

Phase 1 Geotechnical and Geo-environmental Desk Study Report

HCA Compton

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1. Introduction

1.1 Reasons for the Report

This Phase 1 Geo-environmental Desk Study of the site, known as HCA Compton has been prepared by AECOM on the instruction of the Homes and Community Agency (HCA). The report has been produced on the assumption that the site will be redeveloped as residential housing with some employment (commercial) development.

AECOM has reviewed readily available information on the geo-environmental characteristics of the site and undertaken a site reconnaissance visit to make a preliminary qualitative assessment of the potential ground-related risks associated with the proposed development.

1.2 Report Objectives

The report has been prepared in general accordance with the procedures described in the Model Procedures for the Management of Land Contamination, CLR 11 (Defra/EA, 2004), BS 5930:1999 (as amended) Code of Practice for Site Investigations (BSI), and BS 10175:2011 Investigation of potentially Contaminated Sites- Code of Practice (BSI) to:

- Describe the environmental setting of the site;
- Describe the findings of a site reconnaissance visit;
- Summarise the history of the site;
- Summarise the underlying geology and hydrogeology;
- Summarise the findings of any previous ground investigation work;
- Provide a Conceptual Site Model for the prevailing ground conditions;
- Present a preliminary qualitative evaluation of potential land contamination risks; and
- Present a preliminary qualitative evaluation of potential geotechnical issues.

The report concludes with a series of recommendations for undertaking further investigative work. The purpose of such is to substantiate the findings of the preliminary evaluation and thereby reduce uncertainty in the Conceptual Model.

1.3 Details of the Proposed Development

It is understood that the proposed development will comprise low rise residential housing with some allocation for commercial / employment usage.

1.4 Sources of Information

The report has been prepared using a combination of published records, information held by the Client and other sources such as the Local Authority. These include statutory records and historical mapping supplied within a Landmark Envirocheck Report, published geological and hydrogeological mapping, historical borehole records, correspondence with the Environmental Health Officer and observations made during the site reconnaissance.

The following reports have been reviewed as part of this assessment:

- AECOM, High Level Geo-environmental Desk Study Review, January 2016
- SKM Enviros, Phase 1 and 2 Land Quality Assessment Report, 2012;

- Aurora, Radiological Survey at the Institute for Animal Health Compton, December 2011;
- Aurora, Intrusive Radiological Survey at the Institute for Animal Health Compton Main Site- July 2012;
- Aurora, Intrusive Radiological Survey and Sampling at the Institute for Animal Health Compton – August 2012;
- Pirbright Institute Handover Certificates (not dated);
- Hydrock (2015) Greens' Yard, Compton Near Newbury, Remedial Method Statement, (June 2015);
- Aurora, Independent Radiological Survey at the Pirbright Institute Compton Laboratories, January 2017;
- Aurora, Radiological Monitoring Results from Compton Drain Survey, May 2017;
- Zetica, Foul drainage survey and CCTV Inspection, May 2017;and
- Public Health England, Former Pirbright Institute: Compton Berkshire, Data Review and Risk Assessment of Biological Persistence, 2018.

A complete listing of all information sources is included in the references section.

1.5 Limitations of the Report

The opinions expressed in this report and the comments and recommendations given are based on a desk assessment of readily available information and an initial site reconnaissance by an AECOM Engineer. At this stage intrusive investigations have yet to be undertaken at site to establish actual ground and groundwater conditions and to provide data for an assessment for the geo-environmental status of the site.

The information, views and conclusions drawn are based, in part, on information supplied to AECOM by other parties, AECOM has proceeded in good faith on the assumption that this information is accurate. AECOM accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to AECOM from others.

The site reconnaissance consisted of general inspection of the site aimed at identifying any obvious signs of geotechnical hazards and potential sources of ground contamination affecting the site. An environmental compliance audit and/or detailed structural inspection of existing buildings were outside of the project brief. Similarly, the site visit excluded detailed consideration of the ecology or archaeological of the site, and if such are believed to be of potential significance then it is recommended that specialist advice is sought.

Reference to historical Ordnance Survey (OS) maps provides invaluable information regarding the land use history of a site. However, it should be noted that historical evidence will be incomplete for the period pre-dating the first edition and between successive maps.

Any risks identified in this report are perceived risks, based on the information reviewed during the desk study and therefore partially based on conjecture from available information. The study is limited by the non-intrusive nature of the work and actual risks can only be assessed following a physical investigation of the site.

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2. Site Description & Setting

2.1 Location

The site is located at the former Pirbright Institute Site, Institute of Biotechnology and Biological Science Research Council (BBSRC), Compton Farm, Compton, Newbury, Berkshire, RG20 6NL. The site is centred on National Grid Reference 451800, 180840.

The site is situated approximately 13.50km from Newbury. A site location plan is included as Figure 1.

2.2 Site Setting

The site covers approximately 15.20 Hectares and is defined by the redline boundary shown in Figure 2. The site is situated at an average elevation of 100m AOD, and has been developed across a terraced piece of land. On the site there are three distinctive terraces, the top terrace is occupied by the former livestock storage area, the middle terrace is occupied by the former laboratory and barn buildings and the lower terrace is occupied by a mixture of laboratory, administration buildings and the cricket pitch. The low terrace slopes gently down from north to south, from its highest point at 125m AOD in the north of the site to around 105m in the south, towards the River Pang, located 15m south of the site.

The site has been used as the research facility since the 1930s. The buildings vary in age, quality and size and many of them are no longer in use. The site is an irregular shape plot of brownfield land comprising buildings which are part of a former Biological and Biotechnological Scientific Research facility and used as research on animal pathogens endemic to the UK with associated laboratories, agricultural units, incineration, effluent treatment, engineering, fuel storage/use, office space, a hostel and cricket ground.

For the purpose of the site description the site has been zoned into the following:

Zone 1: Compound Area- former livestock storage area;

Zone 2: Operational Area- former laboratories;

Zone 3: Hostel/Accommodation Area;

Zone 4: Recreational Area- Cricket Ground; and

Buildings within each zone are detailed within Appendix A.

2.3 Significant Features On-Site

A plan showing the location of the buildings on the site is presented as Figure 3.

2.3.1 Zone 1: Compound Area

Buildings located in the compound area consist of a large barn/sheep unit (Greenfields Sheep Unit- CO01) and a small sheep pen (CO02). An additional building formerly used as a barn (CO03) was located along the eastern boundary however this has now been demolished.

Site Feature	Location	Description
Dung Yard	Northern compound to the east, south of Sheep Pens (CO02)	Includes the North Compound Sheep Unit (CO02)
Grassed Bunds	On the north and western side of the Dung Yard- Information provided suggests that these are comprised of radioactive waste.	Approximately 4-5m in height

2.3.2 Zone 2: Operational Area

Buildings located within the Operational Area included predominantly laboratories and medium/high security units (MSU/HSU).

Whilst most of the buildings have now been closed out and are disused, buildings CO06, CO17 and CO19 are still currently in use by an external company called Scitech.

A number of tanks and substations are located within this Zone, details of these are presented in Table 2.2 and 2.4.

Other features of note in this area detailed below:

2.3.2.1 Incinerators

The SKM Enviro Report (2012) details the presence of two incinerators on the site installed at different times and were previously referred to in reporting as the old incinerator and the current incinerator.

Historic Incinerator

The old incinerator is located in the Isolation Compound in Building CO28 (Former Slaughter House). It is currently derelict, with the stack having been removed, and the boiler open to expose the firebricks. The operational history including fuel storage and disposal of the ash is uncertain although the Pirbright Institute has confirmed that ash has been removed to landfill since 1993.

Recent Incinerator

The incinerator facility at Building CO43 in the Isolation Compound associated with Building CO44 (High Security Unit) houses two incinerator lines.

The site operated under a Pollution Prevention and Control Permit (PPC) and was authorised to incinerate infectious waste and non-infectious clinical and general waste from research, diagnosis or prevention of disease involving animals. The site was also authorised for the disposal via incinerator of a small quantity of short half-life and low radio toxicity of radioactive waste.

2.3.2.2 Boiler House

A steam heating system was formerly used on the site and the Boiler House for the system (Building CO53) is located within the centre of the site adjacent to the Specified Pathogen Free (SPF) Building (CO52).

A number of associated tanks borders the boiler house. These are detailed within Table 2.2 below.

The boiler house also stored sodium hydroxide and potassium hydroxide for use on the steam heated system.

Previous reporting confirmed that the heating systems leaked a number of times during its operation.

2.3.2.3 Effluent Sterilisation Plant

Information obtained from SKM Enviro Land Quality Assessment Report, 2012, provides details on the presence of an onsite effluent sterilisation plant. SKM Enviro obtained details about the Effluent Sterilisation Plant (ESP) from the Pirbright Institute operating procedures manual and a previous site walkover assessment. As shown on Figure 3, the Effluent

Sterilisation Plant was located on the east side of the site. Records state that the ESP was decommissioned and fumigated in 2010. The buildings and infrastructure remains but the facility no longer receives effluent from the site.

The ESP was originally constructed in the early 1990s however the original plant with a heat recovery system was removed and replaced in 1997. A modification to the plant was made in 2003 which included the provision of a self-contained above ground storage tank within the main hall of the building. This system was designed to act as an additional buffer for untreated effluent.

Liquid effluent was transported to the ESP through a dedicated high security drain which was constructed from either cast iron or rigid plastic with bolted inspection lids to maintain the systems integrity throughout its length. The system operated under gravity and the ESP was the lowest point of the system. The high security drainage system was connected to the High Security Unit (including its extension), the incinerator and the Plowright Laboratory, however it was stated that discharges were never made. Effluent from the effluent treatment system was discharge via foul sewer and exited the south of the site via the former Green Yards site. A mechanism was installed within the control room to prevent the discharge of un-sterilised effluent into the foul sewerage system.

An external backup was provided in 2002 to allow essential maintenance work to the main ESP. This backup comprised a single external above ground holding tank/pump and two above ground storage tanks. There was no facility for heat treatment and the addition of disinfectant directly into the holding tank/pump pre use was required. When used the external system bypassed the EPS, and when maintenance was completed, the external tanks could either be back into the EPS underground storage tank (via a temporary pump) or into a mobile effluent tanker.

2.3.2.4 Sludge Beds

Historic Sludge Beds

Along the northern boundary of Zone 2 and to the north of HSU (CO44) and the skip yard, there is a number of former sludge drying beds situated along the retaining wall. These comprise small brick and concrete sided beds/tanks.

Recent Sludge Beds

The sludge beds on site are located to the south of the Poultry Production Unit (PPU) (CO56). These reportedly regularly over flowed.

2.3.2.5 Former Bull Pens

The former bull pens are situated along the western boundary of the site adjacent to Building CO12 (Storage Building). The former bulls have been highlighted as an area where buried radioactive material is believed to be located.

2.3.3 Zone 3: Hostel/Residential Area

Buildings located within the hostel/residential area comprises a number accommodation buildings. A squash is located along the western boundary of the site with a substation to the immediate south.

2.3.4 Zone 4: Recreational Area

The recreation area is predominantly made up of the cricket ground, with the cricket pavilion located to the north west.

A pump house and associated groundwater borehole is situated to the south west of the cricket ground to the west of Churn Road.

A substation is also located along the southern boundary of the site.

2.3.5 Storage Tanks

Table 2.2 presents information taken from the SKM Land Quality Report and the site reconnaissance. Information in the table comprises details of all the above and below ground storage tanks located on the site. The location of these tanks is also shown on Figure 3.

Table 2.2 Summary of On-Site Storage Tanks

No.	Type	Location	Tank Status	Chemicals Stored
Zone 1				
1	AST x2	At the west end of building CO01	Plastic tank, double skinned	Gas Oil
Zone 2				
2	AST	North of the former engineering store (CO67)	Single skinned metal tank with concrete bund	Kerosene (heating oil)
3	AST x2	North of car park to the east of former engineering stores (CO67)	No details	Liquid Petroleum Gas (LPG)
4	AST	Sub-station 2 (building CO65)	Double skinned	Diesel for the adjacent emergency generator
5	AST x2	Adjacent to the north side of boiler house (CO53)	Cylindrical metal tanks housed within a concrete bund	Heavy oils used in the boiler house
6	AST x2	West side of the boiler house and within boiler house (CO53)	Double skinned	Diesel for the adjacent emergency generator
7	AST	At the incinerator (building CO43)	Double skinned with a concrete bund	Fuels for the incinerator operation
8	AST	In a barn (Building CO37)	Plastic tank, double skinned located on a concreted area	Gas Oil for the adjacent emergency generator
9	AST	Adjacent to building CO32	Plastic tank, double skinned (Capacity 1453 litres) located on a concrete platform	Gas Oil
10	AST x2	Location of the former incinerator (CO28)	Two old metal rectangular tanks (Capacity 2500 litres each)	Gas Oil Diesel
11	Underground old interceptor	South of the car park on the eastern side of the site (Exact location unknown)	-	Unknown
12	UST x2	Adjacent to north side of the Plowright Building	-	Waste from adjacent laboratory (Pirbright Institute indicated that these tanks were intended to be used for chemical treatment of laboratory treatment but it is not known whether this occurred)

No.	Type	Location	Tank Status	Chemicals Stored
13	AST	Substation 1 (building CO54)	Tank no longer present. Formerly located on a brick/concrete platform	Diesel
14	AST	West of building CO55	Tank no longer present. Formerly located on raised stands within a brick bund.	Unknown
Zone 3				
15	AST	Building CO83	-	Class C2 oil only- Kerosene

2.3.6 Storage Areas

Table 2.3

No.	Type	Location	Type of storage	Chemicals Stored
1	Radioactive Store	Unknown	Unknown	Radioactive
2	Chemical waste and drum stores	South of radioactive store	Drums	Contained histology fluids potentially contaminated with TSE from Gordon histology laboratory (Up to Hazard Group 3 waste)
3	Propane Store	CO10	Unknown	Propane
4	Store	CO12	Unknown	Unknown
5	Chemical stores	Boiler house	Pirbright Institute confirmed that leaks to ground of the heating system have occurred historically	Sodium hydroxide and potassium hydroxide for use in steam heating system.

2.3.7 Substations

Table 2.3 provides a summary of the substations located on the site and where they are located (Figure 3).

Table 2.4: Summary of On-Site Substations

No.	Location	Description
Zone 2		
Sub-station 1	South of the site (building CO54)	Largest sub-station (approx. 40 years old)
Sub-station 2	South of the site (CO65)	-
Sub-station 3	South of the site (CO64)	-
Zone 3		
Sub-station 4	Along the western boundary of the site to the south of the squash court	-
Zone 4		
Sub-station 5	South of the cricket ground along southern boundary of the site	-

2.3.8 Close Out Information

Close out information for the buildings on the site consists of the following:

- Handover Certificates from the Pirbright Institute;
- Grundon Decontamination Certificates and Site Clearance;
- Radiological Survey of the Laboratory Buildings; and

- Radiological Survey of part of the drainage system.

2.3.9 Off Site

Features immediately surrounding the site comprise a mixture of farm land, residential and commercial properties. The village of Compton surrounds the south and eastern extents of the site.

To the south east of the site the former Green Yard Area of the Pirbright Institute was located. This has now been remediated and developed as a residential area.

2.4 Site Reconnaissance

An external inspection of the site was completed by an AECOM Engineer on 18th September 2017. The aim of the visit was to identify the range of activities carried out on the site and any obvious potential sources of ground contamination.

A summary of principal observations is provided below. A photographic record of the visit is included as Appendix B.

AECOM were able to access external areas across the majority of the site with the exception of a small area occupied by Scitech, who occupy buildings CO06, CO19 and CO20 (currently ongoing operations). For the purpose of the walkover the site has been split into three sections.

The site as a whole is situated on a downward slope, which has been terraced for the development of the Pirbright Institute. The majority of the site is occupied by hardstanding, which suggest that most of the site is underlain by Made Ground.

Zone 1: Compound Area

The Compound Area is currently occupied by the disused Greenfields Sheep Unit and Sheep Pen. Demolition material along the eastern boundary of the site was evident during the site walkover and likely to be from the former barn (CO03) located in this area.

Surrounding the Greenfields Sheep Unit is surrounded by a retaining wall and mounded materials. The mounded materials are covered by grass. Previous reporting indicates that radioactive materials are buried in the mounds to the north east boundary of the site. No tanks or substations were noted within this part of the site during the site walkover, however previous records indicate that two above ground storage tanks were located to the west end of the Greenfields Building.

A public footpath borders the north boundary of the site.

Zone 2: Operational Area

The Operational Area is currently occupied by a variety buildings. To the west of the site it was evident that Scitech were in operation with Buildings CO06, CO17 and CO19. The rest of the buildings are no longer in use.

- High and Medium Security Units;
- Laboratories;
- Skip Area;
- Bull Pens;
- Slaughter House;
- Two Isolation Compounds with Incinerators;

- Generator;
- Above Ground Storage Tanks;
- Barns (including former pig unit);
- Effluent Sterilisation Plant;
- Sludge Beds (along northern boundary of Zone 2 and south of PPU building); and
- Boiler house.

The sludge beds were gated with a tank located within the locked gates, several signs indicating the presence of radioactive contamination were located on the gates during the site walkover.

It was also evident that the laboratories had not be completely cleared of equipment despite having close out documents indicating that they have been cleared.

Zone 3: Hostel/Residential Area

Within the Zone 3 the building use were generally for residential and office accommodation. Some of the offices of are still in use however the hostel buildings weren't occupied with furniture still likely to be present in each building.

The squash was located along the western boundary of the site along with a car park to the north on the Zone.

A tank was located within Building CO83 with signage indicating the storage of kerosene.

Zone 4: Recreational Ground

The Recreational Ground is still occupied by the cricket ground and pavilion however these are no longer in use.

To the south west the pumping house and groundwater abstraction borehole was evident.

General Site

It is unknown whether any of the tanks have been decommissioned.

Given the age of the buildings and associated infrastructure (pre-2000) the use of asbestos in building material is highly likely. A detailed survey and preparation of an Asbestos Management Plan of the buildings would be required to confirm the presence or otherwise of asbestos containing materials (pACM).

It was evident that the grassed covered grounds were still been maintained across the site.

There is significant evidence of waste material left on the site especially within the area labelled the EWS Skip Areas.

2.5 Information from Statutory Authorities Etc.

2.5.1 Landmark Envirocheck Report

Table 2.1 summarises information contained in the Landmark Envirocheck report (Appendix C). The report collates data from a variety of sources including the Environment Agency (EA) and the British Geological Survey (BGS). All data suppliers are referenced in the report.

Table 2.1: Summary of Regulatory Information

Subject	Number present			Details
	On site	0-250m	250-500m	
Agency and Hydrological				
Discharge Consents	0	1	0	The Environment Agency (EA) holds one current consent located 236m south east of the site. The permit is held by Mr David Pain for sewage discharges (final/trade effluent) onto land and tributary of River Pang.
Integrated Pollution Prevention and Control	2	0	0	Name: The Pirbright Institute Laboratories, Institute for Animal Health (north eastern corner of the site) Authority: Environment Agency Permit Ref: CP3539ZE (November 2012) Original Permit Ref: Tp3135st Activity Code: 5.1 A(1) (A) and 5.1 A (1) (D) Activity: Waste Incineration: Hazardous Waste Unless Otherwise Stated and Incineration of Hazardous Waste
				Name: The Pirbright Institute Laboratories, Institute for Animal Health (centre of the site) Authority: Environment Agency Permit Ref: DP3935GY (June 2009) Original Permit Ref: Tp3135st (November 2005) Activity Code: 5.1 A(1) (A) and 5.1 A (1) (D) Activity: Waste Incineration: Hazardous Waste Unless Otherwise Stated and Incineration of Hazardous Waste
Local Authority Pollution Prevention and Controls	2	0	0	Name: Institute for Animal Health Laboratories, Agricultural Research Council (Centre of the core site) Authority: West Berkshire Council, Environmental Health Department Permit Reference: X10RNEHIGH (August 1993 and August 1992) Description: PG5/4 General waste incineration processes under 1 tonne an hour, PG5/1 Clinical waste incineration processes under 1 tonne an hour, PG5/3 Animal carcase incineration processes under 1 tonne an hour
				Name: Institute for Animal Health Laboratories, Agricultural Research Council (Centre of the core site) Authority: West Berkshire Council, Environmental Health Department Permit Reference: Inc 1. (No Date) Description: PG5/4 General waste incineration processes under 1 tonne an hour, PG5/1 Clinical waste incineration processes under 1 tonne an

				hour, PG5/3 Animal carcass incineration processes under 1 tonne an hour
Pollution Incidents to Controlled Waters	1	7	1	The EA holds records of one incidents on the site, classified as a category 3 minor incident, the polluting substance is recorded as oils, no further details are given. Seven incidents have been recorded within 250m of the site, all classified as category 3 minor incidents. The EA also holds one recorded incident located 328m south east of the site, classified as a category 3 minor incident.
Registered Radioactive Substances	10	0	0	<p>The EA holds ten records for the use, storage and disposal of registered radioactive substances on the site.</p> <ol style="list-style-type: none"> 1. Permit Ref: CA8914 (April 2007) Process: Authorisation under S13 RSA for the disposal of Radioactive Waste Description: Minor variation to authorisation under RSA 2. Permit Ref: Bw8445 (Dec 2003) Process: Authorisation under S13 RSA for the disposal of Radioactive Waste Description: Minor variation to authorisation under RSA 3. Permit Ref: BI7434 (Aug 2001) Process: Authorisation under S13 RSA for the disposal of radioactive waste Description: Minor variation to authorisation under RSA 4. Permit Ref: BH6281 (Feb 2000) Process: Authorisation under S13 RSA for the keeping and use of Radioactive materials Description: Minor variation to a registration under the Act of an open source which is also the subject of an authorisation 5. Permit Ref: BE6919 (June 1999) Process: Authorisation under S13 RSA for the disposal of radioactive waste Description: Authorisation under RSA 6. Permit Ref: AC1644 (March 1991) Process: Authorisation under S13 RSA for the keeping and use of Radioactive materials Description: Minor variation to a registration under the Act of an open source which is also the subject of an authorisation 7. Permit Ref: BE6889 (June 1999) Process: Authorisation under S13 RSA for the disposal of radioactive waste Description: Authorisation under RSA 8. Permit Ref: BE6897 (Jan 1999)

				<p>Process: Authorisation under S13 RSA for the keeping and use of Radioactive materials Description: Registration under the Act of an open source which is also the subject of an authorisation</p> <p>9. Permit Ref: Bw8437 (Dec 2003) Process: Authorisation under S13 RSA for the disposal of Radioactive waste Description: Minor variation to authorisation under RSA</p> <p>10. Permit Ref: AC1628 (March 1991) Process: Authorisation under S13 RSA for the disposal of Radioactive waste Description: Authorisation under RSA</p>
Waste				
Historical Landfill Sites	0	3	0	<p>There are three records of historical landfill sites.</p> <ul style="list-style-type: none"> - Churn Road which deposited inert and industrial waste (last input date 1992) - Hill Barn Road which deposited inert and industrial waste (last input date 1969) - Thorndown which deposited inert and industrial waste (last input date unknown).
Industrial Land Use				
Contemporary Trade Directory Entries	1	2	0	<p>One entry located on the site called Kemtronix Ltd which is an active site for laboratory equipment, instrument and supplies. Two entries are located within 250m of the site both of which are now inactive.</p>

2.5.2 Sensitive Land Uses

The Sensitive Land Uses Map of the Envirocheck Report (Appendix C) indicated that the site is located within an Area of Outstanding Natural Beauty known as the North Wessex Downs which was designated in November 1972.

The site is also located in a groundwater Nitrate Vulnerable Zone.

2.5.3 Unexploded Ordnance

According to regional unexploded bomb (UXB) mapping published by Zetica, the site lies within a zone that experiences a low risk of UXB.

2.5.4 Consultation

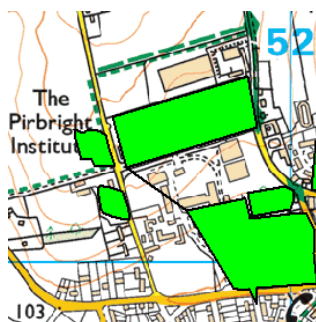
2.5.4.1 West Berkshire County Council

A contaminated land search was requested with the West Berkshire Council. The response was detailed in an email from Regulation 13, Senior Scientific Officer, Public Protection Partnership dated 06 September 2017.

The main findings are summarised below:

- There are no records of any pollution incidents at the site;

- Two waste incinerators were located at the site, one for clinical waste and one for animal carcasses. These were regulated by the Environment Agency however it is believed that these have been decommissioned;
- The map below shows the areas that have been highlighted as potentially contaminated;



- Churn Road Landfill to the west of the site, identified as a former refuse tip;
- There are no records of any unlicensed groundwater abstractions;
- The site has been highlighted as potentially contaminated however it was given a low priority status; and
- The site to the south (known as Greens' Yard) was former agricultural vehicle and maintenance yard. This has now been developed through the planning process for residential accommodation.
- A copy of the Hydrock, Remedial Method Statement for Greens' Yard, dated June 2015, reference R/1252/002, was provided. This is reviewed in Section 4.7.

2.5.4.2 Environment Agency

Information obtain from the Environment Agency confirmed the presence of three historical off site landfills. Information the Environment Agency hold on these landfills is summarised in Table 2.2 below.

Table 2.2 Historical Landfills

Name [Grid Reference]	Status	Distance (m)	Geology	Gas Monitoring	Information
Churn Road [SU 515 802]	Closed	10m west	Chalk	Gastec and Spiking Reveal No Gas-1992	Filled in 1992. Accepted inert and industrial waste.
Thorndown [SU 512 803]	Closed	250m west	-	-	Accepted inert waste.
Hill Barn Road [SU 511 794]	Closed	600m south west	Gravel	Gastec and Spiking Indicated No Gas	Filled in 1960s. Accepted inert and industrial waste.

3. Development History

3.1 Detailed Review of Historical Mapping

The historical Ordnance Survey (OS) maps obtained with the Landmark Envirocheck report date from 1877 to 2015. Table 3.1 summarises a review of the historical mapping

Table 3.1: Summary of Historical Mapping

Year [scale]	Features on-site	Features off site
1877 [1:2,500]	<ul style="list-style-type: none"> - The site is generally vacant and undeveloped. 	<ul style="list-style-type: none"> - The village of West Compton borders the site to the east and south.
1882-1883 [1:10,560]	<ul style="list-style-type: none"> - Ground coverage consists of fields likely to be part of West Compton Manor Farm and Green Farm labelled across the southern extents of the site. - A small area of trees (orchard) present to the south east of the site next to Whitewall Iron Works bordering the site boundary. - A small chalk pit is located along the western boundary. 	<ul style="list-style-type: none"> - To the south west of the site a small boys and girls school is situated next to West Compton Manor Farm. - An access road to the village borders the southern boundary of the site. - West Compton is shown as a small residential area with farm buildings. Beyond this the land comprises farm land with associated buildings.
1899 [1:2,500]	<ul style="list-style-type: none"> - A footpath and bordering wooded area runs from west to east across the site located to the north. - Two small buildings present to the south east of the site likely to be farm buildings associated Green Farm. - West Compton Manor Farm is now labelled as Manor Farm. 	<ul style="list-style-type: none"> - A railway line has now been constructed approximately 400m to the east of the site. A goods shed and station is located along the railway south east of West Compton. Additional access to the station has also been constructed from West Compton. - Allotment gardens boarder the eastern boundary of the site. - The small school is no longer apparent to the south west of the site.
1900 [1:10,560]	<ul style="list-style-type: none"> - There have been no significant changes. 	<ul style="list-style-type: none"> - The village of West Compton shows gradual expansion to the south east. Construction of a new railway line, the Didcot, Newbury and Southampton Railway which runs north to south approximately 400m east of the site. - To the west of the site a chalk pit still remains and an old gravel pit is noted.
1913 [1:10,560]	<ul style="list-style-type: none"> - There have been no significant changes. 	<ul style="list-style-type: none"> - To the west of the site next to the chalk pit Fairholme, a small settlement is now labelled. - A new farm to the south west of the site is now apparent (Mayfield Farm).
Aerial Photograph 1948 [1:10,560]	<ul style="list-style-type: none"> - The aerial photography shows development on the site including access roads 	<ul style="list-style-type: none"> - No significant changes to the immediate surrounding area.

Year [scale]	Features on-site	Features off site
	with a wooded area to the east.	
1960 [1:10,000]	<ul style="list-style-type: none"> - Buildings to the north of the site have been developed and are labelled as Agricultural Research Council's Field Station. - Access roads across the site have not changed, and some buildings are scattered around the access roads to the south and central parts of the site. 	<ul style="list-style-type: none"> - West Compton is now labelled as Compton. To the north of the site is Superity Farm. The surrounding land to the north of the site now classified as the North Wessex Downs. - Whitewall Iron Works is now labelled as Works. - To the west of the site development of three small buildings and two larger rectangular buildings slightly to the north of the Chalk Pit located along the western boundary of the site.
1970-1971 [1:10,000] 1970-1973 [1:2,500]	<ul style="list-style-type: none"> - A cricket ground, electrical substation, and pump house are shown to the south of the site. - Along the northern boundary to the west a tank is noted. 	<ul style="list-style-type: none"> - The chalk pit is now labelled as a refuse tip, with 9 settlements to the south of the tip. - Mayfield Farm has now been developed into cottages with a tennis court to the east and the Agricultural research Council to the west with a Sheep Dip and a tank labelled. - Fairholme is now labelled as Down House. - Compton Village shows areas of expansion to the east towards the railway line. The Works is now labelled as an Engineering Works.
1976 [1:10,000]	<ul style="list-style-type: none"> - Manor Farm to the south west of the site is now labelled as the cricket ground. The rest of the site map is unavailable. 	<ul style="list-style-type: none"> - To the south of the site Compton village has expanded predominantly with residential development. Site map for the rest of the surrounding area is unavailable.
1985 [1:2,500] 1985-1989 [1:2,500]	<ul style="list-style-type: none"> - The site is now labelled as the Institute for Research in Animal Diseases. - Sludge beds and filter beds are labelled to the east of the site. - The north western corner of the site a tank is situated. 	<ul style="list-style-type: none"> - A depot is now situated where the Engineer works was previously located. - A pumping station is now situated approximately 300m to the west of the site.
2006 [1:10,000]	<ul style="list-style-type: none"> - The site is now labelled as Institute For Animal Health. Additional buildings are located on the site however the configuration of the site has stayed the same. 	<ul style="list-style-type: none"> - No significant changes.
2015 [1:10,000]	<ul style="list-style-type: none"> - No significant changes. 	<ul style="list-style-type: none"> - No significant changes.

3.2 Other Sources

SKM Enviros, Phase 1 and 2 Land Quality Assessment Report, 2012

Information was gathered from two sources:

- Cooke GW 1981. Agricultural Research 1931-1981. ARC London; and
- Mackenzie A. History Agricultural Research Council, Institute for Research on Animal Diseases at Compton Undated.

The Agricultural Research Council (ARC) was originally set up by Royal Charter in 1931. The ARC Field Station was established at Compton, when the estate of 1500 acres was purchased

in October 1937. In 1963 the Field Station was renamed the Institute for Research on Animal Diseases.

The research and activities at the site initially provided three main functions

1. Accommodation in strict isolation for cattle and other farm animals on a scale not possible elsewhere;
2. Facilities to breed animals of 'known health history' for Compton and other research stations; and
3. Facilities for research on large animals under controlled conditions, plus observation experiments on pastures and crops on the estate.

To support these activities the first new buildings to be constructed were six isolation units for work on brucellosis and mastitis in cattle together with a laboratory and post mortem-area in the north west of the estate at Ilsley.

As a temporary measure the central laboratory was set up in a converted cooling room in the dairy at Superity Farm. These laboratories were retained for many years but were last used in 1960.

The main laboratory and buildings for breeding of small laboratory animals, poultry and pigeons started to be built in 1939 and became fully operational in 1940. The top floor of the main building was extended by the addition of a new wing to provide accommodation for new departments of Biochemistry and Virology.

In the period 1967-72 a major building programme was undertaken. A new department of Cellular Pathology was created in 1968 by the amalgamation of electron microscopy and histology. The electron microscope section was moved to the main laboratory and the Pigeon House was modified again to house the Department of Parasitology.

In 1971 a purpose built piggery for production of SPF pigs from erected adjacent to the Isolation Compound near the Poultry Unit. The Poultry Unit was closed down in 1972 when it was no longer necessary to produce eggs for virology.

The Pigeon House originally built to undertake work on psittacosis had been converted to a laboratory and was further modified in 1963 to house the Electron Microscopy Section. The Poultry Department was soon added together with 10 staff houses and an estate office on the main driveway.

The engineering department had started in 1937 at the south end of Manor Yard Barn. In 1949 a new engineering workshop was built. Further development took place including the completion of the HSU in the mid-1980s, the HSU extension in 2000/2001 and the latest laboratory the Jenner Building in 1997.

3.2.1 Isolation Compound

In 1948 the construction of a new Isolation Compound for farm animal experiments commenced. The original design was for 22 animal buildings, each housing 24 adult cattle. Offices, a laboratory, slaughterhouse, stores and a dung yard with steam sterilisation cubicles for sterilising infected dung were also built. Since then the Isolation Compound has been adapted and modified to meet the changing needs of the research programmes. A new clinical laboratory and post-mortem room were added in 1960, together with Atcost Dutch barns. In 1960 60ft x 20ft soils were constructed and then enlarged in 1967. Units 43/44 became small operating theatre.

3.2.2 Radioactivity

Radioactive materials have historically been used at the site as tracers in research experiments. Following an agreement between the UK Atomic Energy Authority (UKAEA) and ARC a radiobiology block and animal house was established at Compton in 1955. Experiments carried out within the building included assessments on the uptake of radionuclides in the food chain following a nuclear incident. These experiments were ceased in 1962 and the unit was renamed the Department of Functional Pathology. Between 1967 and 1972 the building was extended to accommodate the Statistics Section.

3.2.3 Biological

The site has been used for the study of animal pathogens endemic to the UK. Hazard Group 2 and 3 pathogens have been studied that the Site. In accordance with the classification given by the Advisory Committee on Dangerous Pathogens (ACDP) Table 3.2 provides details on Hazard Group 2 and Hazard Group 3.

Table 3.2 Hazard Groups at Compton

Group	Classification	Containment Level
Hazard Group 2	Organism that may cause human disease and which may be a hazard to laboratory workers but unlikely to spread to the community	Containment Level 2
Hazard Group 3	Organism that may cause severe human disease and presents a serious hazard to laboratory workers.	Containment Level 3

Appendix A provides the details of which laboratories were using which Hazard Ground and Containment Level.

4. Geology, Hydrogeology and Hydrology

4.1 Geology

The 1:50,000 scale geological maps of the area produced by the BGS and BGS online 'Geological Viewer of Britain' indicates that the site is underlain by the geological successions summarised in Table 4.1.

Table 4.1: Geological Succession from Published Mapping

Period	Epoch	Group	Geological Stratum
Quaternary	Pleistocene	Superficial Deposits	River Terrace Deposits
Cretaceous	Upper	White Chalk Sub Group	Seaford Chalk Formation
Cretaceous	Upper	White Chalk Sub Group	Lewes Nodular Chalk Formation
Cretaceous	Upper	Lewes Nodular Chalk Formation	Chalk Rock Member

4.1.1 Made Ground

A thin layer of Made Ground is noted within the available BGS records at the site, however, a greater thickness of Made Ground is expected due to the sites historical phases of development.

4.1.2 Superficial Deposits

Superficial deposits are generally absent from the majority of the site however; a band of sand and gravel River Terrace Deposits is present towards the south of the site. There are no recorded superficial deposits in the northern section of the site. The BGS lithological description states that these quaternary deposits also contain finer material of silt and clay deposited during overbank floods.

4.1.3 Seaford Chalk Formation

The Seaford Chalk Formation is described by the BGS as comprising "firm white chalk with conspicuous semi-continuous nodular and tabular flint seams. Hardgrounds and thin marls are known from the lowest beds. Some flint nodules are larger to very large."

4.1.4 Lewes Nodular Chalk Formation

The Lewes Nodular Chalk Formation is described by the BGS as comprising "hard to very hard nodular chalks and hardgrounds (which resists scratching by finger-nail) with interbedded soft to medium hard chalks (some grainy) and marls; some griotte chalks. The softer chalks become more abundant towards the top. Nodular chalks are typically lumpy

and iron-stained (usually marking sponges). Brash is rough and flaggy or rubbly, and tends to be dirty. First regular seams of nodular flint, some larger, commence near the base and continue through.”

4.1.5 Chalk Rock Member

The Chalk Rock Member is described by the BGS as comprising “Very hard chalk and chalkstone, some nodular, including mineralised hardground surfaces and marl seams.”

4.1.6 Soil Chemistry

British Geological Survey (BGS) Soil Chemistry datasets detail the topsoil concentrations of five potentially harmful elements (PHEs): Arsenic (As), Cadmium (Cd), Chromium (Cr), Nickel (Ni), and Lead (Pb), as presented within the Envirocheck report. Elevated concentrations of these PHEs can exist because of natural geological conditions or possible human contamination.

These following BGS estimated soil chemistry levels are attributed to the site:

Arsenic <15mg/kg, Cadmium <1.8kg/mg, Chromium 60-90mg/kg, Nickel 15-30mg/kg, Lead 150-300mg/kg.

4.1.7 Ground Stability Records

The Envirocheck report suggests that there is a moderate risk of compressible ground and shrinking and swelling clays.

4.1.8 Historical Exploratory Hole Records

The BGS maintains an archive of historical exploratory hole logs throughout the UK. AECOM has searched the database and a summary of those which are considered to provide useful information on the ground profile at the site is in Table 4.2. Copies of the logs are included as Appendix D.

Table 4.2 Historical Holes in BGS Archive

Boreholes reference NGR Distance from the site Depth Date	Stratum	Description	Depth to Top of Stratum (m bgl)	Thickness (m)	Groundwater
SU58W48 451690, 180270 10m On Site	Made Ground		0.1	0.1	Dry
	Chalk	Medium hard Chalk with flints (Grade III)	4.5	4.4	
		Medium hard Chalk with flints (Grade II)	7.5	3.0	
		Hard Chalk with flints (Grade I)	10.0	2.5	
SU58SW49 451750,180290 15m On Site	Made Ground	Gravel	0.1	0.1	Dry
	Chalk	Soft structureless chalk with lumps of intact material (Grade VI)	1.4	1.3	
		Soft to medium hard chalk with flints (Grade IV)	3.0	1.6	
		Medium hard chalk with flints (Grade III)	7.5	4.5	

Boreholes reference NGR Distance from the site Depth Date	Stratum	Description	Depth to Top of Stratum (m bgl)	Thickness (m)	Groundwater
		Medium hard chalk with flints (Grade II)	9.0	1.5	
		Hard chalk with flints (Grade I)	15.0	6.0	
SU57NW27 451700, 179950 100.58m On Site (Borehole attached to pump station 15 th August 1944)	Top Soil		0	0.2	Not Recorded
	Chalk	Dirty Gravel	0.2	1.3	
		Chalky Gravel	1.5	4.3	
		Chalk	5.8	11.2	
		Cobbly Chalk	17	18	
		Soft Chalk	35	18.3	
		Chalkstone	53.5	0.8	
		Soft Chalk	54.3	5.5	
		Chalkstone	59.8	2.1	
		Bungy Chalk	61.9	14.3	
		Blue Lias	76.2	12.5	
		Grey Chalk	91.7	8.8	

4.2 Hydrogeology

4.2.1 Aquifer Classification

The EA's Groundwater Protection Policy adopts aquifer designations that consistent with the Water Framework Directive. According to this system:

The underlying bedrock chalk geology (Seaford Chalk, Lewes Nodular Chalk and Chalk Rock Formations) are classified by the Environment Agency as Principal Aquifer.

The Environment Agency defines a Principal Aquifer as 'layers of rock or drift deposits that have high intergranular and/or fracture permeability- meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.'

The superficial River Terrace deposits have been classified by the Environment Agency as a Secondary A Aquifer.

The Environment Agency defines a Secondary A Aquifer as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.'

4.2.2 Vulnerability of Groundwater Resources

The EA's Groundwater Vulnerability Map of the area shows that the soils overlying the Secondary A aquifer (superficials) to the south of the site are classified as having an Intermediate Leaching Potential (I1) which are soils that can possibly transmit a wide range of pollutants. Soils overlying the Principal chalk aquifer to the north of the site are classified as having a High Leaching Potential (H1) which are soils that readily transmit liquid discharges because they are either shallow, or susceptible to rapid by-pass flow directly to rock, gravel or groundwater.

In terms of identifying the risk of contamination from potential polluting activities in a given area to groundwater (wells, boreholes and springs) used for supplying public drinking water, the EA identifies Source Protection Zones. These show the extent of a groundwater source catchment and are divided into three zones, as follows:

- SPZ 1 (Inner protection zone) is located immediately adjacent to the groundwater source. It is based on a 50-day travel time from any point below the water table and is designed to protect against the effects of human activity and biological/chemical contaminants that may have an intermediate effect on the source. The zone has a minimum radius 50m.
- SPZ 2 (Outer protection zone) is larger than SPZ 1 and is defined by a 400-day travel time from a point below the water table to the source. The travel time designed to provide delay and attenuation of slowly degrading pollutants. The zone has a minimum radius of 250m or 500m, depending on the size of the abstraction.
- SPZ 3 (Source catchment protection) covers the complete catchment area of a ground source.

Mapping produced by the EA and supplied with the Envirocheck report shows that an area to the south west of the site lies within Inner Zone (SPZ1). The SPZ 1 covers a very small area relating to the groundwater abstraction borehole on the site. The eastern boundary of the site lies within a total catchment Source Protection Zone (SPZ3). The SPZ 3 relating to the underlying principal chalk aquifer.

4.2.3 Site Characteristics

The regional direction of groundwater flow is expected to follow the regional topography to the south of the site in the direction of the River Pang located along the sites southern boundary.

The site classification reflects that the superficial aquifer to the south of the site is likely to contribute to base flow of the local surface water features and the overlying soils have the potential to possibly transmit a wide range of pollutants.

The bedrock aquifer underlying the whole site is likely to contribute to base flow of water on a strategic scale and the overlying soils have the potential to readily transmit liquid discharges either because they are shallow or susceptible to rapid by-pass flow directly to rock, gravel or groundwater.

With reference to the chalk potentiometric contours for 1976 (Hydrogeological Map South-West Chilterns and the Berkshire and Marlborough Downs, 1978) in the Compton area levels between 80 to 90m AOD are indicated. This would give indicative groundwater levels of between 15 to 25m below ground level at the lowest point in the south (105m AOD) to between 35m to 45m at its highest point in the north of the site (125m AOD).

4.2.4 Licenced Groundwater Abstractions

With reference to the Envirocheck report there are 12 recorded groundwater abstraction licences on the site sourced from two boreholes located to the south-west of the site in the pumping house adjacent to the cricket ground. The details of these are summarised in Table 4.3 below.

Table 4.3: EA Licensed Groundwater Abstractions (<1km of the Site)

National Grid Reference	Distance (m) and Direction	Operator	Source	Use
451686,179975	On Site – Borehole 'C'	Institute For Animal Health	Groundwater	Boiler Feed

451699,179957	On Site - Borehole 'A'	Institute For Animal Health	Groundwater	Boiler Feed
451686,179975	On Site - Borehole 'C'	Institute For Animal Health	Groundwater	Drinking, Cooking, Sanitary, Washing (Small Washing)
451699,179957	On Site – Borehole 'A'	Institute For Animal Health	Groundwater	General Farming & Domestic
451699, 179957	On Site – Borehole 'A'	Institute For Animal Health	Groundwater	Drinking, Cooking, Sanitary, Washing (Small Washing)
451686,179975	On Site - Borehole 'C'	Institute For Animal Health	Groundwater	General Farming & Domestic
451750,179950	On Site - Borehole 'A'	Institute For Animal Health	Groundwater	General Farming & Domestic
451750,179950	On Site - Borehole 'A'	Institute For Animal Health	Groundwater	Drinking, Cooking, Sanitary, Washing (Small Washing)
451750, 179950	On Site - Borehole 'A'	Institute For Animal Health	Groundwater	General Farming & Domestic
451750,179950	On Site – Borehole 'A'	Institute For Animal Health	Groundwater	Drinking, Cooking, Sanitary, Washing (Small Washing)
451750,179950	On Site – Borehole 'A'	Institute For Animal Health	Groundwater	General Farming & Domestic
451710,179910	On Site – Borehole 'C'	Institute For Animal Health	Groundwater	General Farming & Domestic

4.3 Hydrology

4.3.1 Surface Water Courses and Drainage

The nearest surface water course is the River Pang which runs along the southern boundary of the site to the south of High Street flowing in south east direction.

A drain ditch runs to the east of the site flowing south towards the River Pang.

4.3.2 Surface Water Abstractions

With reference to the Envirocheck report there are no licensed surface water abstractions within 1km of the site.

4.3.3 Flooding

The indicative floodplain map for the area, presented in the Envirocheck report, shows that the southern part of site lies within flood zone 2 (flooding from rivers with flood defences) and flood zone 3 (flooding from rivers without flood deference).

4.4 Radon

The Envirocheck report indicates the site lies within an intermediate probability radon area, as between 1% and 3% of homes are above the action level. Radon protective measures are necessary in the construction of new dwellings or extensions.

4.5 Quarrying and Mining

An attempt has been made to identify any quarrying operations, past and present that have taken place in the vicinity of the site. The sources of information referenced in this element of the desk study include:

- Envirocheck Datasheet supplied by Landmark;
- Old Ordnance Survey maps and plans; and
- Geological maps.

These records indicate that two BGS recorded mineral sites (ceased) are present within 1km of the site. These are listed in Table 4.4.

Table 4.4 Quarrying Operations (<1km of Site)

National Grid Reference	Distance and Direction	Site Name	Geology	Type	Commodity
451611, 180126	10m West (Along western site boundary)	West Compton Chalk Pit	Lewes Nodular Chalk Formation	Opencast	Chalk
451208, 180318	375m West	Compton Downs Gravel Pit	River Terrace Deposits 1	Opencast	Sand and Gravel

4.5.1 Mining

With reference to the envirocheck report, the site is not indicated to lie in an area considered to be affected by coal mining.

4.6 Waste and Landfilling

An attempt has been made to identify any landfilling operations, past and present that have taken place in the vicinity of the site. The sources of information referenced in this element of the desk study include:

- Envirocheck datasheets supplied by Landmark;
- Records held by Local Authority;
- Old Ordnance Survey maps and plans; and
- Geological maps.

With reference to the above data there are three recorded historical landfill sites within 1km of the site. These are listed in Table 4.5.

Table 4.5 Landfilling (<1km of Site)

National Grid Reference	Distance and Direction	Name	Operator	Dates	Permitted wastes
451613, 180157	10m West (Along western site boundary)	Churn Road	Not Supplied	Dec 1961-Dec 1992	Inert and Industrial Waste
451214, 180343	375m West	Thorndown	Not Supplied	Not Supplied	Inert Waste

451210, 179536	595m South West (Close to Mayfield Farm)	Hill Barn Road	Not Supplied	Dec 1959- Dec 1969	Inert and Industrial Waste
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4.6.1 Historical Waste Disposal on Site

The SKM Enviros Report (2012) provides details on the possibility of historically tipped materials on the site, for example incinerator ash. An 'Institute Tip' was known to be located on the site.

4.7 Previous Site Reports

Aurora, Radiological Survey at the Institute for Animal Health Compton Main Site, December 2011.

A radiological survey was also carried out by Aurora Health Physics Services (Aurora) under the direction of SKM. The radiation survey was targeted at known areas of buried historical radioactive materials.

This was a non-intrusive gamma radiation detection survey to establish radiation levels at the surface of areas identified as potential radiological hazards, specifically based on the records of burial positions of radioactive material on the main site.

The historic work with radioactive materials at the site involved using tracers to study the movement of radioactive isotopes through the food chain. The waste material included laboratory glassware and animal carcasses. The work was mostly carried out with radioisotopes with a short half life so that radioactivity would decay soon after the experiments, these isotopes included phosphorous 32 (32P), sulphur 35 (35S) and iodine 125 (125I). However some experiments were also carried out with long half life isotopes (~30 years) such as caesium 137 (137Cs) and strontium 90 (90Sr) and there was also a possibility that other isotopes have been used and the records are no longer available.

The radiation survey focussed on the known areas of buried historical radioactive materials. These areas were:

- The Former Bull Pen area;
- The Sheep Pens, Dung Yard & environs; and
- Area to the east of Plowright building.

The equipment was capable of detecting radiation to a maximum depth of around 0.5m below ground level and identified some elevated activity indicative of buried 137Cs in the banked area close to the fence next to the Bull Pens area. This is an area where laboratory glassware from radioactive tracer experiments may be buried and also corresponds with the location of radioactive soil experiments undertaken in 1955 and the burial of pots. The maximum count rate of 466 is not indicative of hazardous levels of radiation.

Bull Pens (Area 1)

Identified as an area where laboratory glassware from radioactive tracer experiments and 41 concrete rings/pots may be buried. The buried material is believed to be located within the surrounding bank which lies between the site fence and Churn Road.

Results indicated the presence of radioactive contamination within this area extending beyond the site fence however soil samples of surface soils and vegetation indicated that the contamination had not spread at this time. Accessible drains in this area were also surveyed and no evidence of radioactive contamination was found.

Sheep Pens and Dung Yard Areas (Areas 2, 3 and 4)

Identified as an area where animal carcasses potential contaminated with radioactive materials were buried. The buried material is believed to be concentrated within the surrounding banked area.

Area 3 south of the Dung Yard Barn was not investigated as it was not accessible at the time.

During the survey no areas of significant elevated count rates were identified. One location on the eastern bank had slightly higher count rates, this was investigated further and was found to be an area of buried brick. Brick contains higher levels of naturally occurring radioactivity. The old and new incinerator (at the time) were also surveyed and no evidence of radioactive contamination was found.

Area to the East of Plowright Building (Sludge Beds) (Area 5)

Identified as an area where radioactive glassware may have been buried.

A small amount of laboratory waste was found comprising bags of soil. Results indicated some areas of elevated counts however; these were all associated with the brick building and other brick and tarmac features (such as tank bunds) which contain naturally occurring radioactivity. Accessible drains in this area were surveyed and no evidence of radioactive contamination was found.

Five areas of buried radioactive materials identified within the Site. No records have been seen to confirm whether any remediation has been undertaken with respect to these areas.

In all other areas surveyed no evidence of radioactive contamination was found, however this may be because only short lived radioisotopes were used or because the material is buried under a significant depth of chalk or topsoil. Further intrusive works were recommended.

The potential for the drainage system to have resulted in biological, chemical and radiological releases to ground remained unquantified at this stage and this was highlighted in the SKM report, with particular emphasis on biological waste since the requirement to pre-treat prior to disposal may have not always been conducted during the site's early history.

SKM Enviro, Phase 1 and 2 Land Quality Assessment Report, The Pirbright Institute Compton Laboratory Compton Main Site, (Dec 2012)

A targeted intrusive investigation of potential chemical contamination and a targeted survey of potential radiological contamination sources were carried out on the site by Aurora (reports presented as Appendix G).

The intrusive investigation of potential chemical contamination sources comprised the excavation of 23 hand dug pits and the drilling of 19 boreholes with field screening and collection samples for chemical testing. On site screening including monitoring volatile organic compounds (VOCs) and radioactivity.

Chemical contamination was found to be limited across the site, although asbestos was found within Made Ground particularly in the north.

An investigation in the location of the historical 'Institute Tip' was also carried out, with 4 No. boreholes installed into the waste material and monitored for ground gas. Results from the gas monitoring did not record any concentrations of methane and a low concentration of carbon dioxide (max. 1% v/v). Flow rates recorded in the boreholes were also low with a maximum of 0.7 litres/hour. Conclusions from the monitoring stated that the former Institute Tip does not exhibit a gas risk. No groundwater was detected in the boreholes and concentrations of metals in soil/ waste leachate recorded below Drinking Water Standards (DWS) therefore it was concluded that there was a low likelihood of significant pollution in the underlying aquifer.

Aurora, Intrusive Radiological Survey at the Institute for Animal Health Compton Main Site- July 2012 (Appendix G to SKM Enviros 2012 report)

During the intrusive survey of the Former Bull Pens area, 41 pots in total were discovered (24 pots on the west side and 17 on the north side). All pots were found to contain radioactive material, suspected to originate from nuclear weapons fall out material used for experiments. The sample results show levels of ^{137}Cs of up to 94 Bq/g and Plutonium isotopes over 2 Bq/g. These values are above the exemption limits for ^{137}Cs and ^{239}Pu specified in EPR 2011 of 10 Bq/g and 1 Bq/g respectively (or a total of 10,000 Bq) where an Environmental Permit is required for the accumulation and disposal of radioactive waste.

The presence of ^{241}Am , ^{239}Pu , ^{137}Cs and ^{60}Co indicates that this waste may have arisen from nuclear fission. Holdings of fissionable isotopes (such as ^{239}Pu) are required to be reported annually to UK Safeguards Office which is part of the Nuclear Directorate of the Health and Safety Executive, there are no exemption levels for this requirement. The maximum contact dose rate on a pot was 4 $\mu\text{Sv/hr}$ with an ambient dose rate of 0.2 $\mu\text{Sv/hr}$. It was not possible to confirm if the pots had an integrated base or were rings sat on a concrete slab without further disturbing the pots. The buried pots do not therefore represent a hazard to site staff providing they are not disturbed. Any excavation work (including remediation) in this area should be subject to a permit and a risk assessment.

The contamination found in the initial survey of the Bull Pens area was found to only extend to approximately 0.5m below the surface and was present at the same levels as found previously (maximum 20 counts per second (cps) using a Mini 900 with 44A probe). This contamination is likely to originate from small amounts of soil/manure spilled while filling or moving pots.

The Sheep Pens and Dung Yard area (specifically the surrounding banked area) had been identified as an area where animal carcasses potentially contaminated with radioactive materials were buried, however no trenches / carcasses were found during the investigation. Although the previous non-intrusive survey indicated no areas of significant elevated count rate, the historical data and some indications from site staff suggests that laboratory material was buried at the back of the bank, however reaching this area with an excavator would require significant earthworks which was beyond the scope of this survey. Further work in this area to investigate would be required, although it is noted that one pit identified significant quantities of laboratory waste, some labelled as radioactive, however no increased levels of radioactivity were found, suggesting that short-lived isotopes were used which is consistent with the historical data.

The investigation did not identify radioactivity associated with burials to the east of the current Plowright Laboratory, but only soil in bags was located in this area. Buried glass indicated on Pirbright Institute records was not found and it is possible that some glass remains despite extensive construction in the area since burial.

The site was authorised for the incineration of a small quantity of short half life and low radio toxicity of radioactive waste. Given the history of the site, it is possible that incinerator ash was historically tipped on site. It is known that there was an 'Institute Tip' to the west of the main site, but investigation here does not appear to assess radiological contamination.

Aurora, Intrusive Radiological Survey and Sampling at the Institute for Animal Health Compton – August 2012 (Appendix G to SKM Enviros 2012 report)

The purpose of this survey was to further investigate and take samples from areas where radioactive materials had been found to estimate the amount of radioactive material present. These areas were the Sheep Pen banks, where it had not been possible to fully excavate previously and the Former Bull Pens where two storage pots had been sealed with concrete and needed to be drilled under controlled conditions.

In the Sheep Pens area, a double trench on the north bank was identified adjacent to the old (inner) site fence. Both trenches contained laboratory waste, autoclave waste (metal baskets with glassware and petri dishes) and animal bones. No radioactive materials were found in the north bank trenches. Some items had dates written on them which ranged from 1961 to 1964.

A double trench was also found on the west bank, the first trench was 1.8m east of the fence, the second trench was 4.7m east of the fence. Radioactive materials were found in both trenches on the west bank, these consist of radioactive laboratory items, contaminated soil surrounding animal bones and bags of contaminated soil. Gamma radiation levels were found up to 100 cps measured with a Mini 900/44A scintillation probe, compared to a background instrument response of 5-10 cps.



Figure 2 Location of survey pits and estimated extent of burial trenches.

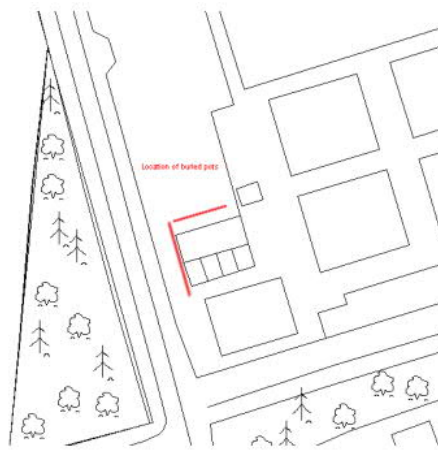


Figure 4 Location of pots on site drawing of Former Bull Pens

In the former Bull Pens area, Pots 40 and 41 were drilled to obtain samples. The concrete capping was approximately 10cm thick and the material inside the pots was the same as had been found in the other pots (soil contaminated with Cs-137). Gamma radiation levels were found up to 2,000 cps measured with a Mini 900/44A scintillation probe inside the pots, compared to a background instrument response of 5-10 cps.

Waste assessment

In the sheep pen area, radioactive soil was found in pits 7, 8 and 9 (west bank trenches) only and seemed to be surrounding animal bones, although the bones themselves were not active. The activity in the soil is likely to have resulted from the burial of contaminated animal carcasses as indicated by the historical data (ref. 2). Samples were taken of each material type (bagged soil, loose soil, chalk), all the samples indicate the soil is 'in scope' of the Environmental Permitting Regulations 2010 (137Cs > 1 Bq/g) and will therefore require specialist disposal under an Environmental Permit. There is approximately 50m in length of trenches (25m of each of the west bank inner and outer trenches) containing contaminated soil, the trenches are approximately 1m wide and 1.6m in depth and therefore could contain up to up to 80m³ (112 te) of Low Level Waste requiring specialist disposal under an Environmental Permit.

In the Former Bull Pens area, each pot contains approximately 0.35 m³ of material weighing approximately 500kg. Therefore there is approximately 6.7m³ (9.5 te) of 'out of scope' waste and 7.7m³ (11 te) (approximately 40 drums) of Low Level waste requiring specialist disposal under an Environmental Permit.

Appendix D Previous Reports and Memos Relating to Radioactive Substances

Key items which have potentially not been addressed are as follows:

Memo to Director from Regulation 21 July 1989

Two sites had recently have used for the burial of low level radioactive waste a) west of Dung

Yard and b) at Chesridge. This comprised the disposal of solvent waste and contaminated glassware respectively. Now all waste solvent is incinerated and glassware disposed to skips, leaving the Chesridge pit for the disposal of difficult wastes such as animal carcasses and contaminated faeces. Two pits present under the 'microbiology car park' and around three sides of the Dung Yard compound.

HMIP recommended centralisation of all radiochemical storage with procedures for updating certification of storage and disposal of isotopes and decay storage of aqueous waste prior to disposal.

NSG Ltd. (Report) Radiological Survey of Site Operated by Waste Construction – 28 August 1990

Survey found background levels in car park. Elevated levels on new bricks and excavated filter bed material, but likely to be naturally occurring radioactive materials. Concluded surface safe for car park use, but excavation should be treated with caution with radiological monitoring in attendance.

Report to Regulator from NRPB (Regulation) 19 May 1995 – Review of Radiation Protection

NRPB was the Radiation Protection Adviser to IAH. A tour was made of the 20-30 waste pit locations dating from the 1950s to 1986. No areas significantly above background radiation levels were found. Only one area approximately 1m² was found on the west side of the Dung Yard with readings of six times background.

Radiation Monitoring of the Schering Plough Car Park Site 1999.

A pit was exposed some 1.5-2m across and monitoring and analysis indicated that it was likely to have been used for coal ash disposal. The area was recovered with concrete. Monitoring of the retaining wall seepage suggested elevated levels of radioactivity and possibly Cs-137.

Advisory Committee on Dangerous Pathogens Risk Assessment of Institute for Animal Health Compton (January 2013)

A risk assessment was prepared as part of a land quality assessment following termination of experimental TSE work at the Institute for Animal Health Compton.

SKM Enviros, The Pirbright Institute Compton Farms Verification Report (July 2013)

This concerned remediation that targeted specific areas to the north, west and south west of the site. Remediation here sought to address any actual or perceived issues surrounding radiological contamination and associated burial of laboratory wastes. The remediation was conducted by Aurora Health Physics Services under the direction of SKM Enviros and appears to have been comprehensive, including for appropriate levels of validation and over digging. The areas targeted appear to include the areas of recorded landfill. Within the report reference is made to three anthrax burial pits which do not appear to have been addressed as part of these works.

SKM Enviros, The Pirbright Institute Compton Laboratory Outline Decommissioning Strategy (March 2014)

SKM Enviros prepared an outline decommissioning strategy report (seen only in draft form by AECOM) in March 2014. Table 8.2 within this report provides a series of estimated costs associated with remediation and demolition of the site. The report presents a breakdown of cost that equates to just less than £1M for remediation of the Core Site. However, there is no justification or rationale presented alongside the costs and in some areas high degrees of uncertainty. In AECOM's opinion particular areas of uncertainty surround the volume of material that would be removed from site as Hazardous. The cost of £715,000 presented for this item specifically would broadly equate to approximately 3000m³ of Hazardous material being disposed from site as part of any clean-up operation. SKM Enviros highlight in their report that there is a high degree of uncertainty with this cost. An allowance is also made to

investigate within the footprints of demolished buildings, but there is no apparent contingency to address any issues that this may identify. There is no specific reference to the drainage system which the LQM LQA identified as a potential risk area, due to potential leakage of untreated effluent prior to their being a requirement to treat the effluent.

Letter from Regulation 13, Head of Risk and Assurance, The Pirbright Institute: dated 10th June 2016, with regards the biological risks that remain at the closed Compton Site (note; this refers to a biological risk assessment – not provided as part of the information reviewed)

Biological risk at the site in particular TSE. The whole site previously worked on low risk biological agents (Hazard Group 2) standard decontamination was suitable. Biological Liquid would have been chemically disinfected before released to the drains and therefore is a negligible risk.

Recommendations:

- BSU and Plowright Buildings to be demolished to footprint;
- Modular building (LCMV) to the side of HSU to be demolished;

Greenfield Land facilities including buildings and associated effluent drains/tanks to be removed.

Letter from Regulation 13, Head of Risk and Assurance, The Pirbright Institute: dated 28th June 2016, with regards the biological risks of the Effluent Treatment Plant

Biological risk from Effluent Treatment Plant (not connected to the whole site) but it was connected to:

- the HCU (Until 2007);
- the mouse (Until 2007);
- Corridor D of the Experimental Animal Facility (EAH) which was never actually used for high containment so the drains to the ETP were not used;
- The Plowright Building may have been connected prior to 2007.

Chemical disinfectants would have been used for decontamination and during decommissioning so risks would be minimal.

Aurora, Independent Radiological Survey at the Pirbright Institute Compton Laboratories (January 2017)

Targeted radiological survey and sampling within the site. The purpose as to investigate the radiological status of the rooms where radioactive materials had been previously used and their associated discharge points to the ventilation and drainage systems.

The survey and sampling results indicate that no radioactive contamination above the out of scope levels defined in EPR16 is present in the above ground buildings that were monitored and sampled. The survey appears to have been carried out appropriately and we would consider that further work is not required, although this assumes that the information regarding which buildings used radioactive materials is correct and that no impacted buildings are left un-surveyed. We would suggest sending the survey analytical results to the demolition contractor for consideration of appropriate waste disposal options, as some low level readings were reported on items within the building (max 2.21 Bq/cm² in a fume cupboard).

Zetica, Summary Report Foul Drainage Mapping and CCTV Inspection, (May 2017)

The CCTV and drain investigation identified:

- 6 pipe fractures
- 5 displaced joints
- 3 point where roots were growing between pipe joints.

These locations present a potential path to the environment for historical radioactive discharges and the EA may require additional investigation in those areas as part of the surrender process of the site's radioactive substances permit.

Aurora, Radiological Monitoring Results from Compton Drain Survey (May 2017)

Radiological monitoring done to provide partial information on the radiological status of the drains under investigation and used as supporting evidence as part of the documentation suite for the Permit Surrender.

Direct monitoring was carried out in the area around the manhole as each drain cover was lifted.

Indirect survey was carried out by taking smear wipes of equipment as it was removed from the drains.

The direct and indirect radiological monitoring undertaken by Aurora found no elevated radiation dose rates or the any presence of radioactive contamination in any of the manholes, the equipment used or personnel monitored during the drain survey.

However, the CCTV and drain investigation identified 6 pipe fractures, 5 displaced joints and 3 points where roots were growing between pipe joints which present a potential path to the environment for historical radioactive discharges. Further investigation is recommended to assess ground conditions in the vicinity of these potential leakage points, focussing on radionuclides and daughter products which are still likely to be present

WYG, Asbestos Demolition Survey Report (June 2017)

High Level survey carried out for demolition contractors. A total of 7 samples were analysed following the survey. This led to the identification of 4 items. These include asbestos cement and well bound material.

Letter from Regulation 13, Industrial Services Manager, Grundon, not dated, subject Final report, Site Clearance Compton Site.

Two page summary of clearance work to remove all remaining items not forming part of any fixed installation. Makes reference to a method of works including removal of waste streams, decontamination of fume cupboards (separate certificates provided) and draining and bottoming out of oil tanks (no specific details provided).

Pirbright Institute Handover Documents, not dated

Numerous building specific "handover" documents with statements on Biohazards risk, H&S risk and Building Clearance state, Isolations, other, attachments (not attached) signed off by Regulation 13. All state the same information (i.e. no risks), with no supporting information. Documents are in word format and undated.

Public Health England, Former Pirbright Institute: Compton Berkshire, Data Review and Risk Assessment of Biological Persistence, 2018

Public Health England (PHE) was commissioned to undertake a review of existing information in order to produce a risk assessment to highlight the risk from biological contamination on site. PHE concluded that high risk areas may be narrowed down to the immediate vicinity of the high security drain connecting the effluent sterilisation plant and laboratory building C044. The risks are associated with numerous leak points and biofilm within the pipe itself.

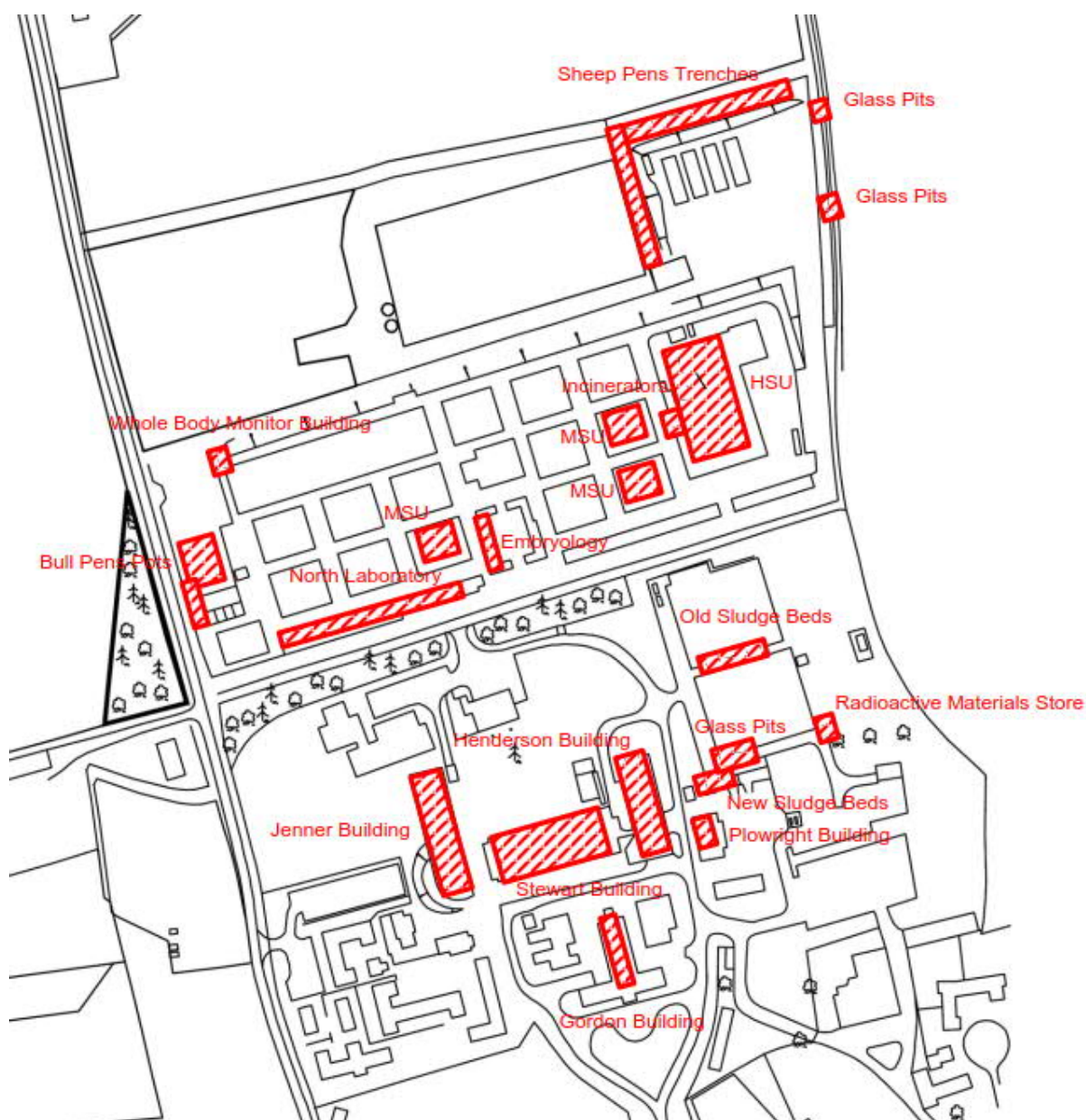
PHE do not recommend extensive sampling of this material as the source is well identified and that the pipework and surrounding soil will be removed and replaced by clean topsoil as planned for the site development Limited sampling may be of value to delineate the extent of contamination around various leak point by testing Salmonella and E.Coli 0157 as markers.

Other areas of additional risk include buried animal waste and bones off site anthrax burial pits and slurry tanks.

Personal Protective Equipment identified by PHE for site worker in the above high risk areas are as follows:

- Disposable Latex/nitrile gloves;
- One piece disposable overalls;
- Wellington boots which can be decontaminated with disinfectant such as Sodium Hypochlorite or Virkon;
- Eye protection cleaned in sodium hypochlorite at a minimum of 2% and preferably 10-20% with a contact time of 10 mins minimum but preferably an hour; and
- Following sampling in the above work areas soil should be removed from the PPE then sealed in bags and sent for landfill or incineration.

Aurora, Independent Desk Study On The Radiological Status of the Former Institute of Animal Health At Compton 2018 The report highlighted that radiological testing started on the site in 1955, subsequent to this date Aurora identified the several areas where radiological material was used on site which are shown below.



Of the above areas Aurora has identified the following areas to potentially contain buried radiological material.

The Bull Pens

The banking around the bull pens has been used to store large pots (0.85m diameter x 0.75m height) containing soil contaminated with radionuclides. Historical drawings of the site indicate that 18 pots were buried in these banks however an intrusive investigation in 2012 found 41 pots.

Radiochemistry analysis of samples from the pots was undertaken in 2013 revealed that some pots contained Cs-137 only whereas some pots contained mixed fission products including Sr-90, Cs-137, Am-241 and Pu-239. Aurora understood no remediation work has been carried out in this area.

Schering Plough Car Park

The car park to the north of the Bull Pens may have been used as a dump. It is also possible that the burial of additional pots extends from the Bull Pens into the Schering Plough Car Park. A surface survey was carried out by NSG in 1990 and no evidence of contamination was found. During the intrusive survey in 2013 it was not possible to investigate if the pots extended further north without undermining the car park. There is no evidence of any intrusive survey in this car park.

Sheep Pens/Dung Yard

On completion of the radiobiology experiments cows were taken to the rear of the site, shot and placed in trenches at the west and north of the current sheep pens/dung yard. Other laboratory waste was also placed in these trenches. In 2013 an intrusive survey was carried out of the trenches which found animal bones, laboratory equipment, used radioactive materials containers and radioactive contaminated soil. The Radiochemistry analysis of samples from the trenches revealed Sr-90 and Cs-137 although other radionuclides are likely to be present. Aurora understood no remediation work has been carried out in this area.

Whole Body Monitor Building

The whole body monitor was used to measure the radionuclide content of cows and was housed in a small building in the north west corner of the north site. The whole body monitor and building was dismantled in 1990. Cows would defecate and urinate while in the building potentially leading to contamination of drains. There is no evidence of any surveys being carried out in this area.

Glass pits,

Burial pits for radioactive glass from 1965. The area has been extensively redeveloped since then with the construction of new buildings and service ducts. Intrusive surveys in 2013 failed to find evidence for these pits.

Sludge Beds

The sludge beds processed effluent from the site and potentially contain radioactivity from animal waste. The current sludge beds and the location of the previous sludge beds have not been sampled or surveyed

Further to the above areas of buried known/potential radiologically impacted material a 2017 radiological survey was undertaken on the following buildings North Laboratory, Jenner Building, Stewart Building, Henderson building, Gordon Building, Medium Secure Units, High Security Unit, Embryology Building, Plowright building, Radioactive (Decay) Store and Site Incinerators as well as the site drainage. No evidence of radioactive contamination was found.

4.7.1 Adjacent Site Reporting

Hydrock, Greens' Yard, Compton Near Newbury, Remedial Method Statement, (June 2015)

The Greens' Yard was formerly located immediately south east of the site just off High Street in the village of Compton. The site was previously a disused agricultural vehicle

maintenance and storage depot. A number of abandoned buildings were previously present on the site with both under and above ground fuel and oil storage tanks.

The site was proposed for redevelopment as a residential area. The main risks identified at the site were to human health and controlled waters.

It was considered that the primary potential risks at the site were from the presence of residual hydrocarbon contamination and potential vapours.

The remediation strategy focused on a combined investigation and remediation of hotspots. The proposed works include the following:

- During Demolition works inspection of building footprints by a geo-environmental engineer;
- Trial pitting and soil sampling;
- Removal of USTs and associated pipe work;
- Removal of grossly contaminated soils and any floating product; and
- Groundwater sampling if encountered.

5. Review of Geo-environmental Risk

5.1 Introduction

This section is aimed at identifying possible risks, if any, to identify receptors arising from substances used or deposited on-site, or from other sources of land contamination. Both past and current potentially contaminative land uses have been considered.

The legislative framework for land contamination risk assessment and the principle of contamination linkages to derive a Conceptual Site Model (CSM) are described in Appendix E.

5.2 Sources of Contamination

5.2.1 Historical Usage

The contamination on a site will largely depend on the history of the site and the range of processes carried out and materials used and produce there.

The earliest mapping from 1877 indicated that the site was occupied by farm land until circa 1948 (Aerial Photograph). The development of the Pirbright Institute gave rise to a variety of activities and buildings including barns, laboratories and admin/accommodation buildings.

A site features plan is included as Figure 3 and Figure 4. A Figure displaying the potential areas of contamination is presented as Figure 5.

5.2.2 Current Usage

The site is currently disused with the exception of the buildings to the north west of the site which are occupied by Scitech. It was noted that some of the laboratories have not been cleared of all equipment and most of the tanks are still situated on the site, although presumed empty. A number of areas on the site were highlighted as potential areas of concern.

5.2.3 Off Site Sources

No current significant sources of potential off-site contamination have been identified; with the surrounding area generally occupied by farm land.

Historical sources of off-site contamination predominantly include the Churn Road Landfill formerly situated along the western boundary of the site. Farm land to the north, west and south west of the site was previously used to bury potentially contaminated animal carcasses however these have since been excavated and no longer considered to pose a risk.

The former Greens' Yard to the south-east was identified to previously host garage facilities, including petrol pumps and below ground storage tanks but this has been redeveloped under planning as residential housing, with presumed remedial works undertaken as detailed in the Hydrock (2015) Remedial Method Statement.

5.3 Potential Contaminants of Concern

With reference to the historical review, site walkover and with reference to the DoE Industrial Profiles (Animal and animal products processing works) the following potential sources of contamination can be anticipated at the site:

Table 5.1: Potential Contaminants of Concern

Sources	Activity/Location	Potential Contaminants of Concerns
S1- Buried Radioactive material	On Site: Bull Pens (Area 1) Results from Aurora radiological investigation positively identified radioactive contamination in this area	Radioactive Contamination
	On Site: Dung Yard/Sheep Pens (Area 2) Results from Aurora radiological investigation positively identified radioactive contamination in this area	
	On Site: South of Dung Yard Barn (Area 3) Results from Aurora radiological investigation indicated that this area was not investigated due to access restrictions	
	On Site: East of Dung Yard Barn (Area 4) Results from Aurora radiological investigation did not identify radioactive contamination in this area	
	On Site: North-east of Plowright Building Sludge Beds (Area 5) Results from Aurora radiological investigation did not identify radioactive contamination in this area	
S2- Potentially contaminated Made Ground	On-Site: Built up areas including roads, accommodation buildings, laboratories, barns and former footprints. The site is terraced and made ground may have also been used for engineering this including retaining walls.	Unknown constituents of Made Ground (metal, phenols, sulphates, poly-aromatic hydrocarbons) Asbestos (identified in SKM Enviros 2011 ground investigation)
S3- Laboratories, barns and Buildings	On Site: There are a significant number of laboratories, barns and buildings scattered across the site	Asbestos, radioactive contamination, biological contamination
S4- Drains	On-Site: Aurora and Zetica 2017 survey information identified fractures, displaced joints and root growth into drains.	Asbestos, radioactive contamination, biological contamination
S5- Institute Tip	Off: Previously used to tip incinerated ash.	Radioactive contamination Land gas generation (carbon dioxide, methane)
S6- Storage and use of fuel	On-Site: Fuel storage for the boiler house, incinerators, effluent treatment plant, Sludge drying beds	Fuels (ie. Kerosene, gas oil/diesel). PAHs
S7- Electricity Substations	On-Site: There are 5 know substations located on the site	Polychlorinated biphenyls (PCBs) and hydrocarbons
S8- Churn Road Landfill	Off-Site: Former Chalk Pit also used historically as a refuse tip.	Land gas generation (carbon dioxide, methane)
S9 Natural Strata	Onsite: Area located in lies within an intermediate probability radon area	Radon
S10- Effluent treatment system	On-site: Associated with treatment of discharges from laboratories	Chemical, radioactive and biological contamination
S11 – Sludge Drying Beds (Historic and recent)	Onsite: Historic: Along the northern boundary of Zone 2 Recent: To the north of HSU (CO44) and the skip yard	Chemical, radioactive and biological contamination
S12 – Buildings / Buried ducting	Onsite: Former Structures	Asbestos Containing materials

5.4 Pathways for Migration

The principal contamination pathways for migration may include the following:

- P1- Dermal contact, inhalation or ingestion of the contaminants present in topsoil or underlying strata, during works and post-development, including home grown vegetables (residential private gardens);
- P2- Leaching of contaminants, impact and migration of groundwater;
- P3- Surface water run-off and/or direct percolation from surface;
- P4- Ingress and/or accumulation of Radon / ground gas/vapours;
- P5- Direct contact of ground with in-ground structures;
- P6 -Leakages from laboratory drainage system; and
- P7 - Migration via preferential flowpaths e.g. services, deep foundation, backfill, etc.

5.5 Potential Receptors

Human Health Receptors

- R1- Final end users (residential and commercial);
- R2- Construction/Maintenance workers; and
- R3- Adjacent site users.

Controlled Waters Receptors

- R4- Groundwater (Principal Aquifer. SPZ and onsite boreholes); and
- R5- Surface Water (River Pang).

Property Receptors

- R6- Future proposed building structures; and
- R7 – Services (potable water).

Ecology

- R8 -Flora and Fauna.

5.6 Assessment of Plausible Contaminant Linkages

A risk assessment of the identified plausible contaminant linkages has been undertaken for the site in line with currently legislation outlined in Appendix E of the report. The assessment takes into consideration the sources of possible contaminant risks and the presence of any plausible pathways or receptors as outlined in the Environmental Protection Act 1900 (Part 2A).

A summary of the assessed risk is provided in Table 5.2. The risk matrix assessment is based on guidance within R&D Publication 66 (NHBC and Environment Agency, 2008) and included as Appendix F.

For the purpose of this risk assessment, it is assumed that the proposed end use of the site following re-development is residential housing.

A CSM illustrating plausible contaminant linkages has been formulated for the site. The qualitative risk assessment of the possible linkages of the above sources (S1 to S10), transport pathways (P1 to P4) and receptors (R1 to R7) is provided in Table 5.2 below:

Table 5.2: Plausible Pollutant Linkages (PPLs) and Qualitative Risk Assessment

Source (s)	Pathway	Receptor	Consequence	Probability	Risk	Justification
Hazards to Human Health						
S1- Buried Material S2- Made Ground S3- Laboratories, barns and buildings S4- Drains S5- Institute Tip	P1- Dermal contact, inhalation or ingestion of contaminants present in topsoil or underlying strata during works and post development	R1- Final end users	Medium	Likely	Moderate	Moderate Risk- Complete PLLs are likely to present an unacceptable risk without mitigation. A targeted intrusive ground investigation/radiological investigation, possible targeted remediation may be required.
		R2- Construction/ Maintenance workers	Medium	Likely	Moderate	Moderate Risk- Complete PLLs may present an unacceptable risk but should be managed by the implementation of appropriate risk assessment, and mitigation measures during construction. Risks are likely to be short term i.e. for the duration of earthworks exposing contaminated ground.
		R3- Adjacent site users	Medium	Unlikely	Low	Low Risk- Completed PLLs are unlikely to present a risk any future groundwork should be assessed with the appropriate risk assessment and mitigation measures if necessary.
S6- Storage and Use of Fuel S7- Electrical Substations S8- Churn Road Landfill S9- Natural Strata S10- Effluent Sterilisation Plant S11- Sludge Beds S12- Buildings/Buried Ducting	P4- Ingress and/or accumulation of ground gas/ vapour	R1- Final end users	Severe	Low	Moderate	Moderate Risk- Complete PLLs are likely to present an unacceptable risk without mitigation. A targeted intrusive ground investigation/radiological investigation and possible targeted remediation may be required. Soil vapour measures may be required for buildings and structures.
		R2- Construction/ Maintenance workers	Severe	Low	Moderate	Moderate Risk- Complete PLLs may present an unacceptable risk but should be managed by the implementation of appropriate risk assessment, and mitigation measures during construction. Risks are likely to be short term.
		R3- Adjacent site users	Severe	Low	Moderate	Moderate Risk- Complete PLLs may present an unacceptable risk but should be managed by the implementation of appropriate risk assessment, and mitigation measures during construction. Risks are likely to be short term.
	P6- Leakages from laboratory drainage system	R1- Final end users	Medium	Likely	Low	Moderate Risk- Complete PLLs are likely to present an unacceptable risk without mitigation. A targeted intrusive ground investigation/radiological investigation, possible targeted remediation may be required.

Source (s)	Pathway	Receptor	Consequence	Probability	Risk	Justification
		R2- Construction/ Maintenance workers	Medium	Likely	Moderate	Moderate Risk- Complete PLLs may present an unacceptable risk but should be managed by the implementation of appropriate risk assessment, and mitigation measures during construction. Risks are likely to be short term i.e. for the duration of earthworks exposing contaminated ground and should be managed by appropriate health and safety risk assessment, in accordance with Construction Design Management Regulations 2015. Risk assessment should be carried out with regards to acute risk, by the Principal Contractor, in accordance with current health and safety regulations. This assessment should cover potential risks to both construction staff and the local population.
		R3- Adjacent site users	Medium	Unlikely	Low	Low Risk- Completed PLLs are unlikely to present a risk any future groundwork should be assessed with the appropriate risk assessment and mitigation measures if necessary.
Hazards to the Water Environment						
S1- Buried Material S2- Made Ground S3- Laboratories, barns and buildings S4- Drains	P2- Leaching of contaminants, impact and migration of groundwater (Principal Aquifer)	R4- Groundwater (Principal Aquifer)	Severe	Likely	High	High Risk- Complete PLLs are likely to present an unacceptable risk. A possible risk of soil leaching impacting groundwater quality if areas of hardcover are lifted and not replaced as part of the final development.
S5- Institute Tip S6- Storage and Use of Fuel	P3- Surface water run-off and/or direct percolation from surface	R5-Surface Water (River Pang)	Severe	Likely	High	High Risk- Complete PPLs are likely to present an unacceptable risk without mitigation. Mitigation of construction effects should be implemented where it is deemed necessary.
S7- Substations S8- Churn Road Landfill S9- Natural Strata S10- Effluent Sterilisation Plant	P6- Leakages from laboratory drainage system	R4- Groundwater (Principal Aquifer)	Severe	Likely	High	High Risk- Complete PLLs are likely to present an unacceptable risk. A possible risk of soil leaching impacting groundwater quality if areas of hardcover are lifted and not replaced as part of the final development.

Source (s)	Pathway	Receptor	Consequence	Probability	Risk	Justification
S11- Sludge Beds S12- Buildings/Buried Ducting						
Hazards to Building Fabric, Structures and Services						
S1- Buried Material S2- Made Ground S3- Laboratories, barns and buildings S4- Drains	P4- Ingress and/or accumulation of ground gas/vapours	R7- Future proposed building structures and services	Medium	Likely	Moderate	Moderate Risk- Complete PLLs are likely to present an unacceptable risk without mitigation. A targeted intrusive investigation and possible targeted remediation may be required. Soil vapour measures may be required for buildings and structures.
S5- Institute Tip S6- Storage and Use of Fuel	P5- Direct contact of ground with in-ground structures		Minor	Likely	Low	Low Risk- Completed PLLs are unlikely to present a risk any future groundwork should be assessed with the appropriate risk assessment and mitigation measures if necessary.
S7- Substations S8- Churn Road Landfill S9- Natural Strata S10- Effluent Sterilisation Plant S11- Sludge Beds S12- Buildings/Buried Ducting	P7- Migration via preferential flow paths e.g. services, deep foundation, backfill, etc.		Medium	Likely	Moderate	Moderate Risk- Complete PLLs are likely to present an unacceptable risk without mitigation. A targeted intrusive investigation and possible targeted remediation may be required. Soil vapour measures may be required for buildings and structures.
Hazards to the Ecological Environment						

Source (s)	Pathway	Receptor	Consequence	Probability	Risk	Justification
S1- Buried Material S2- Made Ground S3- Laboratories, barns and buildings S4- Drains	P2- Leaching of contaminants, impact and migration of groundwater	R8- Flora and Fauna	Medium	Likely	Moderate	Moderate Risk- Complete PLLs are likely to present an unacceptable risk without mitigation. A targeted intrusive ground investigation/radiological investigation, possible targeted remediation may be required.
S5- Institute Tip S6- Storage and Use of Fuel S7- Substations S8- Churn Road Landfill S9- Natural Strata	P3- Surface water run-off and/or direct percolation from surface		Medium	Likely	Moderate	Moderate Risk- Complete PLLs are likely to present an unacceptable risk without mitigation. A targeted intrusive ground investigation/radiological investigation, possible targeted remediation may be required.
S10- Effluent Sterilisation Plant S11- Sludge Beds S12- Buildings/Buried Ducting	P6-Leakages from laboratory drainage system		Medium	Likely	Moderate	Moderate Risk- Complete PLLs are likely to present an unacceptable risk without mitigation. A targeted intrusive ground investigation/radiological investigation, possible targeted remediation may be required.

5.7 Human Health

Based on the findings from the desk study information environmental review, there is a potential for a variety of contamination hotspots across the site. The potential for impact from previous activities at the Pirbright Institute is considered to be moderate.

For final end users the risk from contaminated soils is considered to be moderate. This is because of the presence of Made Ground, small scale radioactive areas and the potential for associated contamination with the biological activities carried out at the site.

A moderate risk to site users was assessed with respect to landfill gas generation from made ground, the on-site Institute tip and the off-site landfill located on Churn Road. This could be reduced to a low risk with site specific gas risk assessment and installation of appropriate gas protection measures within the proposed development.

It is considered that the risk to site/maintenance workers from contaminated soils is moderate. This is because direct contact with any potential contamination by construction workers on any excavation works is considered possible, however the risk could be reduced through an appropriate health and safety risk assessment.

5.8 Controlled Waters

The site is underlain by a Principal Chalk Aquifer and the south west of the site lies within a SPZ 1. A groundwater abstraction borehole associated with the SPZ 1 lies to the south of the site. The abstraction is a single point abstraction for public water supply. Records indicate that it was used as a water supply for the site for various activities including drinking water, farming and as a boiler feed.

A high risk to controlled waters was assessed with respect to controlled waters; this is because potential sources of contamination have been identified at the site with particular concern of the principal chalk aquifer and groundwater abstraction.

5.9 Property

Substances that can be involved in the chemical attack on building materials and structures may be present beneath the site, these substances may include sulphates.

The risk is considered to be low although with a site specific risk assessment and suitable specification of materials in accordance with BRE SD1 and with respect to statutory authorities (water supplies) the risk can be reduced to very low.

A moderate risk to buildings was assessed with respect to landfill gas generation from the presence of Made Ground, historic Institute tip and off –site landfill. This can be reduced to low with a site specific gas risk assessment and the installation of appropriate gas protection measures within the proposed development.

6. Review of Geotechnical Risk Assessment and Foundation Options

6.1 Details of the Proposed Development

It is understood that the development is likely to comprise the construction of low rise residential housing with associate infrastructure.

6.2 Geotechnical Hazards

The anticipated ground conditions beneath the site are discussed in Chapter 4. During the site walkover it was noted that the site is situated on sloping grounds from the north towards Compton Village. The construction of the site has led to a terraced structure with a number of retaining walls to accommodate for the buildings, laboratories and barns.

A summary of commonly occurring ground-related hazards, excluding ground contamination, is given in Table 6.1 together with an assessment of whether the site may be affected by each of the stated hazards and the possible consequences.

6.1: Summary of main potential geotechnical hazards that may affect the site

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development		Engineering considerations if hazard affects site
	Likely/could be present and/or affect site	Unlikely to be present and/or affect site	
Sudden lateral changes in ground conditions	✓		Intrinsic variability of the River Terrace Deposits within the southern extent of the site. This variability could lead to differential settlements which would need to be considered for foundation and earthwork design.
Shrinkable / sensitive clay soils and chalk	✓		Potential ground-related hazards may relate if any sensitive silty clays are encountered beneath the site with risk of swelling / shrinkage, potential rapid loss of strength in wet conditions and frost-susceptible, if present. Chalk can become frost –susceptible in wet conditions. This will need to be considered for foundation design.
Highly compressible and low bearing resistance soils	✓		Potential for soft chalk across the site and loose River Terrace Deposits in the southern part of the site; which would provide an unsuitable founding stratum.
Karstic dissolution features (including 'swallow holes' in Chalk terrain)	✓		The site is underlain by Chalk Bedrock. The Envirocheck indicates that there is a low hazard potential for dissolution features on the site. May affect ground engineering and foundation design.
Evaporite dissolution features and/or subsidence		✓	May affect ground engineering and foundation design.
Ground subject to or at risk from coastal or river erosion		✓	No Hazard
High groundwater table (including waterlogged ground)	✓		Groundwater is likely to be variable within the chalk aquifer and may change depending seasonal fluctuations. The southern part of the site is in a flood zone 2. May affect temporary and permanent works.

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development		Engineering considerations if hazard affects site
	Likely/could be present and/or affect site	Unlikely to be present and/or affect site	
Quarrying/mining		✓	Historical chalk pits is noted in the area. If present on site the infilled pits are unlikely to provide suitable strata for foundations.
Existing sub-structures (e.g. tunnels, foundations, basements, and adjacent sub-structures)	✓		The history of the site involved the construction of buildings; there may be substructures and foundations, including basements, which will require removal prior to future construction projections.
Filled and made ground (including embankments, infilled ponds and quarries)	✓		Potential of disturbed ground / infilled burial pits/bunds across the site. These artificial deposits are unlikely to provide a suitable founding stratum due to the variability of the material
Adverse ground chemistry (including expansive slags and weathering of sulphides to sulphates)	✓		Concrete foundations and service structures may need to be designed against natural chemical attack from sulphates within the superficial strata. A chemical assessment would need to be undertaken to confirm the possible impact of this on any proposed concrete structures.

6.3 Foundations and Ground Engineering

6.3.1 Foundations

For light to moderate loads, the Made Ground and River Terrace deposits are expected to be unsuitable for the use of traditional spread foundations founded within the formation. The chalk is expected to be suitable for the use of traditional spread foundations founded within the formation. However, piled foundations may be considered for more heavily loaded structures or structures located in close proximity to existing trees.

The construction of both bored and driven piles would be technically feasible at this site. However, due to the close proximity of the surrounding buildings driven piles are considered unlikely to be acceptable from an environmental/nuisance point of view.

Piles may encounter perched groundwater within the Made Ground deposits and an allowance should be made for chiselling or other means to remove obstructions.

6.3.2 Ground Floor Slabs

Ground bearing floor slabs are thought to be suitable founding method, however, this is dependent on the consistency of the chalk and the floor loading. The potential use of ground bearing floor slabs will be determined following the ground investigation.

6.3.3 Excavations

Shallow excavations for foundations and drainage are anticipated to be locally stable. However, close or continuous support will be required for any manned entry to excavations.

Shallow groundwater could be encountered in the Made Ground and may therefore require groundwater control during any excavations.

6.3.4 Soakaways

The ground conditions are unlikely to be unsuitable for the use of pit soakaways. Therefore, surface water run-off should be directed to main drainage subject to appropriate consent to discharge.

The EA describes how it manages and protects groundwater in the Groundwater Protection: Principles and Practice (GP3) documents. It identifies that most soakaway systems are a potential risk to groundwater quality. Approval from the EA is likely to be required for the use of soakaways, and where necessary the EA will issue permits or notices in order to control the risk to groundwater from contaminated discharges. It should be noted that there are particular restrictions on the use of soakaway systems, including:

- Direct discharge of pollutants into groundwater will not be authorised unless subject to the provisions set out in the Water Framework Directive (2000/60/EC), Article 11(3)(j) and the Groundwater Daughter Directive (2006/118/EC) Article 6.
- The EA will object to new sewage effluent, trade effluent, storm sewage or other significantly contaminated discharges to ground inside a groundwater SPZ1. This also applies where there is unacceptable risk of pollution to groundwater or where the discharge will cause pollution by mobilising contaminants already in the ground.
- Outside a groundwater SPZ1 the EA will object to developments involving sewage, trade effluent or other contaminated discharges to ground unless they are satisfied that it is not reasonable to make a connection to the public foul sewer. This will not normally apply to surface water run-off to sustainable drainage systems.

Soakaways have a potential cause of dissolution and instability in Chalk as a result of a concentrated flow of water into the Chalk through existing open discontinuities (Lord, Clayton and Mortimore, 2002). In designing foundations CIRIA publication C574 states that soakaways should be avoided if at all possible, but if unavoidable they should be sited with consideration of foundations and Chalk density, as follows:

- In areas where dissolution features are known to be prevalent, soakaways should be avoided if at all possible but, if unavoidable, should be sited at least 20m away from any foundations;
- Where the Chalk is of low density, or its density is not known, soakaways should be sited at least 10m away from any foundations; and
- Where the Chalk is of medium density (or higher), the closest part of the soakaway should be at least 5m away from any foundations.

7. Recommendations for Further Work

The geo-environmental investigation should be designed with due consideration of the requirements of BS10175 (2001+A1) Investigation of potentially contaminated sites- Code of Practice.

Within the areas of radiological potential concern ground investigation works should be carried out with a radiological expert watching brief.

Radiological aspects of the investigation should be designed in consideration of the Environment Agency (2002) Guidance on the Characterisation and Remediation of Radioactively Contaminated Land.

The geotechnical elements of the investigation should be designed with consideration of BS EN 1997-1:2004, BS1997-2:2007 (Eurocode 7:Geotechnical Design- Parts 1 and 2) and BS 5930 (2015) Code of Practice for Ground Investigation.

By undertaking an intrusive investigation, an assessment of the ground and groundwater profiles may be carried out and the geotechnical and geo-environmental risk associated with the site.

The investigation will allow a quantitative assessment as to whether any of the potential risks identified in this study are present and are of material concern to the development.

Further investigation and verification works will be required following the removal of potentially contaminative sources (i.e tanks etc) and within the demolition footprints of buildings.

.

PHE concluded that high risk biological areas may be narrowed down to the immediate vicinity of the high security drain connecting the effluent sterilisation plant and laboratory building C044. The risks are associated with numerous leak points and biofilm within the pipe itself and that outside these areas only anthrax has the longevity in the soil environment to still be present.

Details should be obtained on the current status of existing Environmental Permits relating to the usage of radioactive materials at the site with evidence of supporting evidence for surrender.

Identified buried sources of radiological materials will require specialist disposal under an Environmental Permit.

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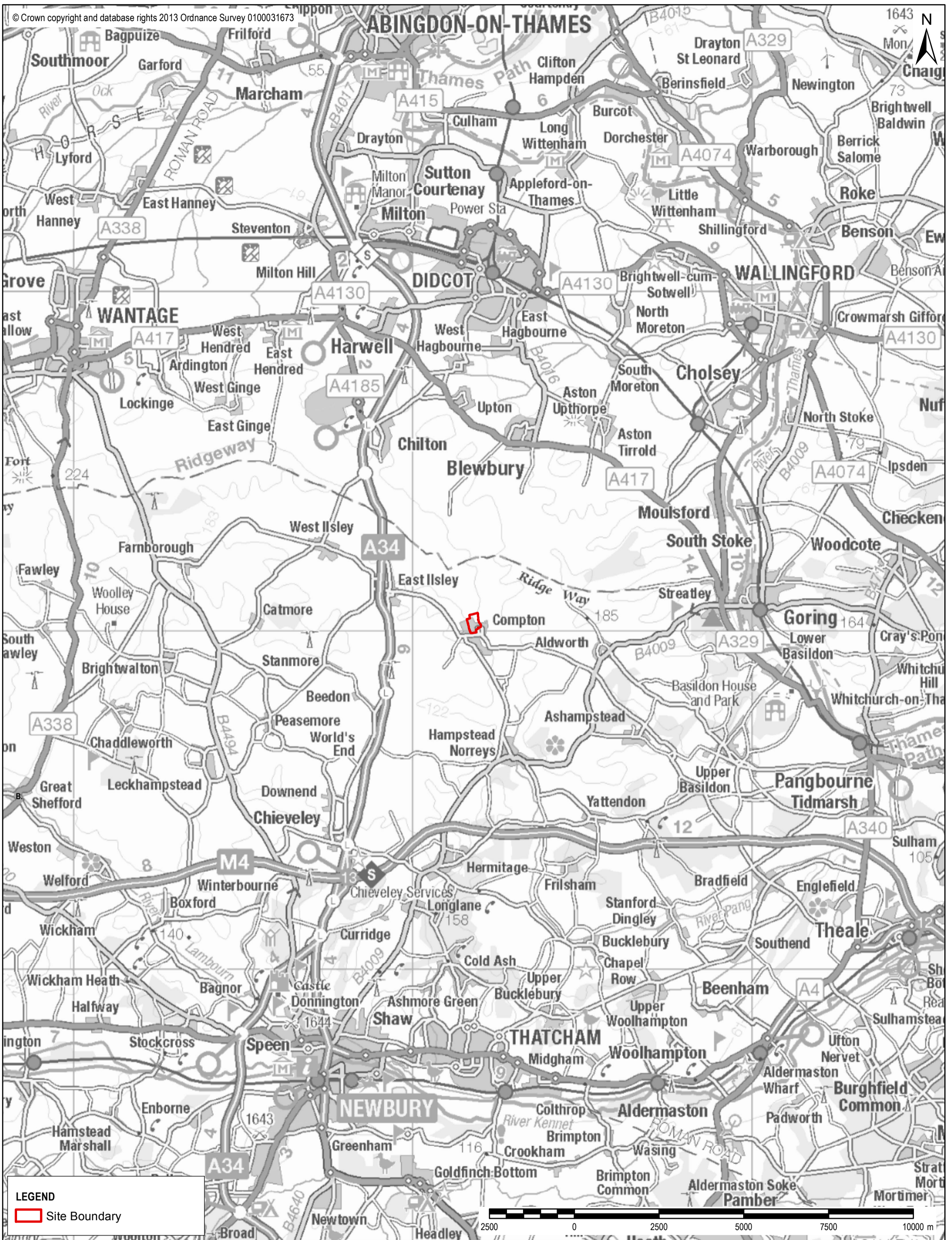
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Figures



Project Title/Drawing Title
HCA COMPTON
FIGURE 1: SITE LOCATION PLAN

Client HOMES & COMMUNITIES AGENCY		
Drawn FG	Checked CC	Approved EI
Date 04/09/2017	Scale @ A3 1:100,000	Purpose of Issue DRAFT
Drawing Number FIGURE 1		Rev 01

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LEGEND

- Site Boundary
- Building

Project Title/Drawing Title <p style="text-align: center; font-weight: bold;">HCA COMPTON</p> <p style="text-align: center; font-weight: bold;">FIGURE 2: SITE LAYOUT PLAN</p>	Client HOMES & COMMUNITIES AGENCY			AECOM One Trinity Gardens, Quayside, Newcastle upon Tyne, NE1 2HF Telephone 0191 224 6584 www.aecom.com <div style="text-align: right; font-weight: bold; font-size: 1.2em;">AECOM</div>
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Institute For Animal Health



Building No.	Name
C001	Greenfields Sheep Unit
C002	Sheep Pens
C003	Barn- Demolished
C006	Schering Plough Laboratory
C010	Propane Store
C012	Store
C013	Bull Pen
C015	Former Pig Unit
C016	Former 'Porta Pig'
C017	Livestock research/accommodation unit
C018	Livestock research/accommodation unit
C019	Livestock research/accommodation unit
C020	Livestock research/accommodation unit
C021	Livestock research/accommodation unit
C022	Livestock research/accommodation unit
C023	North Laboratory
C024	Barn
C025	Office/Store
C026	Livestock research/accommodation unit
C027	Diagnostics Laboratory/Card Unit
C028	Disused Incinerator in Slaughter House
C029	Embryology Laboratory
C030	Farm offices/administrative building
C031	Livestock research/accommodation unit
C032	Gnotobiotic Units
C033	Gnotobiotic Units
C034	Barn
C035	Office/Store
C036	Barn
C037	Barn
C038	Barn
C039	Store
C041	Medium Security Unit
C042	Medium Security Unit
C043	Incinerator
C044	High Security Unit and extension building
C045	High Security Unit
C050	Biological Support Unit
C052	Specified Pathogen Free (SPF) Building
C053	Boiler House
C054	Substation
C055	Experimental Animal House
C056	Poultry Production Unit
C057	Store
C059	Effluent Sterilisation Plant
C060	Jenner Building (Laboratory)
C062	Stewart Building (Research Laboratory)
C064	Henderson Building / Substation
C065	Substation
C066	Plowright Laboratory
C067	Former Engineering Stores
C068	Staff Restaurant
C069	Gordon Building (Research Laboratory)
C070	Selborne Building (Library and prior to that an animal unit)
C072	Residential Accommodation (Dunkin)
C080	Topley Accommodation Unit
C081	Topley Accommodation Unit
C084	Topley Accommodation Unit
C085	Topley Accommodation Unit
C087	Creche/Social Facility
C089	Gate House
C093	Barn

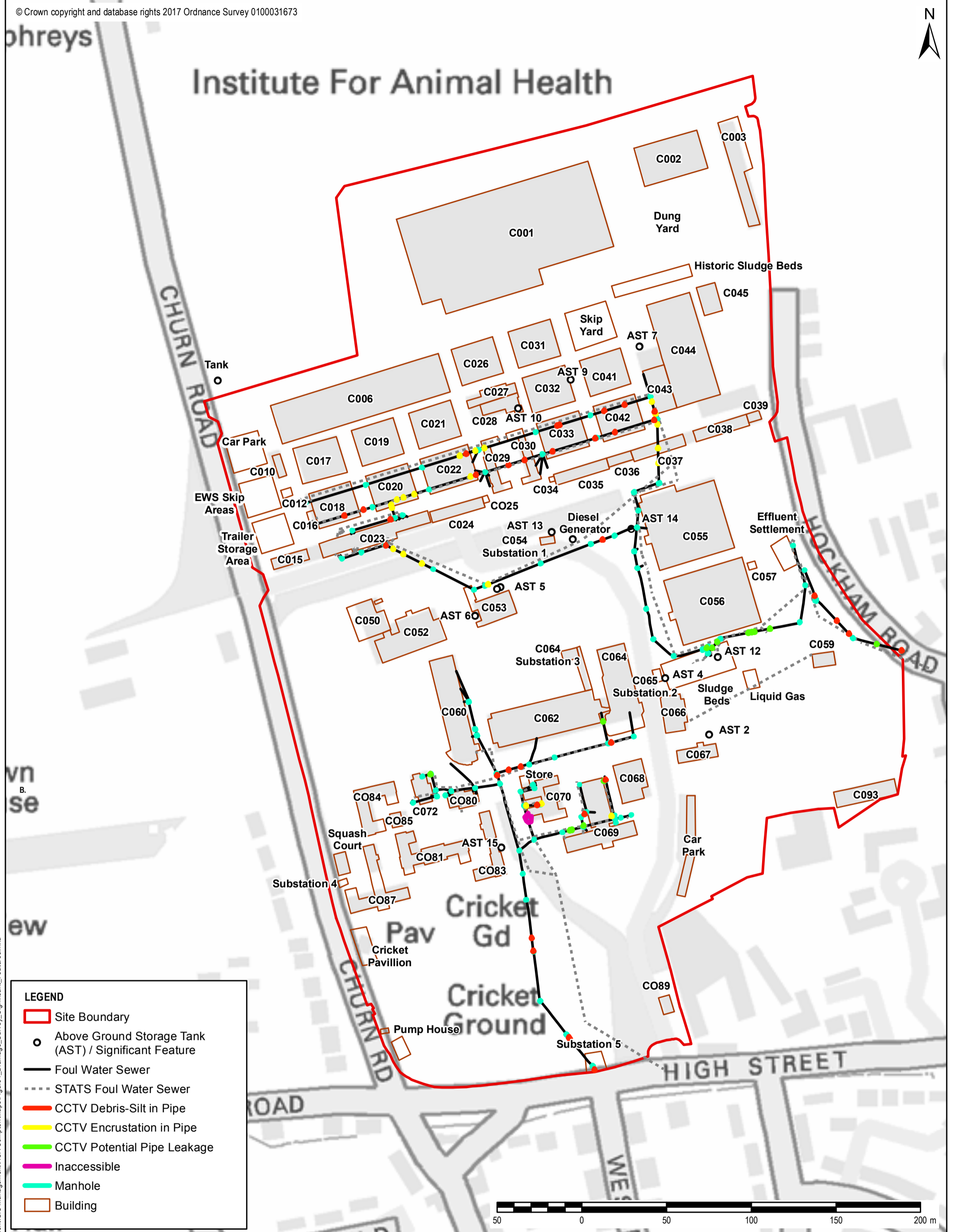
LEGEND

- Site Boundary
- Above Ground Storage Tank (AST) / Significant Feature
- Building
- Zone 1 Compound
- Zone 2 Operational
- Zone 3 Hostel / Residential
- Zone 4 Recreational

Project Title/Drawing Title <h2 style="text-align: center;">HCA COMPTON</h2> <h3 style="text-align: center;">FIGURE 3: SITE FEATURES PLAN</h3>	Client <h3 style="text-align: center;">HOMES & COMMUNITIES AGENCY</h3>	AECOM One Trinity Gardens, Quayside, Newcastle upon Tyne, NE1 2HF Telephone 0191 224 6584 www.aecom.com <div style="text-align: right;">AECOM</div>
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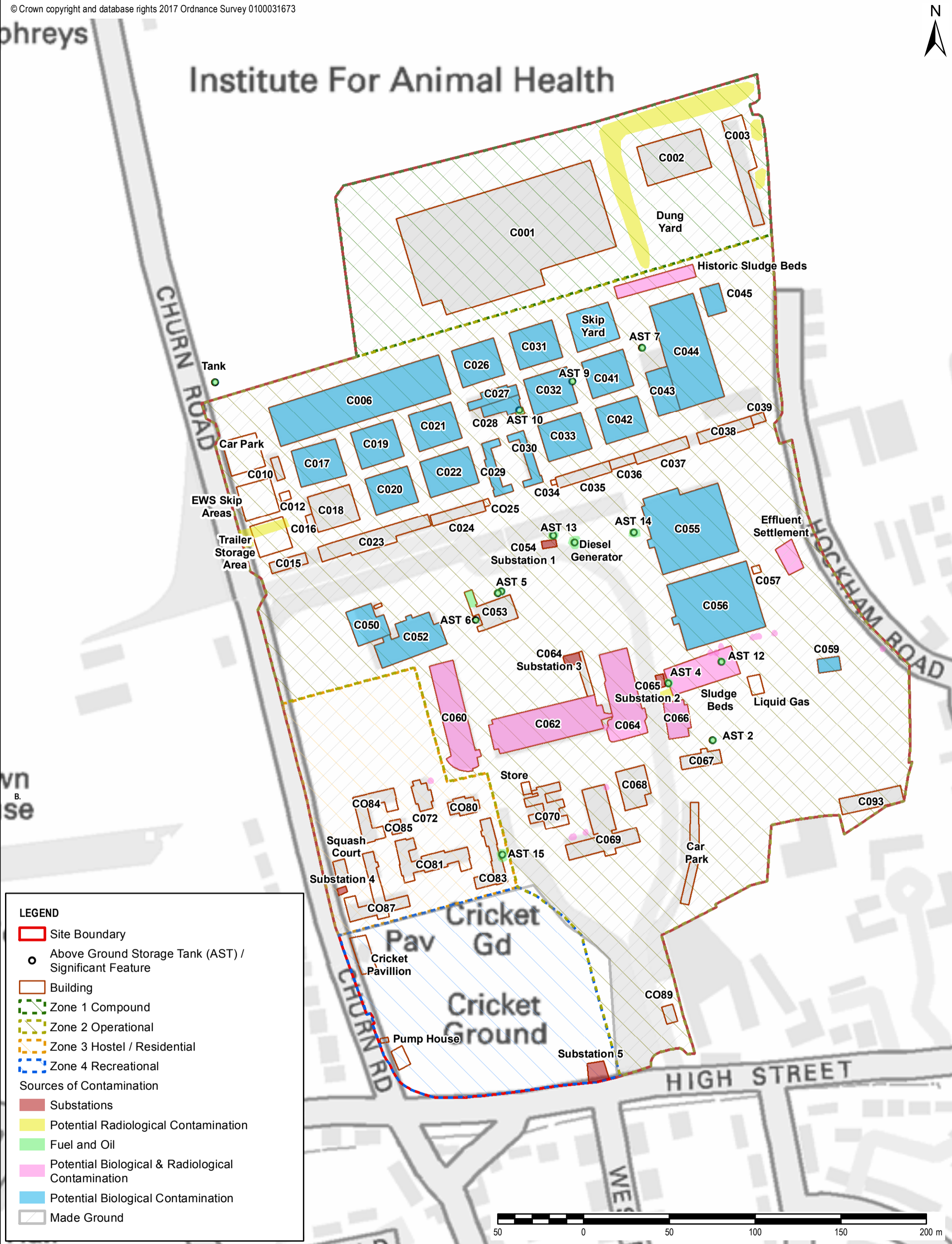
- Site Boundary
- Above Ground Storage Tank (AST) / Significant Feature
- Foul Water Sewer
- STATS Foul Water Sewer
- CCTV Debris-Silt in Pipe
- CCTV Encrustation in Pipe
- CCTV Potential Pipe Leakage
- Inaccessible
- Manhole
- Building



<p>Project Title/Drawing Title</p> <p style="text-align: center;">HCA COMPTON</p> <p style="text-align: center;">FIGURE 4: DRAINAGE SURVEY SIGNIFICANT FEATURES</p>	<p>Client</p> <p style="text-align: center;">HOMES & COMMUNITIES AGENCY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Drawn FG</td> <td style="width: 33%;">Checked LC</td> <td style="width: 33%;">Approved EI</td> </tr> <tr> <td>Date 04/10/2017</td> <td>Scale @ A3 1:2,000</td> <td>Purpose of Issue DRAFT</td> </tr> <tr> <td>Drawing Number FIGURE 4</td> <td>Rev 01</td> <td></td> </tr> </table>	Drawn FG	Checked LC	Approved EI	Date 04/10/2017	Scale @ A3 1:2,000	Purpose of Issue DRAFT	Drawing Number FIGURE 4	Rev 01		<p>AECOM</p> <p>One Trinity Gardens, Quayside, Newcastle upon Tyne, NE1 2HF Telephone 0191 224 6584 www.aecom.com</p> <p style="text-align: right;">AECOM</p> <p style="font-size: small; text-align: center;">THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.</p>
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LEGEND

- Site Boundary
- Above Ground Storage Tank (AST) / Significant Feature
- Building
- Zone 1 Compound
- Zone 2 Operational
- Zone 3 Hostel / Residential
- Zone 4 Recreational
- Sources of Contamination**
- Substations
- Potential Radiological Contamination
- Fuel and Oil
- Potential Biological & Radiological Contamination
- Potential Biological Contamination
- Made Ground



Project Title/Drawing Title <h2 style="text-align: center;">HCA COMPTON</h2> <h3 style="text-align: center;">FIGURE 5: AREAS OF POTENTIAL CONTAMINATION</h3>	Client HOMES & COMMUNITIES AGENCY			AECOM One Trinity Gardens, Quayside, Newcastle upon Tyne, NE1 2HF Telephone 0191 224 6584 www.aecom.com <div style="text-align: right;">AECOM</div>
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Appendix A On Site Building Usage Assessment

Building No.	Name	Current/Previous Use	Biological		Radiological	Infrastructure
			Hazard Group/Study	Containment Level		
Zone 1: Compound Area						
CO01	Greenfields Sheep Unit	Studies on sheep	Hazard Group 2 Transmissible Spongiform Encephalopathies (TSE)	Unknown	-	AST 1: Historically 2 ASTs to the west of the building (<u>Details and exact location unknown</u>) Previously stored Gas - Oil.
CO02	Sheep Pens	Barn	-	-	-	-
CO03	Dung Compound Barn	Demolished	-	-	-	-
Zone 2: Operational Area						
CO06	Schering Plough Laboratory	Scitech now occupy this building	-	-	-	-
CO10	Propane Store	Store	-	-	-	-
CO12	Store	Demolished now used for waste/general storage	-	-	-	-
CO13	Bull Pen	Demolished now used for waste/general storage	-	-	-	-
CO15	Isolation Compound	Former Pig Unit	-	-	-	-
CO16	Former 'Porta Pig'	Disused temporary building	-	-	-	-
CO17	Compound Units 3/4	Livestock research/accommodation unit	-	-	-	-
CO18	Compound Units 5/6	Livestock research/accommodation unit	-	-	-	-
CO19	Compound Units 9/10	Livestock research/accommodation unit	-	-	-	-
CO20	Compound Units 11/12	Livestock research/accommodation unit	-	-	-	-
CO21	Compound Units 15/16	Livestock research/accommodation unit	-	-	-	-
CO22	MSU Unit 17/18	Livestock research/accommodation unit	-	-	-	-
CO23	North Laboratory	Research Unit Pirbright Institute have documentation for cleanup of single floor in 2008	Hazard Group 2	-	-	-
CO24	Barn	-	-	-	-	-
CO26	Compound 19/20	Livestock research/accommodation unit	-	-	-	-
CO27	Isolation Compound CARD Offices	Diagnostics Laboratory/ Clinical laboratory	-	Containment Level 2	-	-
CO28	Disused Incinerator Slaughter House	Housed an incinerator and a slaughter house	-	Containment Level 2	Isotopes Used: Chromium-51 Iodine- 125 Indium- 111 Tritium Sulphur- 35 Phosphorus- 32 Phosphorus- 33 Carbon -14	AST 10: Two tanks associated with incinerator. Stored: Gas Oil and Diesel.
CO29	Embryology Laboratory	Historically a laboratory and used for laundry	-	-	Isotopes Used: Tritium	-
CO30	Farm offices	Administrative building	-	-	-	-
CO31	Compound Units 21/22	Livestock research/accommodation unit	-	-	-	-
CO32	Gnotobiotic Unit 23/24	-	-	-	-	AST 9: Adjacent to building. Stored: Gas Oil
CO33	Gnotobiotic Units 25/26	-	-	-	-	-
CO34	Barn	-	-	-	-	-
CO35	Barn	-	-	-	-	-
CO36	Barn	-	-	-	-	-
CO37	Barn	-	-	-	-	AST 8: Located in the building (Exact location Unknown) Stored: Gas Oil
CO38	Barn	-	-	-	-	-
CO40	Compound Unit 27/28	-	-	-	-	-
CO41	Compound Unit 29/30 Medium Security Unit	Research Unit	Hazard Group 2 (salmonella and other enteric organisms)	-	Isotopes Used: Indium-111	-
CO42	Compound Unit 31/32 Medium Security Unit	Studies on Calves, pigs and goats	Swine Influenza, Respiratory Syncytial Virus (RSV)	Level 2	Isotopes Used: Indium-111	-
CO43	Incinerator	-	-	-	Isotopes Used: Chromium-51 Iodine- 125 Indium- 111 Tritium Sulphur- 35	AST 7: Associated with the incinerator Stored: Fuels

Building No.	Name	Current/Previous Use	Biological		Radiological	Infrastructure
			Hazard Group/Study	Containment Level		
					Phosphorus- 32 Phosphorus- 33 Carbon -14	
CO44	High Security Unit and extension building	Research Unit	Hazard Group 2 (eg. TSE) Hazard Group 3 Pathogens (Bovine TB, Coli 0157H). One room (S22) used for TSE mice studies Hazard Group 3 (Bovine TB, E Coli 0157H)		Isotopes Used: Indium- 111	-
CO45	CAT 3 Unit High Security Unit	-	-	-	-	-
CO50	Biological Support Unit	Research Unit Pirbright have confirmed that the building was cleaned in accordance with established procedures for TSE	Hazard Group 2 Hazard Group 3 (eg. TSE mice studies)	-	-	-
CO52	Specified Pathogen Free (SPF) Building	10 animal rooms and ancillary services	-	-	-	-
CO53	Boiler House	-	-	-	-	AST 5: Two large tanks to the north of the boiler house. Stored: Heavy Oils AST 6: To the west of the boiler house. Stored: Diesel
CO54	Substation	-	-	-	-	AST 13: Associated with Substation. Stored: Diesel
CO55	Experimental Animal House	Research Unit	Hazard Group 2	-	-	AST 14: West of building. Stored:Unknown
CO56	Poultry Production Unit	Closed down in 1972	-	-	-	-
CO58	Radioisotope Store	-	-	-	-	-
CO59	Effluent Sterilisation Plant	No longer in use	-	-	-	-
CO60	Jenner Building (Laboratory)	Research Unit Pirbright Institute has documentation for cleanup	Hazard Group 3 (E.Coli 0157H and burkholderia pseudomallei, HIV, lymphochoromeningitis virus, hepatitis c and b)	Containment Level 3	Isotopes Used: Chromium-51 Iodine- 125 Indium- 111 Tritium Sulphur- 35 Phosphorus- 32 Phosphorus- 33 Carbon -14	-
CO62	Stewart Building (Research Laboratory)	Research Unit	Hazard Group 2 Virus (eg. Avian Flu, Bovine Viral Diarrhea (BVD), Vaccinia Virus), Bacteria (Streptococcus Uberis)	Two laboratories were used at derogated contaminated level 3 for work with TSEs (BSE)	Isotopes Used: Tritium Sulphur-35 Phosphorus-32 Phosphorus-33 Carbon-14 Iodine- 125	-
CO64	Henderson Building (Research Laboratory) Built in 1970-1972	Research Unit Microbiology with microbiological services and laboratories to house heavy equipment such as analytical and preparative centrifuges on the ground floor. On the first floor the design included 16 laboratories two of which were secure for work on dangerous pathogens.	Hazard Group 2 Possible earlier use of higher hazard microbes. Virus (eg. Avian viruses, Marek Disease Virus (MDV), Vaccinia Virus) Bacteria (Avian Tuberculosis- TB species of Hazard Group 2 only)	-	Isotopes Used: Chromium-51 Iodine- 125 Indium- 111 Tritium Sulphur- 35 Phosphorus- 32 Phosphorus- 33 Carbon -14	-
CO65	Substation	-	-	-	-	AST 5: One AST associated with Substation Stored: Diesel
CO66	Plowright Laboratory	Research on: Pirbright have documentation for partial cleanup	Hazard Group 3 SAPO 4 Pathogens Research conducted into avian flu, Newcastle Disease virus, bronchiseptica pneumonia and TSE	-	Isotopes Used: Sulphur-35 Phosphorus- 32	AST 12: Two ASTs (Exact Location Unknown) Stored: Waste from laboratory
CO67	Former Engineering and Maintenance Building	-	-	-	-	AST 2: One AST to the north of the Engineering building. Stored: Kerosene AST 3: North of car park to the east of the engineering stores. Stored: Liquid

Building No.	Name	Current/Previous Use	Biological		Radiological	Infrastructure
			Hazard Group/Study	Containment Level		
CO68	Staff Restaurant	-	-	-	-	Petroleum Gas
CO69	Gordon Building (Research Laboratory)	Histology laboratory	Hazard Group 2 (various biological agents) and Hazard Group 3 (human and cattle for of TB) Also used for research on TSE (Scrapie and BSE) with derogated Containment Level 3 Laboratory)	Level 2 and Level 3	Isotopes Used: Indium- 111 Tritium Phosphorus- 32	-
CO70 & CO70a	Selborne Building (Library and prior to that an animal unit)	-	-	-	-	-
Zone 3-						
CO72	Dunkin House	Residential Accommodation	-	-	-	-
CO80	Topley House	Residential Accommodation	-	-	-	-
CO81	Accommodation unit	Residential Accommodation	-	-	-	-
CO83	Accommodation unit	Residential Accommodation	-	-	-	AST 15: Enclosed area of Building 83. Stored: Kerosene
CO84	Accommodation unit	Residential Accommodation	-	-	-	-
CO85	Accommodation unit	Residential Accommodation	-	-	-	-
CO87	Crèche/Social Facility	Residential Accommodation	-	-	-	-
-	Squash Court	Sports Facility	-	-	-	-

Appendix B Photograph Log

Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 1	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Above Ground Storage Tank (AST 2)			

Photo No. 2	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Sludge Beds			



Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 3	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Above Ground Storage Tank (AST 12)			

Photo No. 4	Date: 18/09/17	
Direction Photo Taken: South		
Description: Looking south towards the former Greens' Yard Area		

Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 5	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Effluent Settlement			

Photo No. 6	Date: 18/09/17	
Direction Photo Taken: West		
Description: Taken from bank north of the effluent settlement looking to Buildings CO56 and CO57.		



Client Name: HCA		Site Location: Former Pirbright Institute Compton		Project No. 60544578
Photo No. 7	Date: 18/09/17			
Direction Photo Taken: N/A				
Description: The rear of building CO56				

Photo No. 8	Date: 18/09/17	
Direction Photo Taken: N/A		
Description: Retaining wall to the north of Zone 2		



Client Name: HCA		Site Location: Former Pirbright Institute Compton		Project No. 60544578
Photo No. 9	Date: 18/09/17			
Direction Photo Taken: N/A				
Description: Generators to the north of Zone 2.				

Photo No. 10	Date: 18/09/17			
Direction Photo Taken: N/A				
Description: Former raise tank platform and bund (AST 14)				



Client Name: HCA		Site Location: Former Pirbright Institute Compton		Project No. 60544578
Photo No. 11	Date: 18/09/17			
Direction Photo Taken: West				
Description: Boiler house				

Photo No. 12	Date: 18/09/17			
Direction Photo Taken: West				
Description: Substation 1 (Building CO54)				



Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 13	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Former platform for above ground storage tank (AST 13) next to Substation 1 (CO54)			

Photo No. 14	Date: 18/09/17	
Direction Photo Taken: South West		
Description: Two above ground storage tanks associated with the boiler house to the rear of Building CO53		



Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 15	Date: 18/09/17		
Direction Photo Taken: South West			
Description: Chemical Store to the rear of Boiler House (CO53)			

Photo No. 16	Date: 18/09/17		
Direction Photo Taken: East			
Description: Looking towards to the barn CO35			



Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 17	Date: 18/09/17		
Direction Photo Taken: East			
Description: Building CO23			

Photo No. 18	Date: 18/09/17		
Direction Photo Taken: West			
Description: Former Bull Pens/ Skip Area			

Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 19	Date: 18/09/17		
Direction Photo Taken: North			
Description: Former Portapig			

Photo No. 20	Date: 18/09/17		
Direction Photo Taken: North			
Description: Operational Building CO06			


Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 21	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Above Ground Storage Tanks associated with Incinerator in Building CO28			

Photo No. 22	Date: 18/09/17	
Direction Photo Taken: West		
Description: Former incinerator in Building CO28		



Client Name: HCA		Site Location: Former Pirbright Institute Compton		Project No. 60544578
Photo No. 23	Date: 18/09/17			
Direction Photo Taken: North east				
Description: Skip Yard to the north of Zone 2				

Photo No. 24	Date: 18/09/17			
Direction Photo Taken: N/A				
Description: Above Ground Storage Tank (AST 7) associated with CO44				

Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 25	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Storage tank in front of Building CO43			
Photo No. 26	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Diesel Generator			

Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 27	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Building CO35 (Barn)			

Photo No. 28	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Historic Sludge Beds			


Client Name: HCA		Site Location: Former Pirbright Institute Compton		Project No. 60544578
Photo No. 29	Date: 18/09/17			
Direction Photo Taken: N/A				
Description: Two storage tanks associated with the Greenfields Sheep Unit north of the building				

Photo No. 30	Date: 18/09/17			
Direction Photo Taken: N/A				
Description: Greenfields Sheep Unit (CO01)				


Client Name: HCA		Site Location: Former Pirbright Institute Compton		Project No. 60544578
Photo No. 31	Date: 18/09/17			
Direction Photo Taken: North				
Description: Terrace/Mounds to the north boundary of the site				

Photo No. 32	Date: 18/09/17			
Direction Photo Taken: South				
Description: Evidence of demolition material from the former CO03 (barn)				



Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 33	Date: 18/09/17		
Direction Photo Taken: North			
Description: Burial ground mounds along the northern boundary of the site.			

Photo No. 34	Date: 18/09/17		
Direction Photo Taken: West			
Description: CO2 Sheep Pens with mounds of burial material to the west of the building.			

Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 35	Date: 18/09/17		
Direction Photo Taken: N/A			
Description: Above Ground Storage Tank (AST 6) associated with the Boiler House (CO53)			

Photo No. 36	Date: 18/09/17	
Direction Photo Taken: South East		
Description: South of the Jenner building (CO60) looking towards the Selborne Building (CO70).		



Client Name: HCA		Site Location: Former Pirbright Institute Compton	Project No. 60544578
Photo No. 37	Date: 18/09/17		
Direction Photo Taken: East			
Description: Building CO69 the Gordon Building.			

Photo No. 38	Date: 18/09/17		
Direction Photo Taken: South			
Description: Cricket Ground with pumping house to the south western boundary of the site.			

Client Name:

HCA

Site Location:

Former Pirbright Institute Compton

Project No.

60544578

Photo No.**39****Date:**

18/09/17

Direction Photo Taken:

West

Description:

Squash Court

**Photo No.****40****Date:**

18/09/17

Direction Photo Taken:

N/A

Description:

Above Ground Storage Tank (AST 15) within Zone 3 (hostel/residential area)

