples to ascertain their settlement characteristics.

The tests are carried out in accordance with BS1377: Part 5: 1990 + A1:1994 Compressibility, Permeability and Durability tests.

8 Dry Density / Moisture Content Relationship (Compaction) Testing

Compaction testing for the determination of the dry density / moisture content relationship is carried out on using either a 2.5kg, 4.5kg hammer or a vibrating hammer.

The tests are carried out in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction-related tests.

9 California Bearing Ratio

The soil is usually compacted at the as dug "natural" moisture content and often at moisture contents around the natural moisture content.

The California bearing ratio is determined in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction related tests.

10 Chemical Testing

Soil samples are tested for their concentration of water soluble sulphate and pH for use in concrete mix design.

Water samples are tested for total sulphate concentration and pH value.

Where a water soluble sulphate content in soils or a total sulphate content in groundwater exceeds 3000mg/l SO₄ the magnesium sulphate content of the samples is required to be determined (BRE Special Digest 1:2005).

ASHDOWN SITE INVESTIGATION LTD

Site:	Shepherds Spring School and Andover Education Centre.	Report No:	LW21195
		Sheet No:	1 of 1

SOIL CLASSIFICATION SUMMARY

Sample No.	Depth (m)	Nat. Moist. Cont. (w %)	Equiv. Moist. Cont. (w _a %)	Atterberg Limits			Class'n	Cons. Index (I _c)	% passing 425 μm sieve	Visual Description of Sample
				W _l %	W _p %	I _p %				
TP1	0.50	13	21	49	22	27	CI	1.04	62	Stiff to very stiff brown gravelly CLAY. Gravel is fine to coarse of flint.
	1.00	20	26	50	21	29	CI/CH	0.83	77	Stiff brown slightly gravelly CLAY with occasional dark brown staining. Gravel is fine to coarse of flint.
	2.20	25								
TP2	0.50	12	19	57	21	36	CH	1.06	62	Stiff to very stiff brown gravelly CLAY. Gravel is fine to coarse of flint.
	1.00	11	26	54	21	33	CH	0.85	42	Stiff brown very gravelly CLAY. Gravel is fine to coarse of flint.
	1.50	20								
	3.20	29								
TP3	0.30	9.8								
	2.60	27								

Remarks:

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Site:	Shepherds Spring School and Andover Education Centre.	Report No.:	LW21195
		Sheet No.:	1 of 1

SATURATED MOISTURE CONTENT SUMMARY

Exploratory Hole No.	Depth (m)	Natural Moisture Content (%)	Saturated Moisture Content (%)	Bulk Density Mg/m ³	Dry Density Mg/m ³
TP1	1.60	44			
	3.10	23			
TP2	3.00	23	23	2.05	1.67
	4.00	28	28	1.96	1.53
TP3	1.50	14			
	2.90	25			

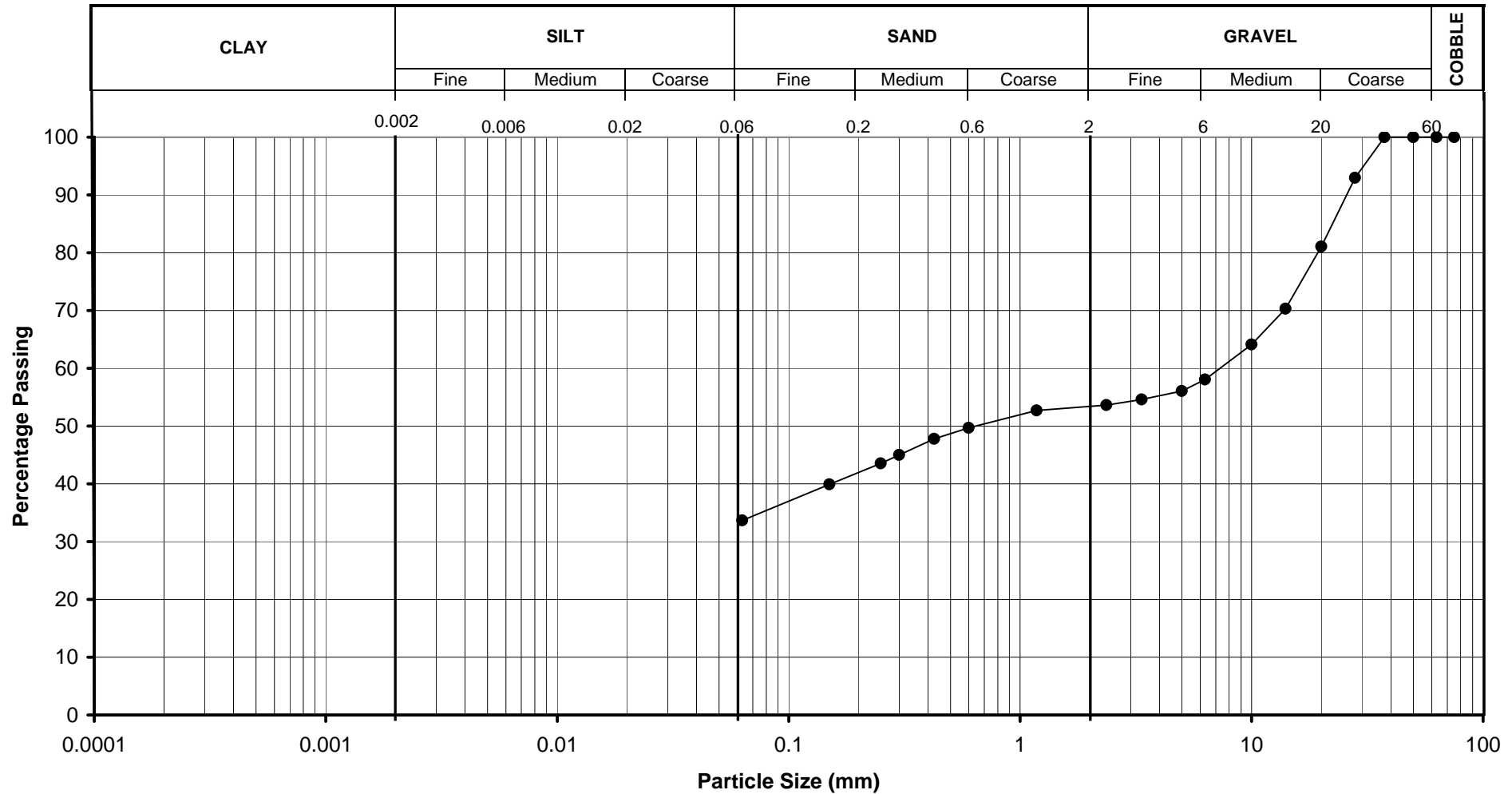
Test Method: BS1377 : Part 2 : 1990, 3.3

Date of test: 03.08.10

Remarks : All TP1 and TP3 specimens were unsuitable for SMC testing.

ASHDOWN SITE INVESTIGATION LTD

RESULTS OF PARTICLE SIZE ANALYSIS



Job Name	Shepherds Spring School and Andover Education Centre	BH/ TP No.	TP3	Sample Description	Sandy very clayey GRAVEL.
Job No.	LW21195	Sample Depth	0.30m		



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THE ENVIRONMENTAL LABORATORY LTD

F.A.O. David Harris
Ashdown Site Investigation Limited
The Old Dairy, Swanborough Farm
Swanborough, Lewes,
East Sussex, BN7 9PF

Reporting Date: 04/08/10

ANALYTICAL REPORT No. AR28300

Samples Received By:- Laboratory Courier
Samples Received:- 23/07/10
Your Job No: LW21198
Site Location: Shepherds Spring School and Andover Education Centre
No Samples Received:- 2

Report Checked By:-

Steve Knight
Director

Authorised By:-

Cliff P.V. Knight BSc, EurChem, CChem FRSC
Managing Director

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ANALYTICAL REPORT No. AR28300

Location: Shepherds Spring School and Andover Education Centre



Your Job No: LW21198

Reporting Date: 04/08/10

F.A.O. David Harris
 Ashdown Site Investigation Limited
 The Old Dairy, Swanborough Farm
 Swanborough, Lewes,
 East Sussex, BN7 9PF

Soils	Characteristic	Silt Loam	Silt Loam
		TP/BH	TP3
	Depth (m)	0.05	0.05
	Our ref	65625	65628
Arsenic**	(mg/kg)	14.4	8.6
Cadmium**	(mg/kg)	0.7	0.6
Chromium**	(mg/kg)	37	17
Lead**	(mg/kg)	64	23
Mercury**	(mg/kg)	<0.5	<0.5
Nickel**	(mg/kg)	24	15
Copper**	(mg/kg)	24	11
Zinc**	(mg/kg)	83	55
Selenium**	(mg/kg)	1.3	0.7
Hexavalent Chromium	(mg/kg)	<2	<2
Water Soluble Boron	(mg/kg)	1.8	1.3
pH Value**	(Units)	6.5	6.8
Total Sulphate	(% as SO ₄)	0.17	0.11
Total Cyanide**	(mg/kg)	<1	<1
Free Cyanide	(mg/kg)	<1	<1
Sulphide	(mg/kg)	2.5	<2
Total Sulphur	(% as S)	0.08	0.05
Thiocyanate	(mg/kg)	<2	<2
Total Monohydric Phenols**	(mg/kg)	<1	<1
Ammonium	(mg/l)	0.2	0.2
Total EPH**	(mg/kg)	12.6	5.4

All results expressed on dry weight basis

** - MCERTS accredited test

* = UKAS accredited test

GP



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ANALYTICAL REPORT No. AR28300

Location: Shepherds Spring School and Andover Education Centre



Your Job No: LW21198

Reporting Date: 04/08/10

F.A.O. David Harris
 Ashdown Site Investigation Limited
 The Old Dairy, Swanborough Farm
 Swanborough, Lewes,
 East Sussex, BN7 9PF

<u>Soils</u>	Characteristic	Silt Loam	Chalk
	TP/BH	TP1	TP2
	Depth (m)	1.00	3.20
	Our ref	65626	65627
Stone Content	(%)	<1	<1
pH Value**	(Units)	7.5	8.2
Total Sulphate	(% as SO ₄)	<0.05	<0.05
Total Sulphur	(% as S)	0.05	<0.05
Water Soluble Sulphate**	(mg/l as SO ₄)	12	<10
Water Soluble Chloride	(mg/l)	23	7
Water Soluble Nitrate	(mg/l)	1	<1
Water Soluble Magnesium	(mg/l)	1.6	1.2
Ammonium	(mg/l)	0.1	0.2

All results expressed on dry weight basis

** - MCERTS accredited test

* = UKAS accredited test

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ANALYTICAL REPORT No. AR28300

Location: Shepherds Spring School and Andover Education Centre



Your Job No: LW21198

Reporting Date: 04/08/10

F.A.O. David Harris

Ashdown Site Investigation Limited

The Old Dairy, Swanborough Farm

Swanborough, Lewes,

East Sussex, BN7 9PF

Soils	Characteristic	Silt Loam	Silt Loam
		TP/BH	TP3
	Depth (m)	0.05	0.05
	Our ref	65625	65628
Naphthalene**	(mg/kg)	<0.5	<0.5
Acenaphthylene**	(mg/kg)	<0.5	<0.5
Acenaphthene**	(mg/kg)	<0.5	<0.5
Fluorene**	(mg/kg)	<0.5	<0.5
Phenanthrene**	(mg/kg)	<0.5	<0.5
Anthracene**	(mg/kg)	<0.5	<0.5
Fluoranthene**	(mg/kg)	<0.5	<0.5
Pyrene**	(mg/kg)	<0.5	<0.5
Benz(a)anthracene**	(mg/kg)	<0.5	<0.5
Chrysene**	(mg/kg)	<0.5	<0.5
Benzo(b)fluoranthene**	(mg/kg)	<0.5	<0.5
Benzo(k)fluoranthene**	(mg/kg)	<0.5	<0.5
Benzo(a)pyrene**	(mg/kg)	<0.5	<0.5
Indeno(123-cd)pyrene**	(mg/kg)	<0.5	<0.5
Dibenz(ah)anthracene**	(mg/kg)	<0.5	<0.5
Benzo(ghi)perylene**	(mg/kg)	1.0	<0.5
Total PAH**	(mg/kg)	1.0	<0.5

All results expressed on dry weight basis

** - MCERTS accredited test

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ANALYTICAL REPORT No. AR28300

Location: Shepherds Spring School and Andover Education Centre



F.A.O. David Harris
Ashdown Site Investigation Limited
The Old Dairy, Swanborough Farm
Swanborough, Lewes,
East Sussex, BN7 9PF

Your Job No: LW21198

Reporting Date: 04/08/10

Asbestos Identification

Sample ref:	TP1
Depth (m)	0.05
Our ref:	65625
#Description of Sample Matrix:	Silt Loam
Result	No asbestos identified

Sample ref:	TP3
Depth (m)	0.05
Our ref:	65628
#Description of Sample Matrix:	Silt Loam
Result	No asbestos identified

*= UKAS accredited

Analytical result only applies to the sample as submitted by the client

Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client

op



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THE ENVIRONMENTAL LABORATORY LTD

SAMPLE RECEIPT AND TEST DATES

Our Analytical Report Number AR28300
Your Job No: LW21198
Sample Receipt Date: 23/07/10
Reporting Date: 04/08/10

Registered: 23/07/10
Prepared: 24/07/10
Analysis complete: 04/08/10

TEST METHOD SUMMARY

PARAMETER	Analysis Undertaken on	Date Tested	Method Number	Technique
Arsenic**	Air dried sample	29/07/10	118	ICPMS
Cadmium**	Air dried sample	29/07/10	118	ICPMS
Chromium**	Air dried sample	29/07/10	118	ICPMS
Lead**	Air dried sample	29/07/10	118	ICPMS
Mercury**	Air dried sample	29/07/10	118	ICPMS
Nickel**	Air dried sample	29/07/10	118	ICPMS
Copper**	Air dried sample	29/07/10	118	ICPMS
Zinc**	Air dried sample	29/07/10	118	ICPMS
Selenium**	Air dried sample	29/07/10	118	ICPMS
Hexavalent Chromium	As submitted sample	27/07/10	110	Colorimetry
Water Soluble Boron	Air dried sample	28/07/10	202	Colorimetry AA3
pH Value**	Air dried sample	28/07/10	113	Probe
Total Cyanide**	As submitted sample	02/08/10	204	Automated Flow Digital Colorimetry
Free Cyanide	As submitted sample	02/08/10	107	Colorimetry
Total Sulphate	Air dried sample	28/07/10	208	Colorimetry AA3
Total Sulphur	Air dried sample	29/07/10	216	Automated IR Adsorption
Sulphide	As submitted sample	29/07/10	109	Colorimetry
Thiocyanate	As submitted sample	27/07/10	146	Colorimetry
Speciated PAH**	As submitted sample	29/07/10	133	Gas Chromatography
Asbestos*	As submitted sample	28/07/10	179	see note
Total Monohydric Phenols**	As submitted sample	28/07/10	121	HPLC
Total Petroleum Hydrocarbons**	As submitted sample	28/07/10	117	Gas chromatography

Asbestos analysis qualitative only

Note:- Documented In-house procedure based on HSG 248 2005

* = UKAS Accredited test

** - MCERTS Accredited test

Determinands not marked with * or ** are non accredited

MCERTS accreditation covers samples which are predominantly sand, clay, loam or combinations of these three soil types

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THE ENVIRONMENTAL LABORATORY LTD

SAMPLE RECEIPT AND TEST DATES

Our Analytical Report Number AR28300
Your Job No: LW21198
Sample Receipt Date: 23/07/10
Reporting Date: 04/08/10

Registered: 23/07/10
Prepared: 24/07/10
Analysis complete: 04/08/10

TEST METHOD SUMMARY

PARAMETER	Analysis Undertaken on	Date Tested	Method Number	Technique
pH Value**	Air dried sample	28/07/10	113	BRE SD1
Total Sulphate	Air dried sample	28/07/10	208	BRE SD1
Total Sulphur	Air dried sample	29/07/10	216	BRE SD1
Water Soluble Sulphate**	Air dried sample	29/07/10	172	BRE SD1
Water Soluble Nitrate	Air dried sample	29/07/10	172	BRE SD1
Water Soluble Chloride	Air dried sample	29/07/10	172	BRE SD1
Water Soluble Magnesium	Air dried sample	29/07/10	101	BRE SD1
Ammonium	As submitted sample	04/08/10	151	BRE SD1

* = UKAS Accredited test

** - MCERTS Accredited test

Determinands not marked with * or ** are non accredited

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APPENDIX C

Hampshire County Council Geotechnical Work
Package Information:

Site Location Plan 1:10,000

Site Location Plan 1:1,250

Geology

Epoch 1 (1843 -1893)

Epoch 2 (1891 - 1912)

Epoch 3 (1904 - 1939)

Epoch 4 (1919 - 1943)

EA Main Rivers

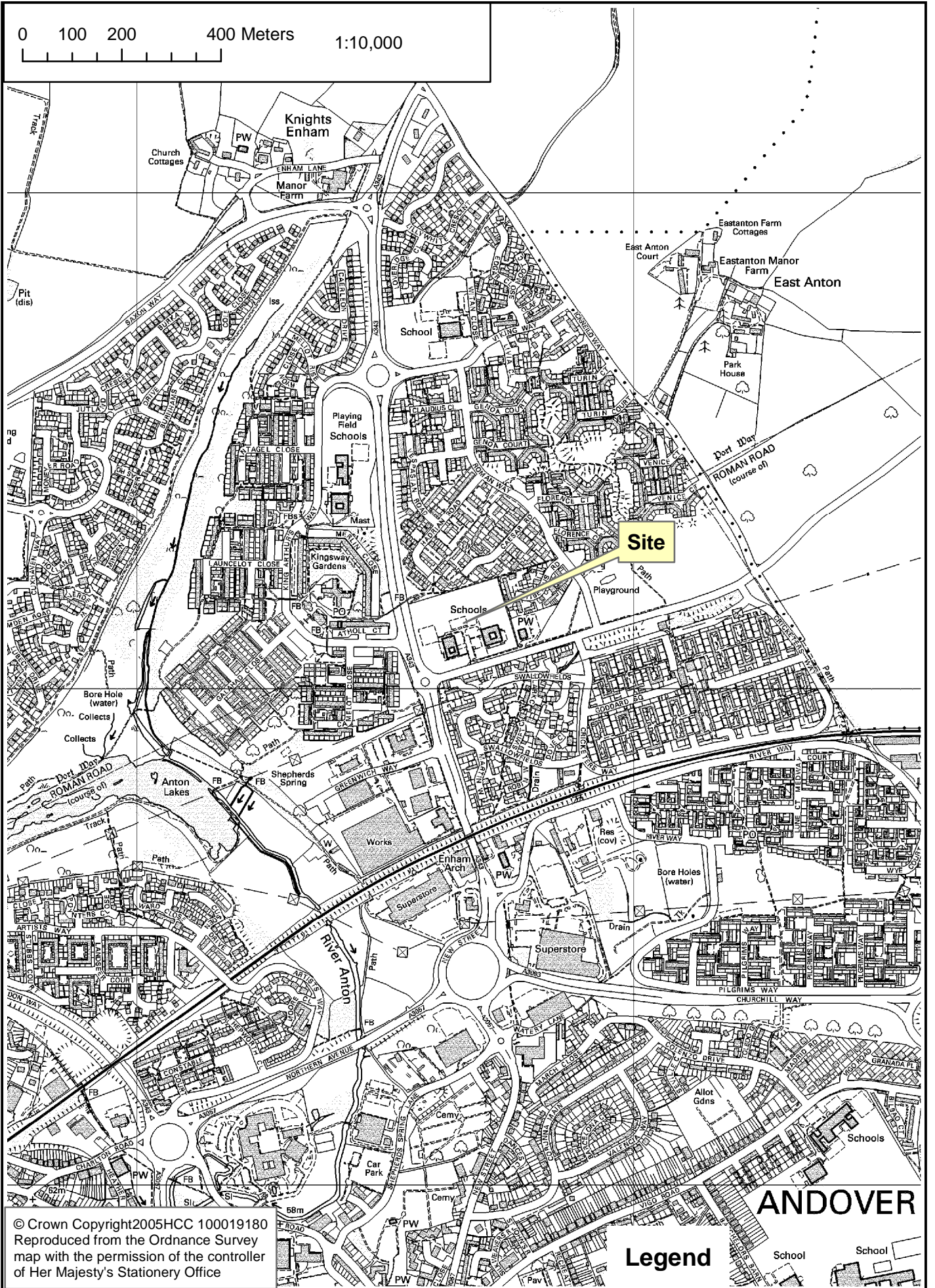
EA Main Rivers and Flood Risk Zones

Groundwater Levels

Current Landfill Site

Environmentally Sensitive Sites

0 100 200 400 Meters 1:10,000



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ANDOVER

Legend

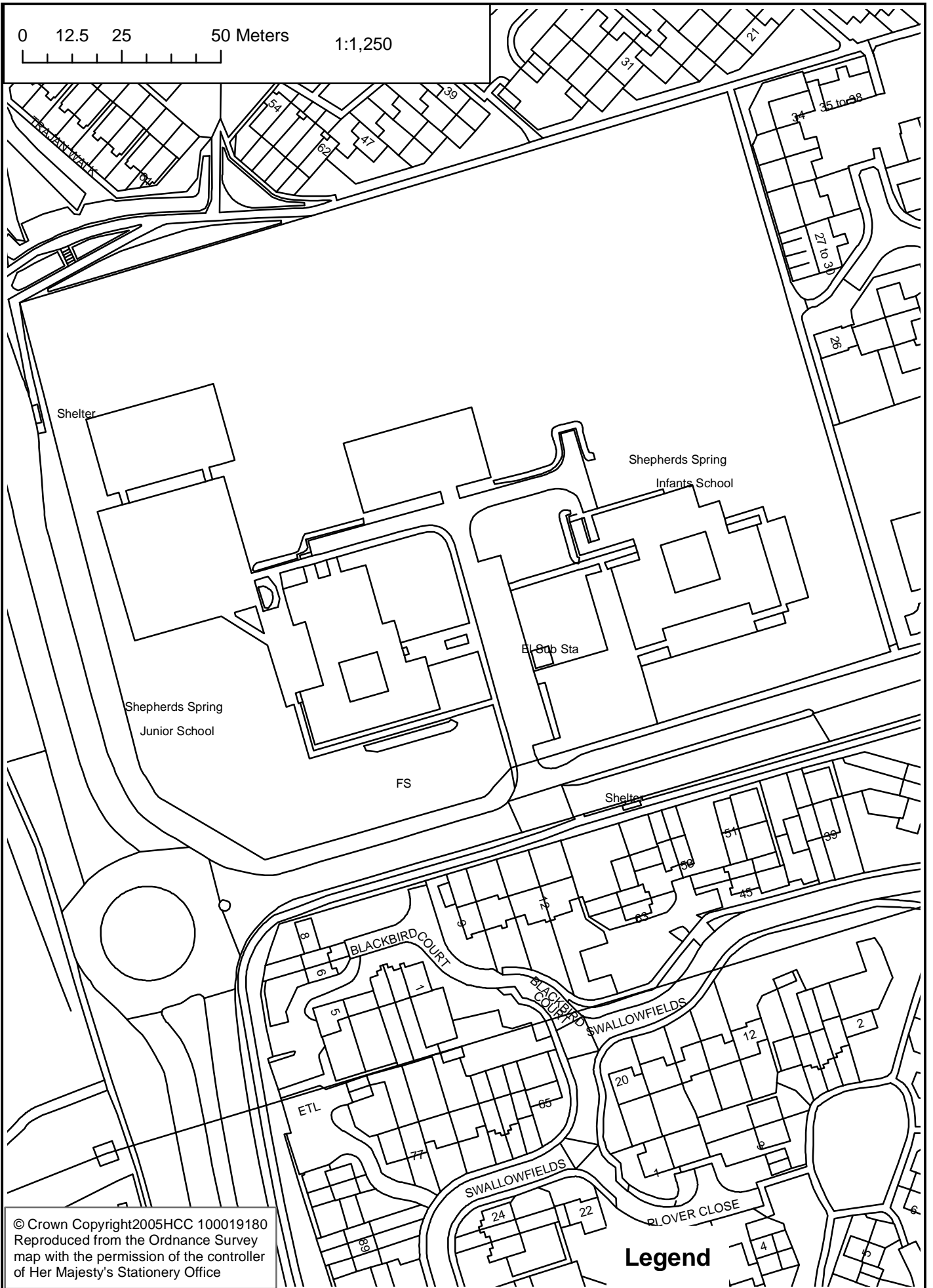


**Shepherds Spring School
 Andover**



**Hampshire
 County Council**

0 12.5 25 50 Meters 1:1,250



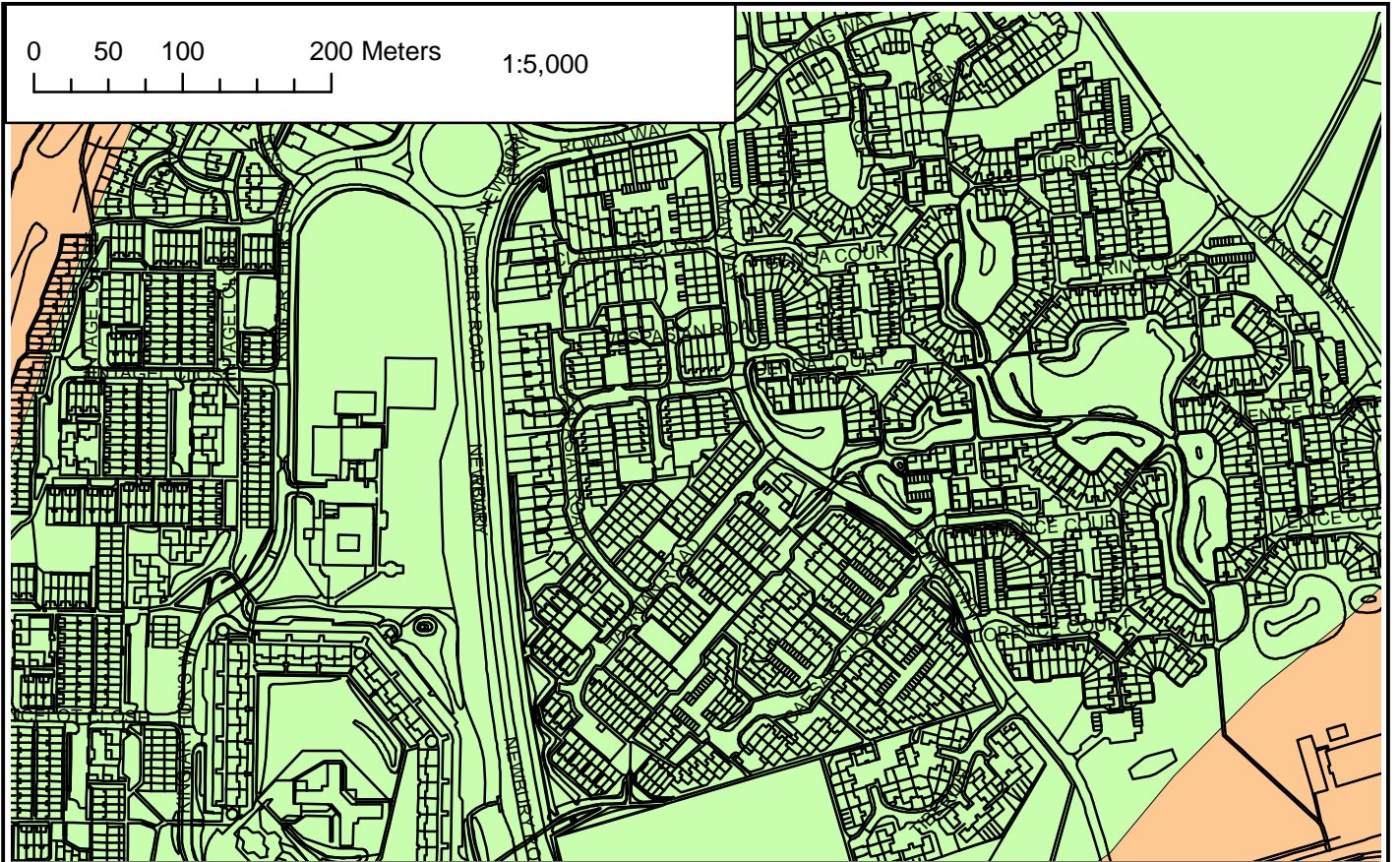
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Shepherds Spring School
Andover

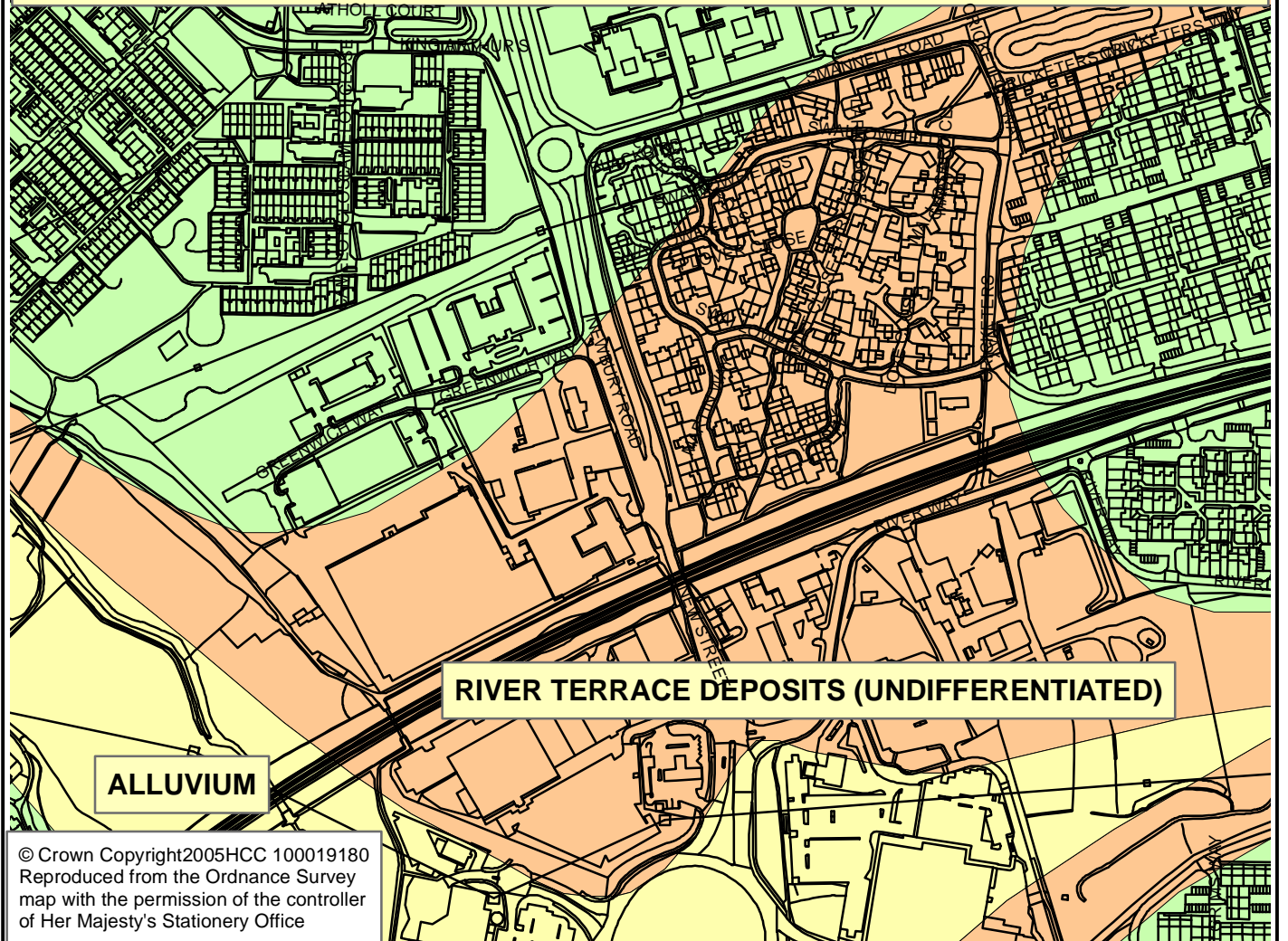


Hampshire
County Council

0 50 100 200 Meters 1:5,000



LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)



RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)

ALLUVIUM

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0 12.5 25 50 Meters 1:1,250

R O A D
to Silchester

244

End

62

19
15
41
M.S. BM 2305

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Legend

Shepherds Spring School
Epoch 1 1843-1893



Hampshire
County Council

0 12.5 25 50 Meters 1:1,250

144

13.057

62
13.057

ury... 15 } M.S ← B.M. 230.5
... 7

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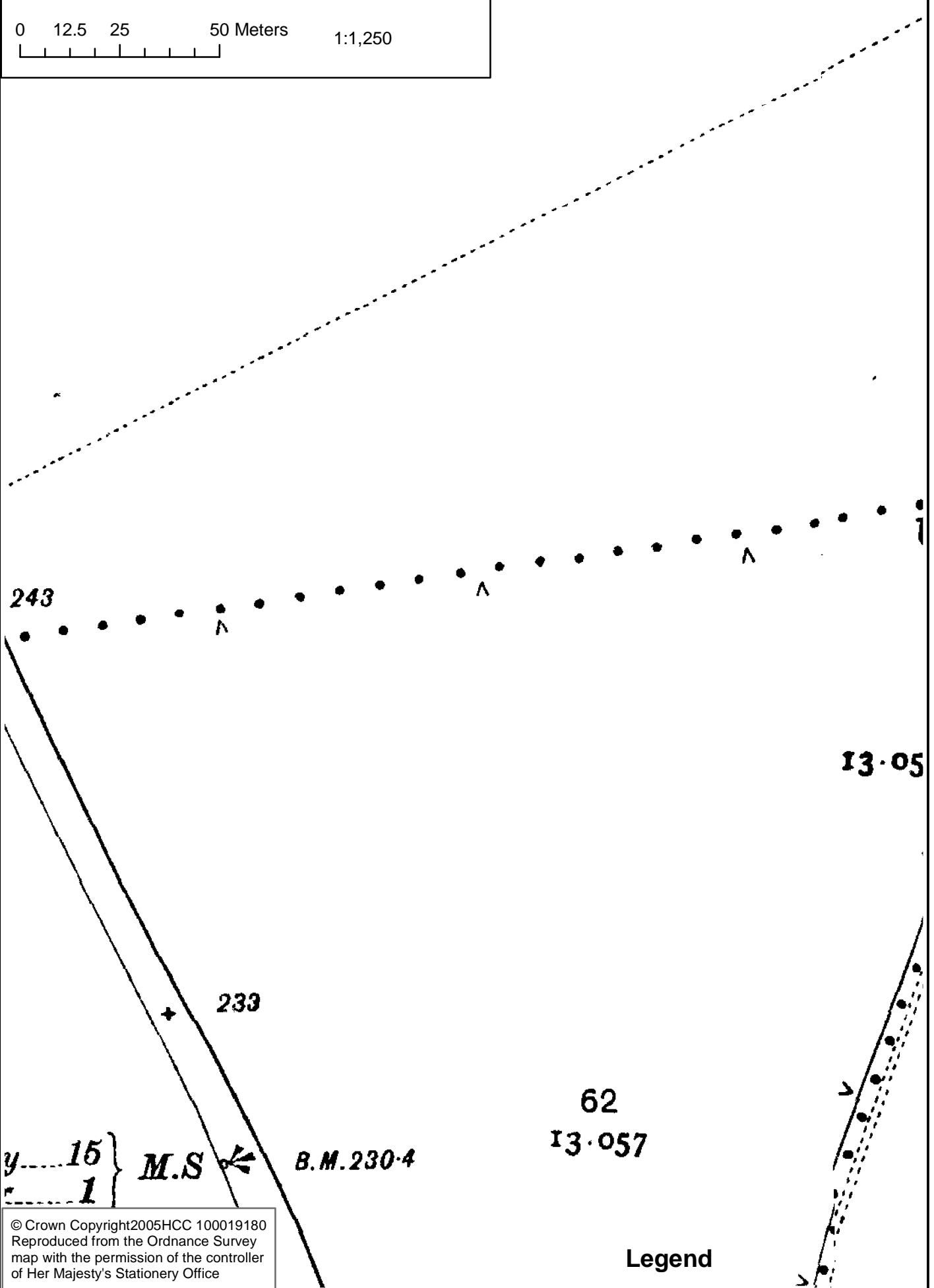
Legend

Shepherds Spring School
Epoch 2 1891-1912



Hampshire
County Council

0 12.5 25 50 Meters 1:1,250



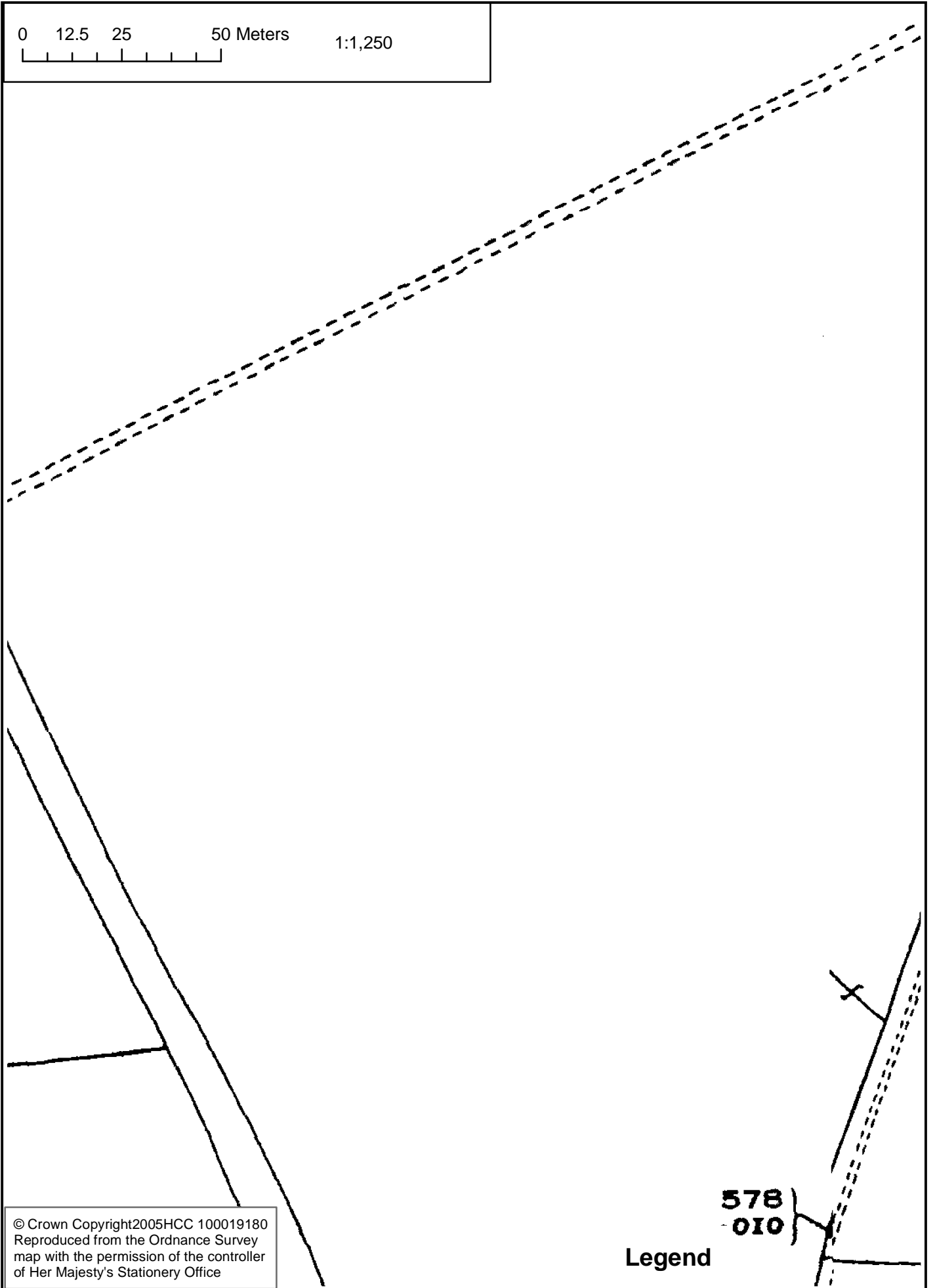
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Shepherds Spring School
Epoch 3 1904-1939



Hampshire
County Council

0 12.5 25 50 Meters 1:1,250



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Legend

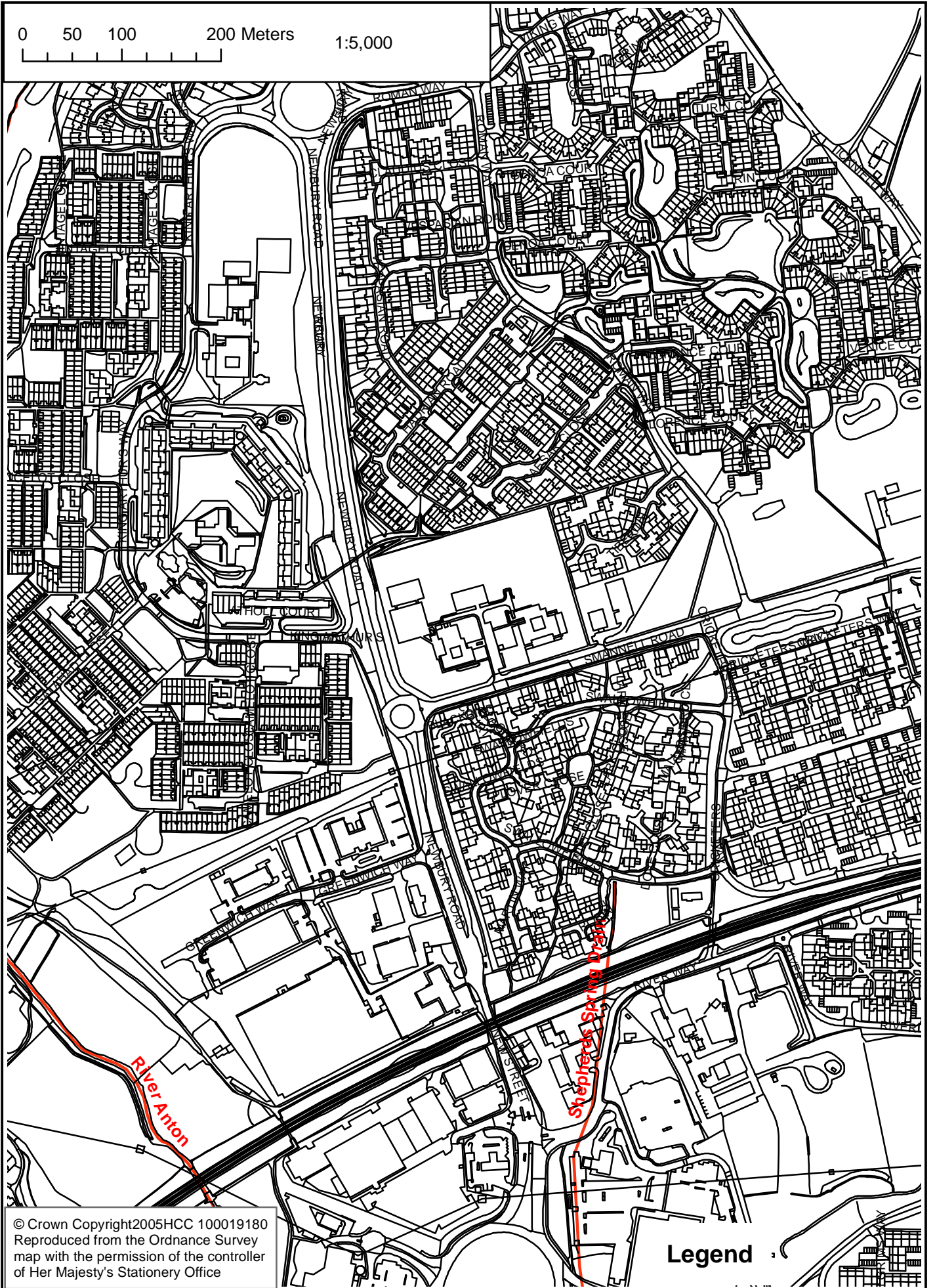
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Shepherds Spring School
Epoch 4 1919-1943



Hampshire
County Council

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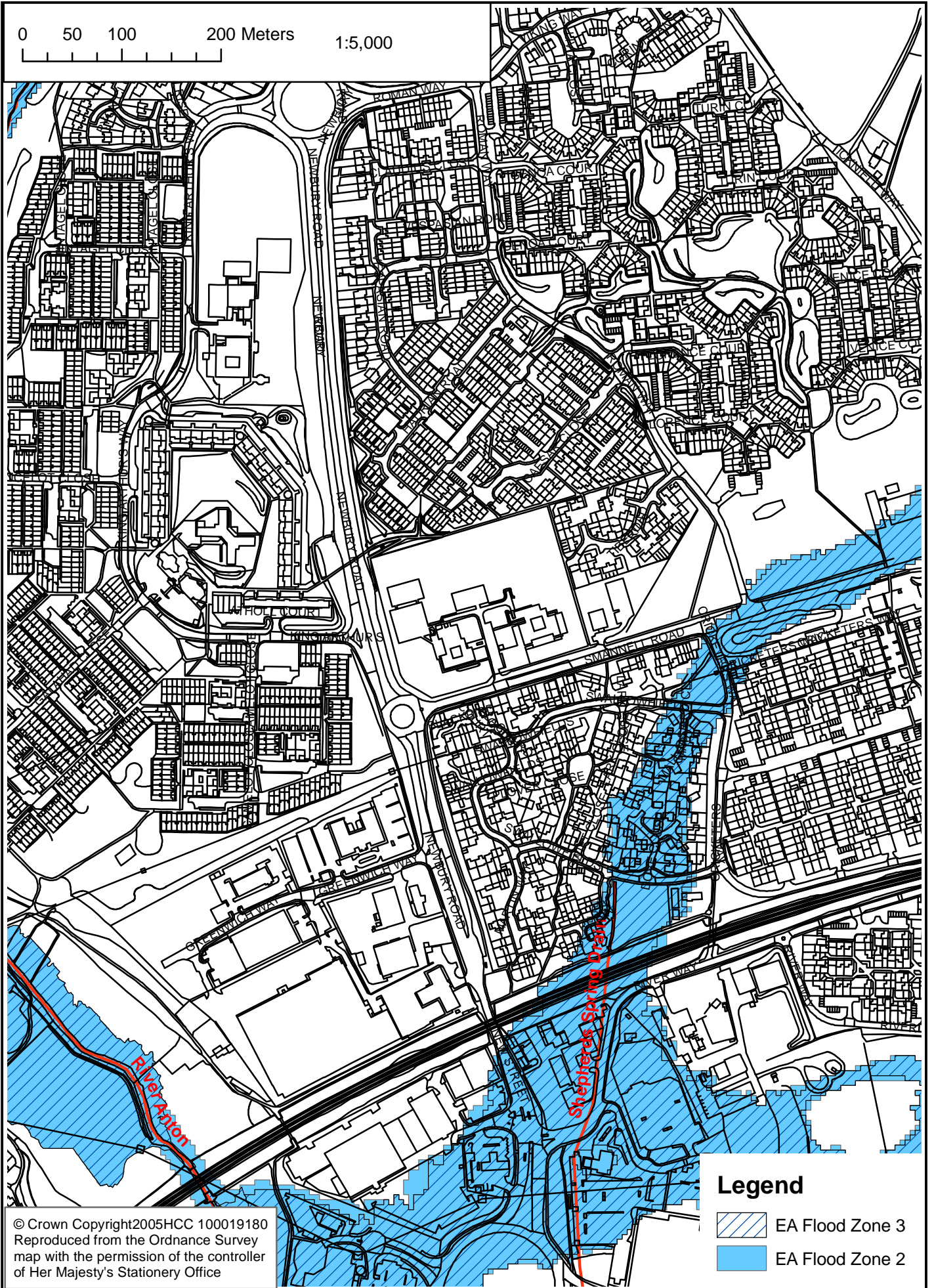
Legend

Shepherds Spring School
EA Main Rivers





Hampshire
County Council

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Legend

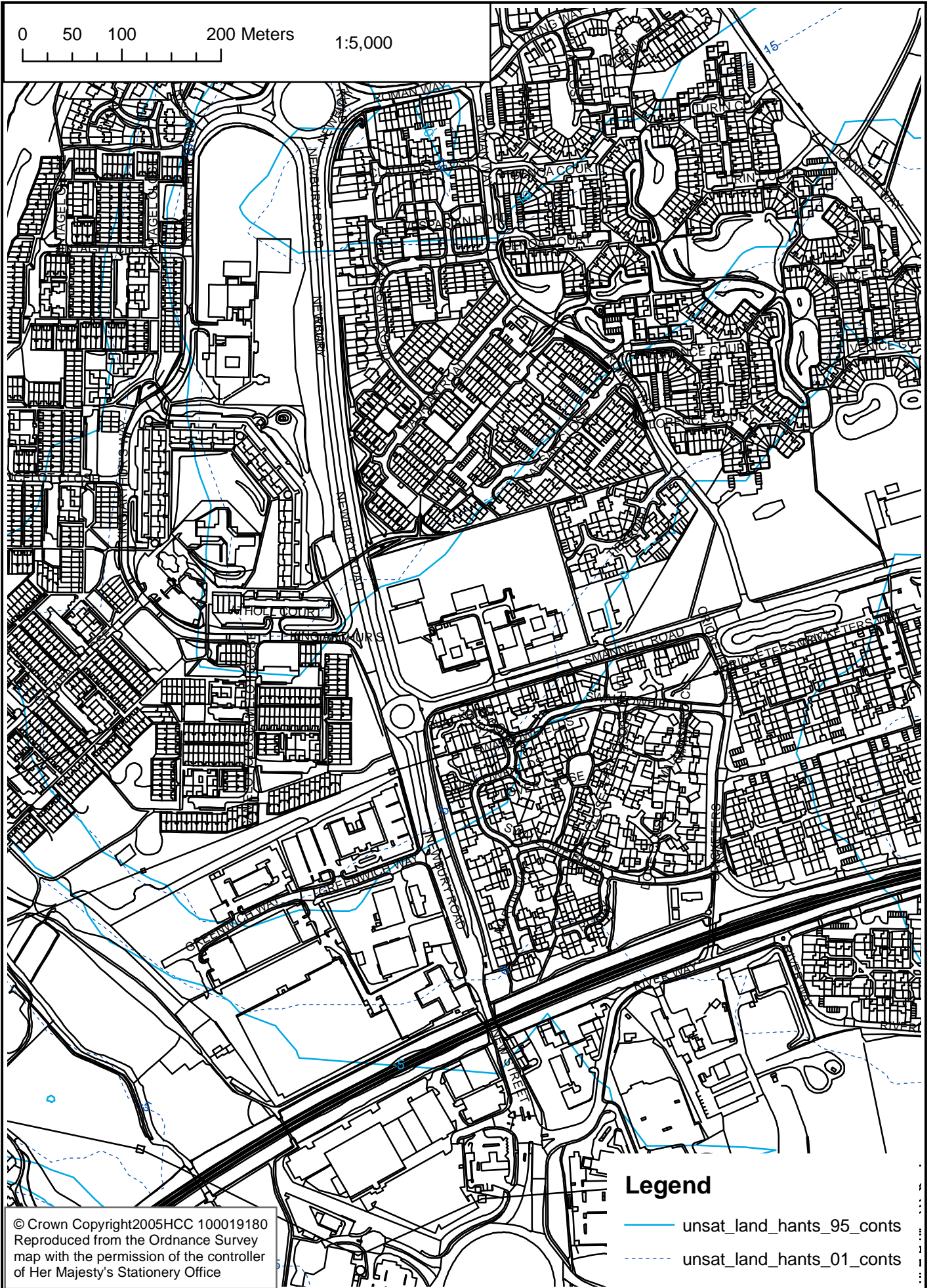
-  EA Flood Zone 3
-  EA Flood Zone 2

**Shepherds Spring School
EA Main Rivers and Flood Risk Zones**



**Hampshire
County Council**

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Legend

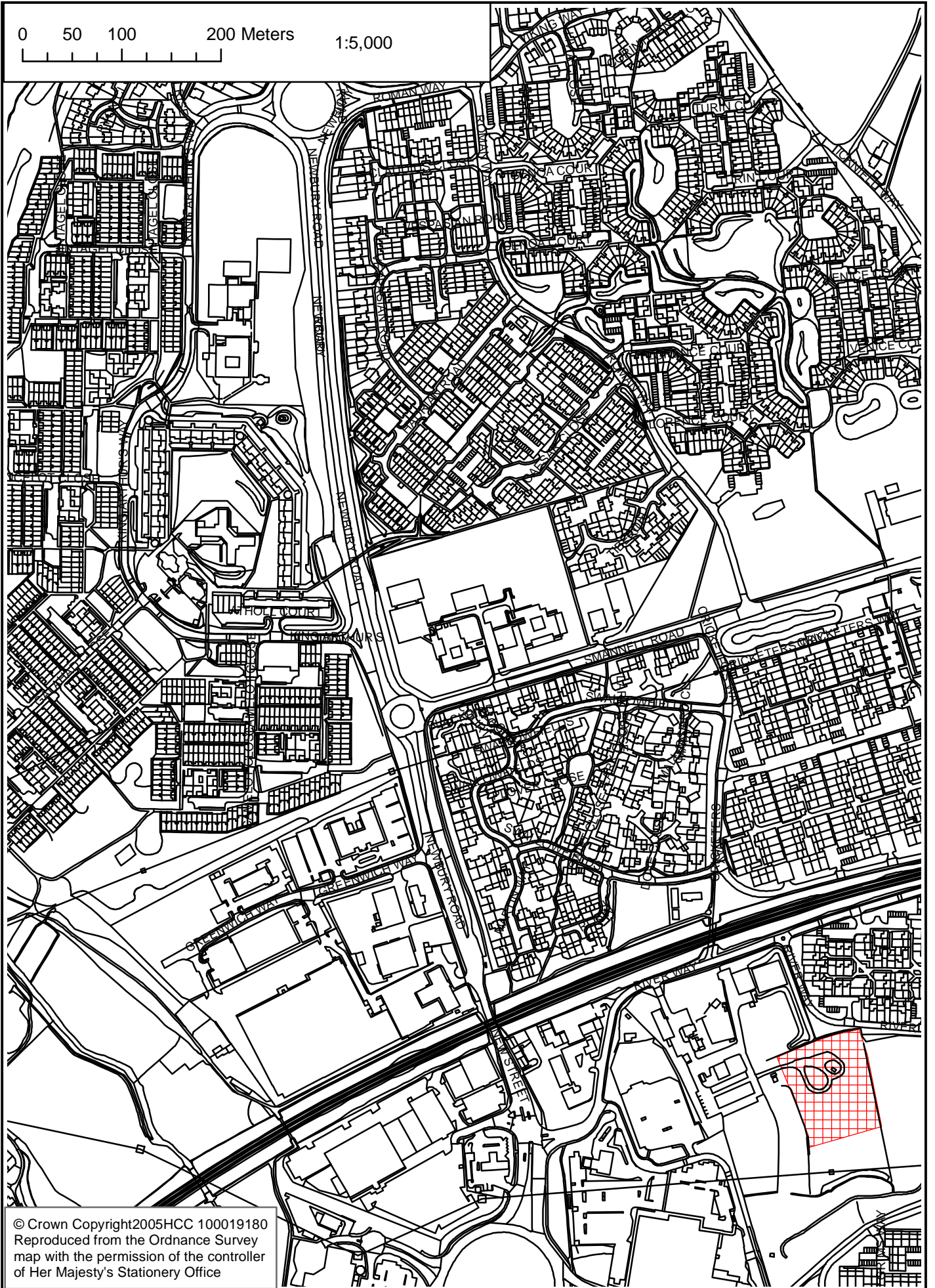
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**Shepherds Spring School
Groundwater Levels**



**Hampshire
County Council**

0 50 100 200 Meters 1:5,000



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**Shepherds Spring School
Current Landfill Site**





**Hampshire
County Council**

0 50 100 200 Meters 1:5,000



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Legend

-  SINCs
-  Local Nature Reserves

**Shepherds Spring School
Environmentally Sensitive Sites**



**Hampshire
County Council**

FIGURES

Figure 1 Site Location Plan

Figure 2 Site Plan



Site Location

