St Modwens Developments Limited

Poundswick Lane, Wythenshawe, Manchester

Phase 1 Geo-Environmental Audit

February 2006



Halcrow Group Limited

PLANNING
ACK'D
REPLIED
RECD 6 - JUN 2008
M
M
M
FOR ACTION

Halcrow

St Modwens Developments Limited

Poundswick Lane, Wythenshawe, Manchester

Phase 1 Geo-Environmental Audit

February 2006

Halcrow Group Limited

Halcrow Group Limited
Deanway Technology Centre, Wilmslow Road, Handforth, Cheshire.
SK9 3FB
Tel +44 (0)1625 540456 Fax +44 (0)1625 549325
www.halcrow.com

Halcrow Group Limited has prepared this report in accordance with the instructions of their client, Key Property Investments Limited, for their sole and specific use. Any other persons who use any information contained herein do so at their own risk.

© Halcrow Group Limited 2006

St Modwens Developments Limited

Poundswick Lane, Wythenshawe, Manchester.

Phase 1 Geo-Environmental Audit

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	1	Draft	November 2005	D Meaden
1	2	Final	February 2006	D Meaden

Contents

Executive Summary 1

1 Introduction 3

2 Results of Desk Study 5
2.1 Historical Land Use 5
2.2 Results of Landmark Geo-Environmental Data Search 7
2.3 Air Raids and Bomb Records 7
2.4 Site Walkover 7
2.5 Previous Ground Investigations 8
2.6 Geology 8
2.7 Hydrogeology 9

3 Site Implications 11
3.1 Geotechnical Implications 11
3.2 Environmental Implications 12

4 Conceptual Model 13
4.1 Plausible Source Pathway Receptor Scenarios 13
4.2 Qualitative Risk Assessment 15

5 Conclusions and Recommendations 18
5.1 Summary 18
5.2 Further Studies 19

6 References 21

Tables

Table 1	Sites Summary Information
Table 2	Historical Land Use
Table 3	Landmark Search Occurrences within the immediate area
Table 4	Landmark Search Occurrences within 250m of the site
Table 5	Geological Information
Table 6	Hydrogeological Information
Table 7	Summary of Geotechnical Site Implications
Table 8	Summary of Environmental Site Implications
Table 9	Potentially harmful substances anticipated to be present within the sites
Table 10	Preliminary assessment of risks associated with the site under present site conditions and during future redevelopment

Figures

Figure 1	Site Location Plan
Figure 2	Site Boundary Plan

Appendices

Appendix A	Risk Categorisation (based on DETR, 2000)

Executive Summary

This Audit describes the findings of a Phase 1 Geo-Environmental Audit for a site at Poundswick Lane, Wythenshawe, Manchester.

The site was developed between 1967 and 1971 when two seven Story L-shaped residential tower blocks, Violet Court and Park Court, were constructed. These developments were both served by Elm Tree Drive, a newly constructed cul-de-sac linking the development to Rowlandsway. Previous to this development the site had been greenfield land. The Violet Court block appears to contain an electrical substation, it unclear as to whether Park Court also contains a substation. Aside from several cosmetic alterations to the flats, the site has apparently remained unchanged since the original construction.

The flats are no longer in use as residences but a part of the lower level of Park Court and some associated hardstanding is currently used for a part of Wythenshawe open market.

The site is likely to be at least partly underlain by made ground that would have been used to level the site during initial construction. The made ground, where present, is underlain by a Devensian age Till. The Till and made ground are both underlain by the Bollin Mudstone Member, part of the Sherwood Sandstone Group.

The Bollin Mudstone Member and the Till are both classified by the Environment Agency as non aquifers; the permeability of any made ground cannot be ascertained without further testing, but must in the interim be considered to be permeable.

The presence of the substation, the possibility of made ground along with the development activities that have taken place at the site, together with adjoining land uses, are likely to have resulted in the presence of potentially harmful substances (such as heavy metals, sulphates, Polychlorinated Biphenyls and Hydrocarbons) at the site.

During demolition there is a risk of encountering asbestos containing materials. The presence of rats and pigeons indicate there is a potential zoonose risk.

This report provides the basis for progressing the design and execution of a detailed intrusive ground investigation. In addition, the report discusses the implications for proposed redevelopment of the site.

The proposed investigation is designed to assess the presence and distribution of the identified contaminants across the site in general and of any elevated concentration, and the presence of potential pathways to identified receptors, such as the general public.

1 Introduction

In October 2005 St Modwens Developments Limited commissioned Halcrow to undertake a Phase 1 Geo-Environmental Audit of a site at Poundswick Lane, Wythenshawe, Manchester, which is currently proposed for redevelopment.

This Phase I Geoenvironmental Audit was undertaken to enable formulation of an opinion, via the development of a Conceptual Model, as to the potential for hazardous substances or conditions to exist on the site at levels that would require further consideration with regard to the proposed change of use, which was stated to be a mixed residential/commercial development.

The general location of the site is shown on Figure 1 and its extent is indicated on Figure 2. Summary details of the site are as follows.

Table 1 Site Summary Information

Sites Name and Address	Poundswick Lane, Wythenshawe, Manchester
Location	The site is located at National Grid Reference 382720E 387190 N, and is shown on the Site Location Plan, Figure 1.
Description	The site comprises two system built seven storey L-shaped blocks of flats at the north end of Wythenshawe town centre. The flats are currently empty. The surrounding area comprises a mix of hardstandings (part used by the Wythenshawe open market), landscaped areas and an access road. Adjacent to the south is a pedestrianised shopping area, with a bus station to the south east.

For the purpose of this report a Phase 1 Geo – Environmental Audit comprises the following: -

- Desk Study in accordance with the recommendations of The Association of Geotechnical Specialists (AGS) Guide to Geo-environmental Reports but excluding at this stage utilities searches
- Searches of publicly accessible geo-environmental records
- Walkover survey of the site

The purpose of a Phase 1 Geo-Environmental Audit is, from readily available sources of information, to identify hazards and/or sources of potentially harmful substances and to determine the geological and hydrogeological conditions both beneath the site and in its immediate vicinity. In order to establish environmental risk a source/pathway/receptor relationship for contamination (if present) is tabulated. Additionally, the geotechnical conditions of the sites have been reviewed from data held in published sources and possible opportunities and constraints on future development have been evaluated.

The report describes the studies and enquiries undertaken and discusses the possible implications of the information obtained. Outline recommendations are made for the geotechnical and environmental aspects of the proposed redevelopment with specific recommendations for Phase 2 & 3 studies.

2 Results of Desk Study

2.1 *Historical Land Use*

A series of historical Ordnance Survey maps was obtained as part of a Landmark Envirocheck Report. A brief description of the land uses apparent from those maps is as follows:

Table 2 Historical Land Use

Year	Scale	Site Description
1877	1:2,500	The site is shown as part of a large field adjoining a lane (unidentified). There is a small hamlet (Brownley Green) approximately 100m to the east.
1882	1:10,560	No significant changes. The whole district is apparently agricultural.
1898	1:2,500	No change other than the site has become part of a larger field. Poundswick Lane is now labelled. Some small changes had taken place in Brownley Green and a smithy is marked.
1899	1:10,560	No significant changes apparent.
1910	1:2500	No significant changes apparent.
1910 - 1911	1:10,560	No significant changes apparent.
1935	1:2500	Almost all of the land to the north of Poundswick Lane has been developed as a residential housing estate. [This was part of the creation of Wythenshawe Garden City].
1938	1:10,560	The site remains a field. A school has been developed to the north-east of the original Brownley

Year	Scale	Site Description
		Green village and further development is occurring to the south-east.
1954	1:10,560	No significant changes apparent.
1960	1:1250	No significant changes apparent.
1967	1:10,560	No significant changes apparent. However adjacent to the eastern boundary the map indicates that preparatory works had begun for a new road (Rowlandsway). The district has become known as Wythenshawe.
1971	1:1250	The site has been developed and Violet and Park Courts constructed. These are served by Elm Tree Drive, a cul-de-sac running off of the newly constructed Rowlandsway. Adjoining sites to the south and west had also been developed as part of the Wythenshawe Centre.
1977	1:10000	No significant changes apparent. Some redevelopment of the road system is taking place to the south.
1982	1:1250	No significant changes apparent.
1990	1:10000	No significant changes apparent.
1992	1:1250	No significant changes apparent.
1996	1:10000	No significant changes apparent.
1999	1:10000	No significant changes apparent.

2.2 *Results of Landmark Geo-Environmental Data Search*

Halcrow have obtained a Landmark Geo-Environmental Data Search for the site, dated 2006. Halcrow have summarised this data in terms of the findings present within the site, and those within 250 metres of the site boundary.

According to Waste Management Paper No. 27, a radius of up to 250m is considered to be a normally significant distance with regards to the immediate effects of landfill gas, etc and as such only occurrences of landfills within 250m will be discussed in more detail.

There were no Landmark Envirocheck search occurrences, either at the site or within a 250m radius.

2.3 *Air Raids and Bomb Records*

Manchester City Council Records Office and the Manchester Central Library were contacted but indicated that they have no surviving data on the Wythenshawe area concerning air raids or bomb records.

2.4 *Site Walkover*

A site walk-over was conducted on Tuesday 1st November 2005. The two principal features of the site are seven storey system built L-shaped blocks of flats. These are now empty with the lower parts boarded up. Access to the flats was via single storey porch/entrance structures. That to Violet Court appears to include an electrical substation. It was less clear whether the Park Court entrance also includes a substation.

The blocks are concrete framed structures with curtain wall infills, under flat roofs. The flats must have been refurbished in the recent past as all of the windows have been replaced with PVCu units. The age and construction of the flats suggest that asbestos containing materials may have been used in the original construction. Typical locations include bath panels, airing cupboards, under sink pads, soffit boards, and in services locations such as electric conduits and lift shafts. Whilst asbestos containing materials may have been removed by the previous site owner, a confirmatory inspection of the premises should be carried out.

At least one flat was burnt out. Others are possibly likewise damaged. A number of flats have broken windows and it was apparent that pigeons were roosting in these units. Where there is an accumulation of pigeon droppings there is a risk of demolition workers contracting fungal and bacterial diseases from the droppings. Therefore there are biohazards that will need to be addressed prior to, and during, demolition.

The immediate surrounds of the flats are delineated by steel fencings. Non hard standing areas are generally grassed with some trees. The fenced areas were generally free of fly tipped waste at the time of the site walkover.

Parts of the hand standing area are used by the Wythenshawe open market and this use extends to some areas under part of the Park Court structure. There will therefore be potential access/landuse issues to resolve prior to demolition and reconstruction.

To the north of the site lies Poundswick Lane which is a reasonably busy district thoroughfare. To the south-east is the Wythenshawe centre bus station. Immediately to the south of the site boundary there is a pedestrianised shopping area, with generally ground floor lock up shop units with two stories of residential accommodation over. To the south-west there are open spaces, car parks and civic buildings.

2.5 Previous Ground Investigations

No previous ground investigations reports for the site have been made available to Halcrow, and no previous ground investigations are known. The Envirocheck report indicates that there are 7 borehole records from sites within 250m of the subject site. Six of these are shallow (<3.1m) and associated with Askern Avenue. The seventh was drilled on behalf of Manchester Corporation to a depth of 10.67m and was 209m to the north-east.

2.6 Geology

The following geological information has been derived from a Landmark Geology Report, which is based on British Geological Survey digital mapping.

Table 5 Geological Information

Recorded Drift Deposits	Devensian Till. Red brown sandy clays with some lenses of sands and gravels. Generally firm to stiff. Deposits can be up to 20m thick.
Solid Strata	The site overlies the Bollin Mudstone Member of Anisian age. Part of the Sherwood Sandstone Group. Red brown mud and siltstones with known depths in Cheshire of c 460m. May naturally contain gypsum and halite minerals.
Structural Features	The site lies about 300m to the north-east of an approximately north-south trending fault line.

2.7 Hydrogeology

The following hydrogeological information has been derived from the Landmark Envirocheck report.

Table 6 Hydrogeological Information

Aquifer Classification	The Devensian Till deposits are classified as a non-aquifer (negligibly permeable) and the Bollin Mudstone Formation is classified as a non-aquifer.
Water Table and Flow Direction	Groundwater flows at the site may be limited unless perched water bodies are in hydraulic continuity with each other and any surface water courses.
River Water Quality	The nearest reported surface water feature is the Sinderland (Baguley) Brook, 725m west of the site. River water quality was Grade D in 2000.
Source Protection Zones	The site is not located within a groundwater source protection zone.
Licensed Groundwater Abstractions	There are no groundwater abstractions within the site.

Table 7 Hydrology Information

Surface Water	The nearest surface water feature is the Sinderland (Baguley) Brook, 725m to the west.
Licensed Surface Water Abstractions	The closest abstraction point is located 1813m to the north-east.
Flood Risk	The subject site is not shown to be within an area vulnerable to river flooding.

3 Site Implications

Based on the findings of this desk study, the following geotechnical and environmental implications have been identified within the site and could have an impact on any proposed redevelopment of the site.

3.1 Geotechnical Implications

Table 7 Summary of Geotechnical Site Implications

	Geotechnical Implications
(i)	Although the site had not been developed prior to the present landuse, there may be some buried obstructions in the form of redundant services and building foundations, which may be encountered during redevelopment works. Such structures would need to be removed or stabilised, prior to or during any redevelopment of the site.
(ii)	It is not known whether there is any made ground under the site but it is likely that some made ground would have been used for levelling the original field, prior to construction. This made ground could be of a variable nature. The suitability of any made ground foundations would need to be assessed by means of a ground investigation.
(iii)	The Bollin Mudstone Formation is likely to have increased levels of naturally occurring sulphate/sulphide minerals. Soluble sulphates have the potential to be aggressive towards buried concrete and as such concrete should be designed in accordance with the recommendations detailed in BRE Special Digest 1 (2001) 'Concrete in Aggressive Ground'.
(iv)	Tills have the potential for shrink/swell behaviour dependant on their parent material and the presence of any lenses of sand and/or gravel that may contain perched water tables. Further testing would be needed to determine the exact nature of the till present at this site. Unless this is determined trees should not be planted in close proximity to the building foundations as water uptake by the roots may cause shrinkage within the till and instability within the foundations. Similarly, the removal of existing trees could cause the reverse effect.

3.2 *Environmental Implications*

Table 8 Summary of Environmental Site Implications

	Environmental Implications
(i)	The made ground that underlies the site is of unknown origin and has the potential to contain elevated concentrations of substances harmful to human health and controlled waters.
(ii)	Polychlorinated Biphenyls (PCB) may be present in the areas surrounding substations and this will need to be investigated by means of a ground investigation.
(iii)	Leakages of contaminants from within site drainage systems may have led to contamination of the surrounding ground.
(iv)	There is the potential for the buildings and services installations to contain insulation made from asbestos containing materials.
(v)	There is the potential for zoonoses to be encountered in the buildings, particularly those accessible to pigeons and vermin.
(vi)	The composition of the made ground will govern the potential for ground gas generation at site. It will be necessary as part of ground investigation works to monitor for such gases to establish the need for safety measures to be incorporated into foundation design.

4 Conceptual Model

4.1 *Plausible Source Pathway Receptor Scenarios*

4.1.1 *Background*

The Government's current approach to existing contaminated land is to encourage land to be used safely and economically, striking a balance between risks and the need to restore "Brownfield" sites to beneficial use. The "Suitable for Use" approach is adopted by regulators for existing contamination where site conditions are assessed in relation to intended use of the site after restoration.

Risk assessment is usually carried out to determine the significance of the presence and concentration of harmful substances measured at site. The commonly accepted approach to risk assessment is to examine the *source* of the harmful substance in relation to the *receptor* (which might be a human, sensitive environmental feature or building) and determine whether there is a linkage (*pathway*) between them. If any of these elements (source, pathway or receptor) are absent or removed the site poses no risk. The Conceptual Site Model is described and discussed below.

4.1.2 *Identified Sources, Pathways and Receptors*

Historical and current uses at the sites provide a potential for harmful substances to be present within the site. From the forgoing review of the history of the site, harmful substances that may be present are detailed in Table 9, below (see Table 10 for the significance of their presence).

Table 9 Potentially harmful substances possibly present within the site

Area of Site	Possible Sources of Harmful Substances	Possible Harmful Substances Associated with these Sources
Site in general	Made Ground	Heavy metals, inorganic compounds, sulphates, hydrocarbons, ground gas
Electricity Sub-stations	Transformers	Polychlorinated Biphenyls (PCBs)

(b) Identified Pathways

The proposed development of the site is understood to comprise demolition of existing structures, and replacement with new residential accommodation with commercial uses under, in a multi-storey structure.

Potential pathways associated with the residential land use and public open space are:

- Ingestion of soil and soil derived dust
- Ingestion of household dust (soil tracked into workplace from outside)
- Dermal contact with soil
- Dermal contact with household dust (soil tracked into house from outside)
- Inhalation of fugitive (wind-blown) soil dust
- Inhalation of fugitive household dust (soil tracked into house from outside)
- Inhalation of vapours indoors
- Inhalation of vapours outdoors
- Migration of soil gases from made ground/decomposing organic matter.

Human Health

The critical human health receptor within the Residential Areas and Open Space is identified as a young female child with the duration of exposure covering the first six years of life as stated in R & D Publication CLR 10, published by the Environment Agency .

Controlled Waters

There are no controlled water receptors within the site boundaries or within 500m of the subject site perimeter. The Devensian Tills underlying the site are generally considered to be a non-aquifer, due to their relative impermeability. There may be perched groundwaters within the Till but their distribution and any hydraulic connectivity will not be known without a site investigation.

The site does not lie within a Groundwater Protection Zone (GPZ) as described by the Environment Agency.

(c) Receptors

The following site-specific receptors have been identified:

1. General public (before, during and after construction).
2. Site workers – construction staff involved in works at the site.
3. Maintenance staff - carrying out maintenance on services, landscaped areas etc. at some point in the future.
4. Long term site users (residents, commercial occupiers).
5. Users of adjacent sites.
6. Flora – landscaping plants placed as part of the landscaping.
7. Building fabric and foundations.

4.2 ***Qualitative Risk Assessment***

A preliminary qualitative risk assessment has been carried out and is summarised in Table 10 below. The purpose of this is to prioritise any risks likely to be present, to provide an initial indication of their acceptability in the context of both ongoing uses and any redevelopment, and to determine the need for further investigation.

(a) The Assessment

By assuming that a viable pathway exists, connecting a source to a receptor, a "pollutant linkage" is said to exist. Assuming that there is a link between the above source(s) and receptor(s), an assessment is now made of the level of risk. Risk is a consideration of both:

- the likelihood of an event occurring (probability of an event); and
- the severity of the consequences that result from receptor/source contact (consequence).A Risk Categorisation (based on DETR, 2000) has been formulated and enclosed within Appendix A.

The significance of each risk is also explained within Appendix A.

Table 10 Preliminary assessment of risks associated with the site under present site conditions and during future redevelopment

Source of Harmful Substance	Source of Information	Site Area	Pathways	Receptors	Likelihood of Occurrence	Consequence of Occurrence	Potential Significance (risk classification)	Comment/Mitigation
Ground gas generation from organic substances in made ground and from hydrocarbons that have inadvertently entered ground	Historic and current land uses	Potentially the entire site	Migration through permeable horizons within made ground	Buildings/ Humans	Low Likelihood	Medium	Low/Moderate Risk	Ground Investigation to monitor for the presence of ground gas and establish the need for safety measures to be incorporated into foundation design.
Heavy metals in made ground	Historic and current land uses	Potentially the entire site	Direct contact, ingestion	Humans	Low Likelihood	Medium	Low/Moderate Risk	Further GI to define distribution of contamination. Capping/stabilization of areas of contamination/ removal of source areas.
			Wind blown dust	Humans	Low Likelihood	Medium	Low/Moderate Risk	Dust suppression measures during site redevelopment works.
			Percolation through ground	Groundwater, and surface drainage	Low Likelihood	Medium	Low/Moderate Risk	The hard surfacing would limit the infiltration of rainfall and thereby inhibit the amount of leached contamination generated from the fills.
Phytotoxic metals in made ground	Historic and current land uses	Potentially the entire site	Root uptake	Flora	Unlikely	Medium	Low Risk	Landscaping design should take account of potential phytotoxicity
Leachable materials within the soil and/or groundwater	Historic and current land uses	Potentially the entire site	Migration through permeable strata	Groundwater and surface water	Likely	Medium	Moderate Risk	Ground investigation to define presence and extent of leachable substance(s) within the made ground.

Source of Harmful Substance	Source of Information	Site Area	Pathways	Receptors	Likelihood of Occurrence	Consequence of Occurrence	Potential Significance (risk classification)	Comment/Mitigation
PCB's within the soil and/or groundwater	Historic and current land uses	Around the electricity substations	Migration through permeable strata	Humans, Groundwater, and surface water	Likely	Medium	Moderate Risk	Ground investigation to investigate presence of PCBs at the site.

Note: The above table is subject to change following intrusive ground investigation.

5 Conclusions and Recommendations

5.1 *Summary*

A review of historical land usage has indicated that the site was developed as housing between 1967 and 1971. The housing comprised of two seven story L-shaped blocks of flats and a road linking the development to Rowlandsway. All the buildings and access roads originally constructed are still currently present in their original form. A section of the ground floor of Park Court remains in use as part of the Wythenshawe open market; access to the rest of the block is restricted with the lower floors boarded up and secured. The areas surrounding the flats not covered by hardstanding, are laid to amenity grassland with occasional trees.

The flats were constructed on a greenfield site but it is possible that material was imported to level the site prior to the construction of the flats; the origin of any material that may have been used in this process has not been determined. The geology immediately underlying any made ground comprises of a Devensian age Till. The drift deposits and any made ground present is then underlain by the Bollin Mudstone Member, part of the Sherwood Sandstone formation. The Till and the Bollin Mudstone Member are both classified by the Environment Agency as non-aquifers.

The made ground is likely to be variable in nature and its suitability as a founding medium is unknown. The nature, extent and mobility of any contamination associated with the made ground would also need to be determined. The suitability of the superficial deposits as a founding horizon would need to be determined by ground investigation. However, the Bollin Mudstone Member is expected to provide a suitable horizon within which foundations could be located.

The previous development activities and the presence of an electricity sub-station at the site, together with the potentially contaminative adjoining land use (bus station) may have led to a number of potentially harmful substances (such as heavy metals, Polychlorinated Biphenyls, sulphates and hydrocarbons) being present within subsoils and

groundwaters under the site. At least one flat within Park Court has been burnt out. Many of the flats are apparently occupied by pigeons, and rats may also be present, giving rise to a potential risk of zoonoses in areas where droppings have built up.

During construction works for the new development, the creation of pathways for the migration of potential contaminants to any receptors must be avoided.

5.2 Further Studies

This report constitutes a Phase 1 Geo-Environmental Audit of the site. Best Practice dictates that intrusive investigation should not be designed or implemented until the findings of a Phase 1 study are known.

A Phase 2 ground investigation should be carried out across the whole site area, designed in accordance with the British Standard BS10175 and BS5930.

The general objectives of this investigation should be: -

- To determine the general geotechnical characteristics of the site, including the presence of near surface groundwater and the potential for natural ground aggressiveness to buried structures such as concrete and services.

- To determine the properties of made ground for considering their reuse in earthworks and/or to assess the necessity for ground improvement (including the need for capping layers beneath roads) and mitigation of pollutant linkages.

- To assess (to a reasonable degree of confidence) the nature and extent of any contamination present within the site; especially the presence of heavy metals, hydrocarbons and PCBs

- To determine the leachability of any soil-bound potentially hazardous substances located.

- To assess the potential for contamination (if present) to migrate off site. This will require an assessment of the hydrogeology and

other potential pathways.

- To assess the presence of ground gas and establish the need for gas safety measures to be incorporated into foundation design.

- To carry out surveys of any suspected remaining asbestos and/or other potentially hazardous building material within the site.

The scope and timing of the ground investigations are dependent on the development process. It is recommended that a Phase 2 Geo-environmental investigation is undertaken prior to the finalisation of the masterplan for the redevelopment in order for the design of the development and any necessary remediation works to be planned in tandem and to be cost-effective.

6 References

Department of the Environment, Transport and the Regions (2000). Guidelines for Environmental Risk Assessment and Management

Landmark Information Group (2005). EnviroCheck Ref 14654841-2-1 'Wythenshawe'.

FIGURES

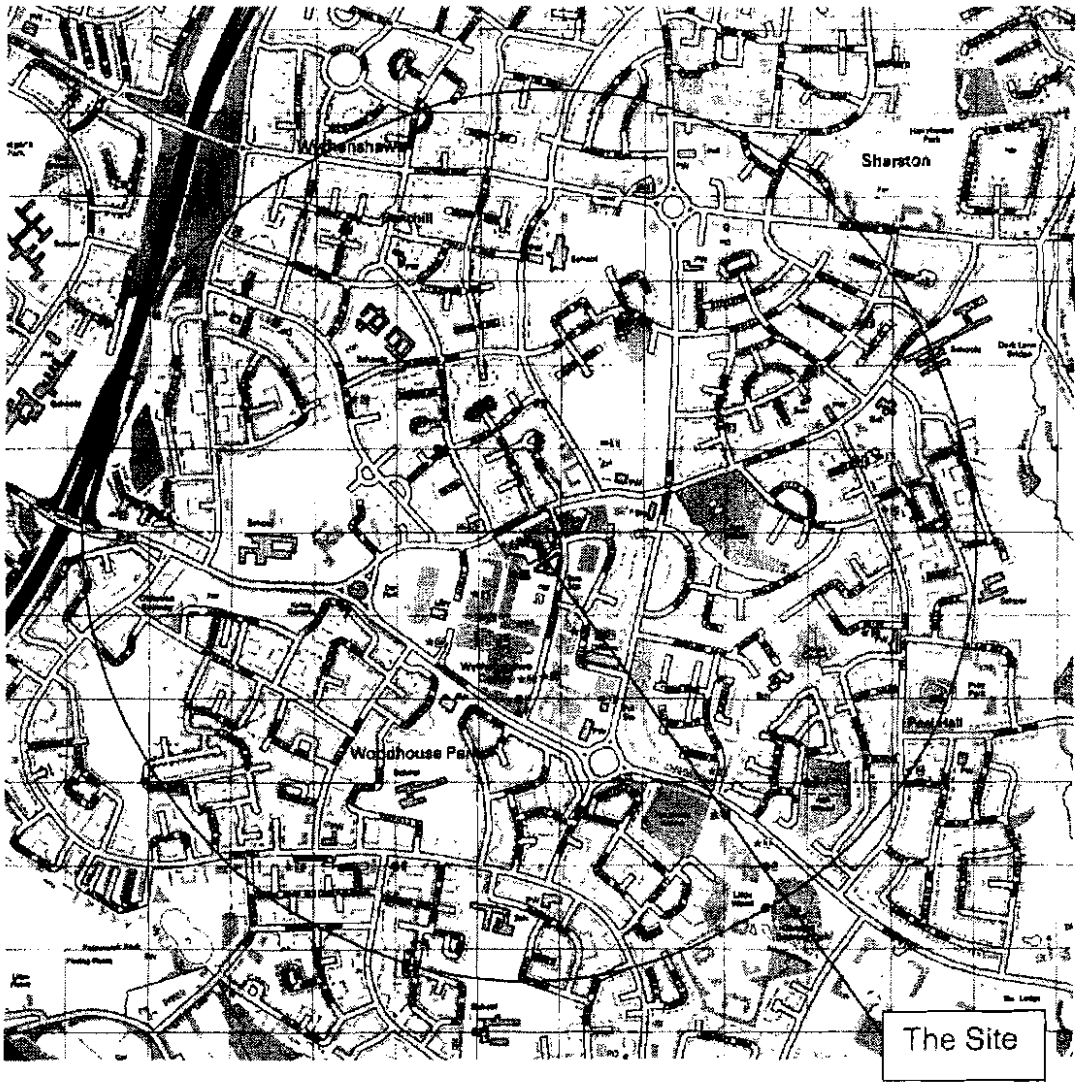


Figure 1: Site Location Plan

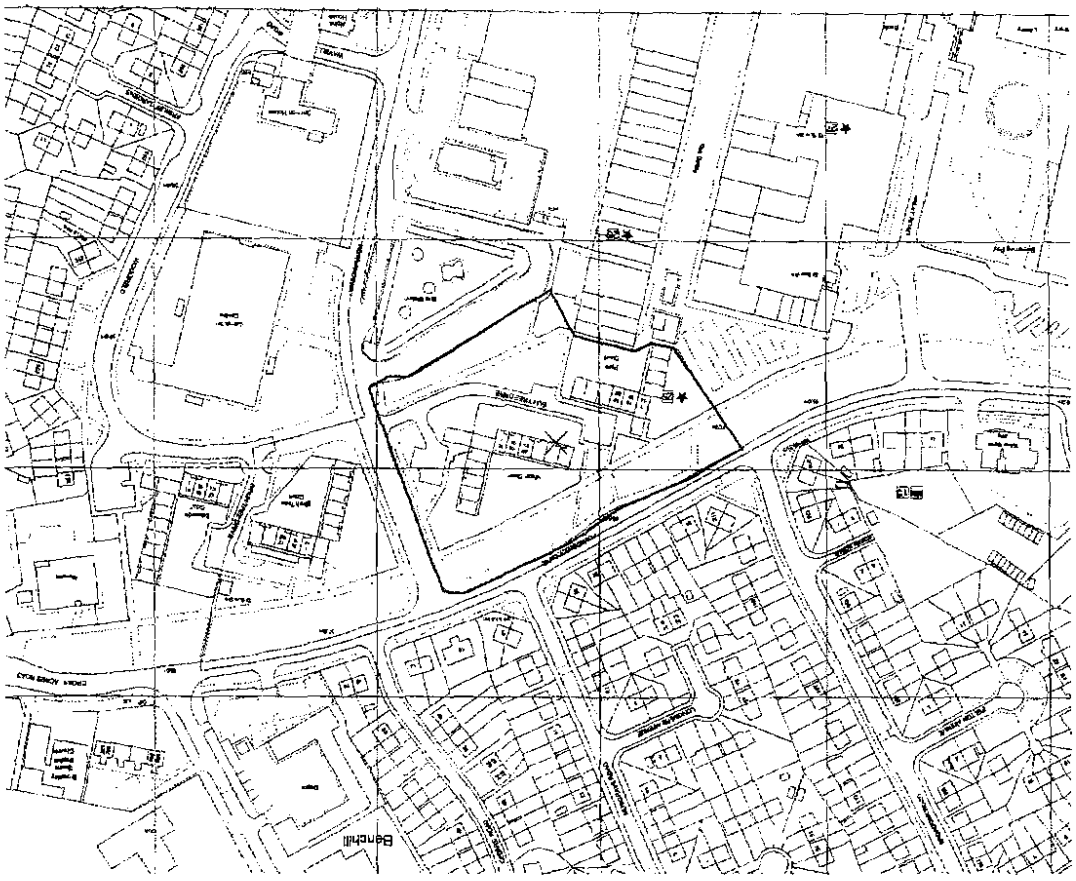


Figure 2: Site Boundary Plan

Appendix A: Qualitative Risk Categorisation

Table 1: Classification of Probability

Classification	Definition
High Likelihood	There is a pollution linkage and an event which would either appear very likely in the short term and almost inevitable in the long term, or there is evidence of harm to the receptor.
Likely	There is a pollution linkage and it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely in the long term.
Low Likelihood	There is a pollution linkage but circumstances are such that an event is less likely to occur in the short term, and is not certain to occur in the long term.
Unlikely	There is a pollution linkage but circumstances are such that the occurrence of an event is improbable even in the very long term.

Table 2: Classification of Consequence

Classification	Definition	Examples
Severe	Short term (acute) risk to human health, sensitive water resources, buildings, property, crops, livestock, organisms or particular ecosystems, likely to result in significant harm	High concentrations of a toxic contaminant on a readily accessible land surface. Major spills of contaminants into controlled waters. Explosion of contaminants resulting in building collapse.
Medium	Long term (chronic) risk to human health, sensitive water resources, crops, livestock, organisms or particular ecosystems, or significant degradation of buildings or property, with the potential to result in significant harm.	Contaminant concentrations exceeding generic or site specific assessment criteria. Leaching of contaminants into a major or minor aquifer. Death of a species within a designated nature

		reserve.
Mild	Pollution of non-sensitive water resources or damage to buildings, property, crops, livestock, organisms or particular ecosystems.	Pollution of non-classified groundwater. Damage to a building rendering it unfit for purpose.
Minor	Minor harm (not significant) or damage to buildings, property, crops, livestock, organisms or particular ecosystems, and which is capable of being mitigated or repaired.	The presence of contaminants at concentrations requiring PPE during the course of construction works. Loss of plants in a landscaping scheme. Discolouration of concrete.

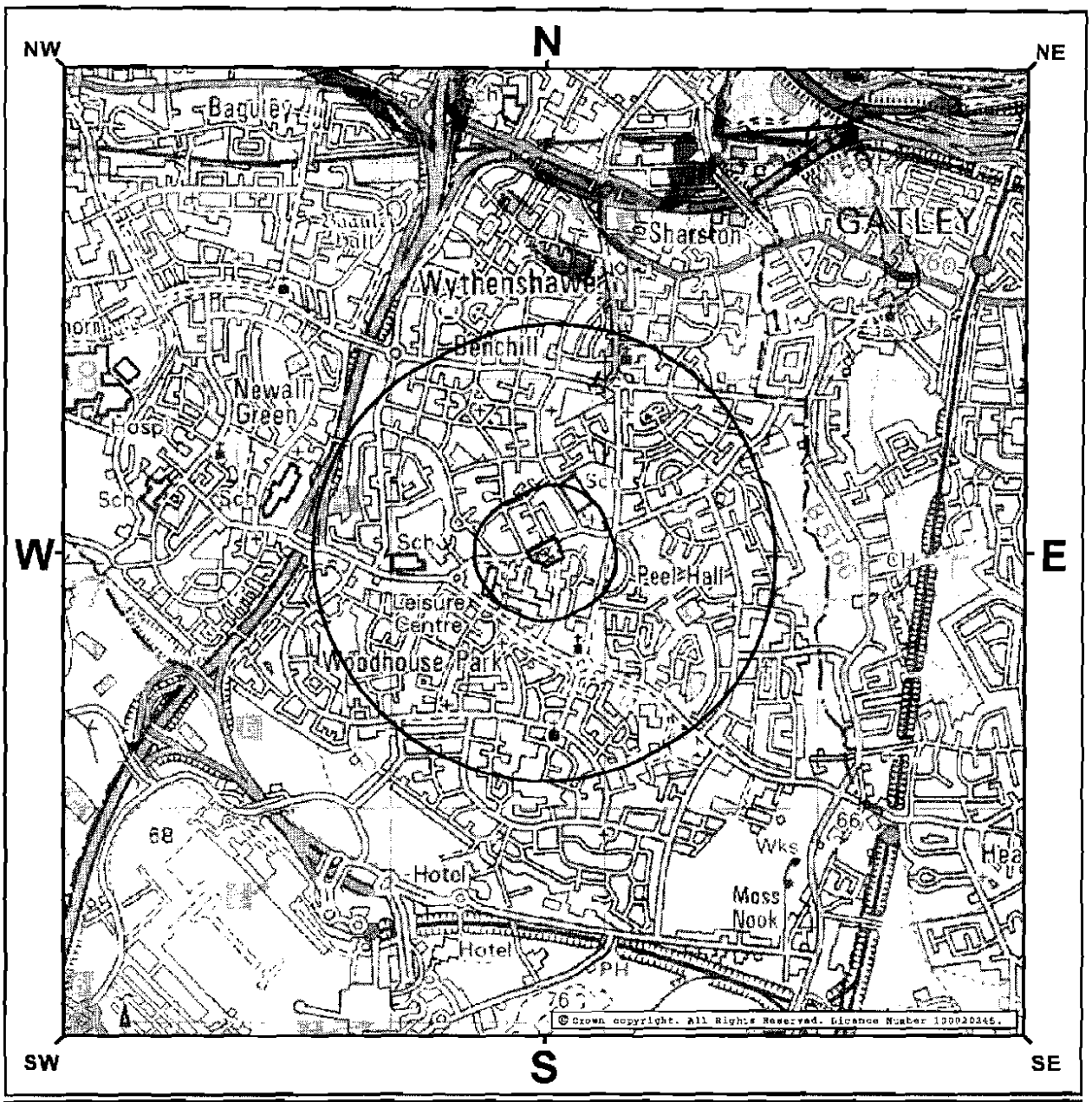
Table 3: Comparison of Consequence v Probability

Probability		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
	High Likelihood		High Risk	Moderate Risk	Low/Moderate Risk
	Likely	High Risk	Moderate Risk	Low/Moderate Risk	Low Risk
	Low Likelihood	Moderate Risk	Low/Moderate Risk	Low Risk	Very Low Risk
	Unlikely	Low/Moderate Risk	Low Risk	Very Low Risk	Very Low Risk

Table 4: Description of classified risks and actions required

Very High Risk	[redacted]
High Risk	[redacted]
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. It is unlikely that any such harm would be severe if it occurred. Investigation (if not already undertaken) is required to clarify risks and determine potential liabilities. Some remedial works may be required in the long term.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard. It is likely that any such harm would be mild if it occurred. Investigation (if not already undertaken) in the short term is required to clarify risks and determine potential liabilities. Some remedial works may be required in the long term.

Very Low Risk	There is a low possibility that harm could arise to a designated receptor from an identified hazard. It is likely that any such harm would be very mild if it occurred. Investigation (if not already undertaken) in the medium term may be required to clarify risks and determine potential liabilities. Some remedial works may be required in the long term.



KEY

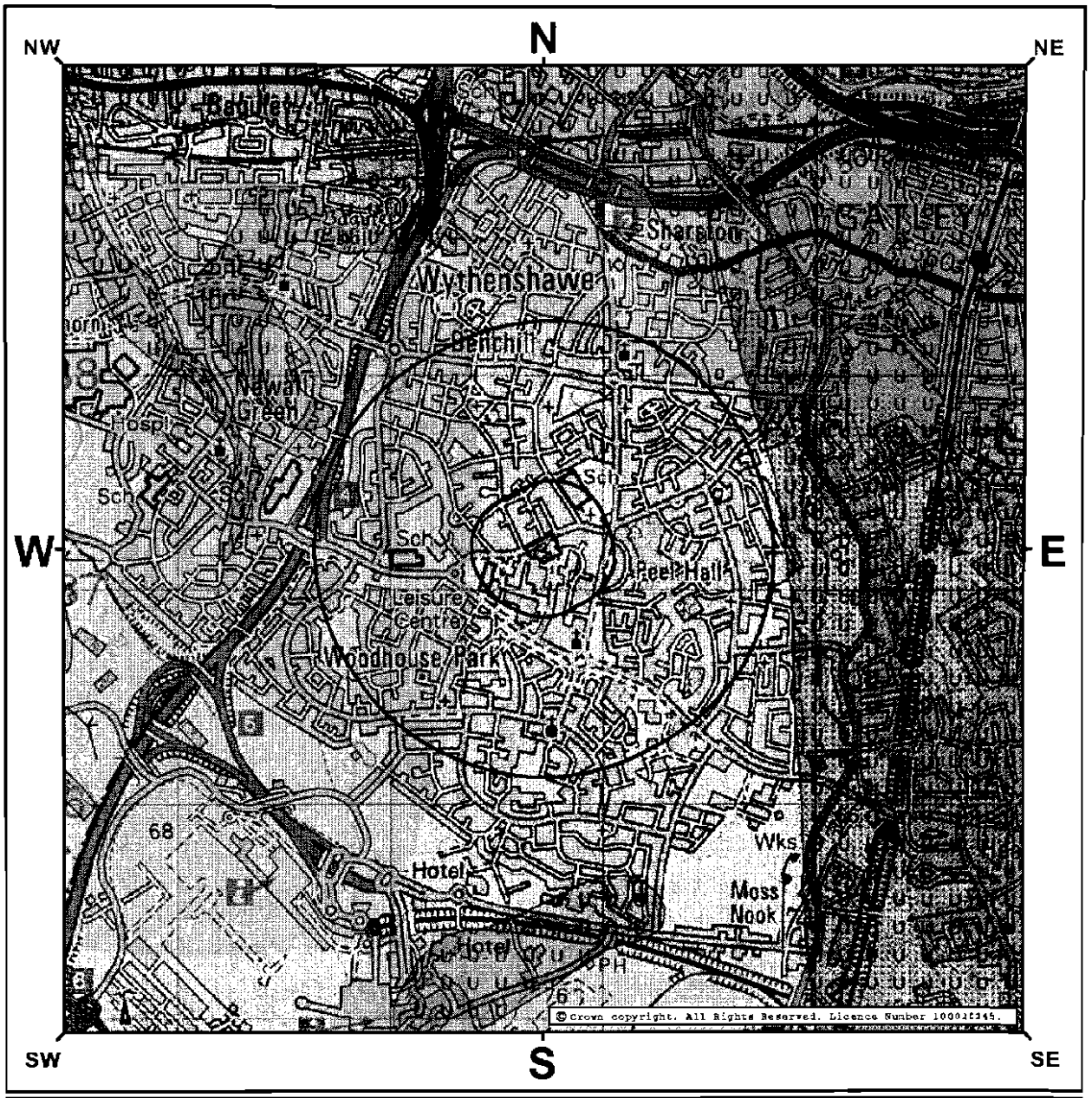
General

- Specified Site
- Bearing Reference Point
- Buffer

Agency & Hydrological

Environment Agency

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defences
- Flood Water Storage Areas
- Flood Defences



KEY

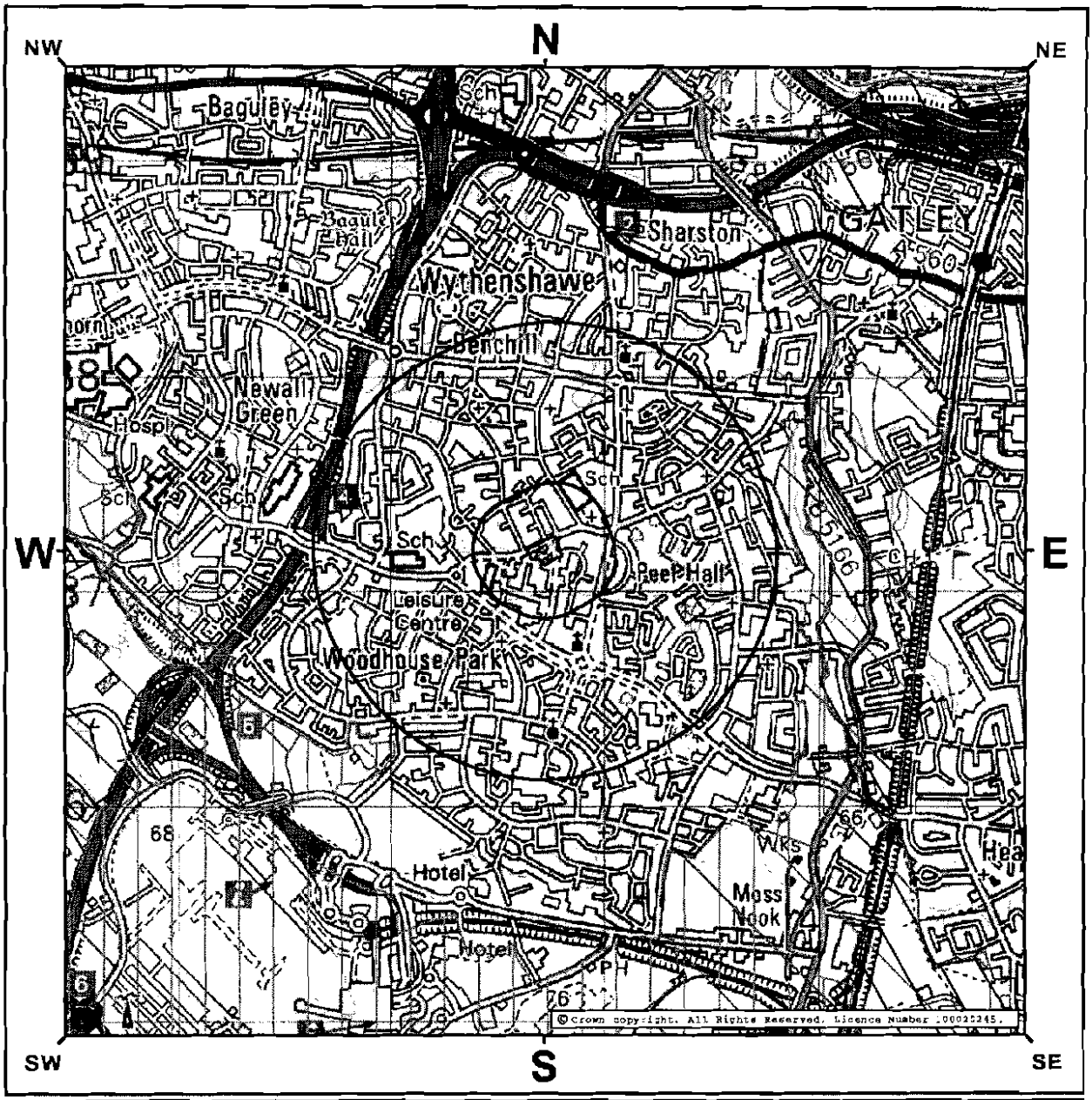
General

- Specified Site
- Bearing Reference Point
- Buffer

Groundwater Vulnerability

Geological Classes	Soil Classes
Major Aquifer (High Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Minor Aquifer (Variable Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Non Aquifer (Negligibly Permeable)	

Drift Deposit



KEY

General

- Specified Site
- Bearing Reference Point
- Buffer

Sensitive Land Uses

- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- National Park
- National Scenic Area
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area