

Phase 1 Environmental Assessment
Former Corstorphine Station, off Station Road (The
Paddockholm), Edinburgh, EH12 7XP

The City of Edinburgh Council

Contract/Proposal No:	62C9251
Issue:	2
Author (signature):	
Project Manager/Director (signature):	
Date:	25 th May 2006

This report has been prepared by ENVIRON with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. This report is confidential to the client, and ENVIRON accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by ENVIRON beforehand. Any such party relies upon the report at their own risk.

ENVIRON disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

VERSION CONTROL RECORD

ISSUE	DESCRIPTION OF STATUS	DATE	REVIEWER INITIALS	AUTHORS INITIALS
A	First Draft	15.03.06		
1	First Release to Client	24.03.06		
1A	Second Draft	25.05.06		
2	Final	25.05.06		

CONTENTS

	Page
1.0 INTRODUCTION	1
1.1 BACKGROUND	1
1.2 OBJECTIVES AND SCOPE	1
2.0 SITE DETAILS	3
2.1 SITE DESCRIPTION	3
2.2 SITE SETTING	3
3.0 POTENTIAL FOR GROUND CONTAMINATION	4
3.1 HISTORICAL DEVELOPMENT OF SITE AND SURROUNDING AREA	4
3.2 REGULATORY AUTHORITY INFORMATION	6
3.3 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY	9
4.0 SITE INSPECTION	11
4.1 SITE SETTING AND DESCRIPTION	11
4.2 SURROUNDING AREA	12
5.0 POTENTIAL FOR CONTAMINATION	13
5.1 THE SITE	13
5.2 THE SURROUNDING AREA	14
5.3 PRELIMINARY CONCEPTUAL SITE MODEL	15
6.0 SUMMARY AND CONCLUSIONS	20

1.0 INTRODUCTION

1.1 BACKGROUND

ENVIRON UK Limited (ENVIRON) was commissioned by The City of Edinburgh Council, to undertake a Phase 1 environmental appraisal, including site inspection, of the former Corstorphine Station, off Station Road (The Paddockholm), EH12 7XP.

This report is addressed to The City of Edinburgh Council.

1.2 OBJECTIVES AND SCOPE

The objectives of the Phase 1 environmental review are to assess the potential for ground contamination and its likely implications in relation to Part IIA of the Environmental Protection Act 1990. Specifically the review will assess the potential for soil and groundwater contamination in, on or under the land which has originated from current and historical potential sources of contamination originating from on and off-site. In order to assess the potential presence of a pollutant linkage the following sensitive receptors will be considered:

- occupants;
- water resources;
- ecological systems or living organisms forming part of a system and within protected locations;
- property in the form of buildings, building fabric and underground infrastructure (e.g. water supply pipeline); and
- property in other forms (crop, livestock, home-grown produce, owned or domesticated animals, wild animals subject to shooting).

The review is based on the following:

- examination of historic, recent and current Ordnance Survey plans to identify activities which might have led to contamination of soil or groundwater both on the subject site and on adjacent sites;

- examination of published records and plans on the shallow and deep geology and hydrogeology of the site to assess the vulnerability and sensitivity of groundwater and surface water resources to contamination, if present, and the possible direction of movement off site, if mobile;
- search of a proprietary database of environmental permits, records and incidents at the site and surrounding area;
- a visit to the Contaminated Land Department of the City of Edinburgh Council to view records held by the Council on environmental conditions, incidents and known contamination risks associated with the site; and petroleum records of above ground or below ground licensed (petrol) storage facilities; and
- A site inspection.

No sampling or analysis of soils, waters or other materials will be undertaken as part of the review.

2.0 SITE DETAILS

2.1 SITE DESCRIPTION

The site is irregular in shape and occupies a total area of approximately 3.11 ha. The majority of the site is occupied by the residential development of the Paddockholm with government offices are present in the south west. An electrical substation is present in along the southern site boundary east of the government offices.

2.2 SITE SETTING

The site is located in Corstorphine approximately 6km west of Edinburgh city centre. It is located at approximate National Grid Reference NT 203727 (as shown in Figure 1). The site layout is shown in Figure 2. Site access to both the residential development of the Paddockholm and the government offices is off Station Road which forms the western site boundary.

The site is located within a predominately residential setting. Adjacent and surrounding land uses are detailed below:

- To the north: Residential; a hospital is located approximately 150m north west and Edinburgh Zoo Park is located approximately 500m north.
- To the east: Residential; Carrick Knowe Golf Club is located approximately 300m east.
- To the south: Residential; a school is located approximately 200m south.
- To the west: Residential.

3.0 POTENTIAL FOR GROUND CONTAMINATION

3.1 HISTORICAL DEVELOPMENT OF SITE AND SURROUNDING AREA

Historical use information enables an assessment to be made of the potential for soil and groundwater contamination associated with previous industrial activities. The following history of the site and surrounding area has been obtained by review of the available historical maps dated 1895 to 2003. In addition aerial photographs of the site dating from 1947 onwards were viewed to supplement the historical map data.

The former Corstorphine Station is shown on an historical plan dated 1965 in Annex A (Figure 3).

3.1.1 The Site

The first edition 1895 map showed the site as Greenfield; the south eastern corner was wooded. The 1908 map showed railway sidings originating in the north west of the site and crossing the site in a south easterly direction. The railway sidings continued south east to form a railway line. A small-shaped building was shown in the north east of the site and was marked as a Terminus. No further change was indicated in the 1914 map edition.

The 1932 map showed the Station Nursery in the south western section of the site. A number of small additional buildings were present just north of the Terminus building in the north west of the site and 7 small buildings/structures in the south east of the site. The 1949 map showed the site was marked as Corstorphine Station. A works building was marked in the south western corner of the site. The station building was marked in the location of the Terminus building along Station Road which forms the western boundary of the site. A raised area/embankment was indicated in the south west of the site.

The 1963 /1965 map showed the works building had been extended and was shown as 2 roughly square buildings. The station was marked as disused in the 1973 map and the railway and sidings had been dismantled and removed. The station former building was divided and numbered. One of the 2 buildings shown in the previous map as a works building (the western most building) was marked as a General Register Office (census branch) and the adjacent

building was still marked as a works. The 1984 map showed the General Register Office was marked as a Government Office. A depot and electrical substation was indicated in the centre of the site. The north western area of the site was redeveloped as a number of housing estates with associated access ways named the Paddockholm. Corstorphine House Terrace was marked in the north western corner on the 1986 map. The site was almost developed to its present layout with the exception that the depot was still marked in the centre of the site and the building adjacent to the Government Building was still marked as a works.

The 1996-1998 and 2000 maps showed no further change to the site. The 2001 map showed the site as in current layout; the Government Office and adjacent works building were merged as one building and the depot was no longer marked on the site. No further change was indicated on the subsequent 2002 and 2003 maps.

3.1.2 The Surrounding Area

The first edition 1895 map showed the site was located in a predominately undeveloped area with residential development of Corstorphine to the west. A convalescent hospital was shown approximately 250m to the north east and a Children's Home to the east. A small smithy was present approximately 200m to the south west. Corstorphine Station was marked approximately 1.5km south east of the site at the inspection of the Corstorphine-Dalmeny line and the Edinburgh-Glasgow line. A gasworks was indicated along the Stank river approximately 800m south-south west of the site. A graveyard was indicated adjacent to a church approximately 200m west of the site and Corstorphine Castle was shown approximately 600m south west.

The 1908 map showed a smithy approximately 700m to the north west; the smithy to the south west was no longer marked. The gasworks was marked as disused and Corstorphine station was renamed as Saughton Station. A laundry was marked in the site of the former gasworks in the 1914 map edition and the gasometers were no longer present. The laundry building was no longer indicated on the 1932 map. The 1949 map showed meadowhouse garage approximately 100m north east of the site. Residential development was shown to the north and south of the site and Edinburgh Zoo (with a number of ponds on the grounds) was shown approximately 500m north east. A tramway was indicated along St. John's Road north of the site.

The 1956 and 1966 map showed no significant change to the site surroundings. The 1973 map showed a works approximately 400m to the west as a smaller works building with a garage immediately to the south. The railway line to the east was shown as dismantled. The 1986 map edition showed a government office approximately 100m east of the site in a formerly undeveloped site.

The 1996/1998 map showed a builders yard approximately 200m south west of the site and the garage to the west/south west of the site (400m) was no longer marked. No significant changes were indicated in subsequent map editions 2000-2003.

3.1.3 Aerial photographic records

Aerial photographic records from 1946 to 1990 of the site are detailed in Table 3.1.

TABLE 3.1 AERIAL PHOTOGRAPHIC RECORD OF THE SITE

DATE	DESCRIPTION
April 1947	The site was shown as a railway terminus with a number of railway sidings terminating at the western end of the site; loading and storage area were indicated between the sidings. A depot and a shed were indicated in the south western section of the site and a depot was also marked at the north western section of the site. A parking area was indicated along the southern boundary adjacent to the depot and shed. The immediate surrounds was indicated north and south of the site.
April 1953	Four sidings were evident; a warehouse was present in the south west of the site and a storage yard was present south of the site.
June 1961	Three buildings were evident along the southern boundary adjacent to the building and a car park area was evident further east
June 1973	All railway sidings have been removed from the site
June 1982	Construction was evident in the south west of the site
July 1990	Red brick buildings were evident in the south west of the site (3 rectangular roofs were evident). A area of hardstanding was evident adjacent to the buildings which was vacant

3.2 REGULATORY AUTHORITY INFORMATION

3.2.1 Environmental Database

An Envirocheck data search was carried out for the site area, providing information on Discharge Consents, Integrated Pollution Control (IPC) / Air Pollution Control (APC) / Pollution Prevention and Control (PPC) authorisations, pollution incidents, landfill sites,

Radioactive Consents, ground and surface water quality information, ecologically sensitive sites and fuel stations. Relevant information to the site is outlined below.

- There are no Air Pollution Control (APC) authorisations within 500m of the site.
- There are no Integrated Pollution Control (IPC) or Pollution Prevention Control (PPC) processes within 500m of the site.
- There are no Discharge Consents associated with the site or the surrounding 500m of the site.
- There are no Registered Radioactive Substances within 500m of the site.
- There is currently no publicly available register of surface and groundwater abstractions in Scotland.
- There are no Waste Transfer or Waste Treatment or Disposal Sites within 500m of the site.
- There is a Contemporary Trade Directory Entry held by Research Micro Systems Ltd. for office equipment manufacture, 36m south east of the site. There are a further 16 Contemporary Trade Directory Entries for a range of companies such as a gas company, two dry cleaners, a hospital, a cabinet makers, a petrol filling station and two car garages.
- There are two Fuel Station Entries within 500m of the site, one at 323m east of the site for Shell Carrick, a petrol station now marked as 'out of industry' and the second 332m south west of the site for an unknown building type now marked as 'obsolete'.
- An area of unadopted green belt is located 157m north east of the site and Corstorphine Hill is designated as a Local Nature Reserve 430m north east.

3.2.2 Local Authority

Records held by the Environmental Services Department of The City of Edinburgh Council were viewed to ascertain if the Council have information relating to any specific ground contamination issues at the site.

No records were held for the site at the time of the review of Council Records i.e. there are no records of site investigations or remedial works undertaken for the redevelopment of the site.

Offsite Records

A desk top environmental investigation¹ and site investigation² was undertaken at an adjacent site, Romano House (former Chinese embassy) immediately south west of the site. The site investigation was undertaken prior to the proposed development of the site. The following information was detailed in the reports:

- The site investigation comprised the drilling of 4 cable percussion boreholes.
- Made Ground was encountered to a depths between 0.3m and 1.8m bgl.
- Natural soils comprised greyish brown clayey gravely fine to coarse sands (up to 1.3m in thickness) which in turn are underlain by dark grey sandy gravely clay with cobbles (a proven depth of >5.7m).
- Groundwater was encountered at one borehole location at 5.8m bgl which rose to 3m in 20 minutes during drilling.
- Three soil samples (2 natural and 1 made ground) were analysed for metals, total PAH, Cyanide, phenols, sulphate, sulphide, sulphur, thiocyanate and toluene extract.
- The report concluded “the results of laboratory analysis on soil samples collected from the site have indicated that bulk soil contaminant concentrations are low”.

3.2.3 Petroleum Records

Petroleum licence records held by The City of Edinburgh Council were viewed to determine if records exist of above ground or below ground licensed (petrol) storage facilities at the site and its immediate surrounds. No petroleum records were identified for the site.

3.2.4 Scottish Environment Protection Agency

Information has been requested from SEPA regarding potentially contaminative activities, authorised processes and water quality in the surrounding area. SEPA has provided the following information (dated 25th July 2005):

¹ Resource and Environmental Consultants Ltd, Results of a Desk Top Environmental Investigation, Romano House, Corstorphine, Edinburgh on behalf of Scotia Homes, July 2005

² Aitken laboratories Ltd Site Investigation Contractors, Report on Ground Investigations at Romano House on behalf of McLay Collier & Partner, Consulting Engineers, Edinburgh, February 2005 (ref: D640)

- SEPA have no record of current landfill/waste disposal sites within 250m of the site.
- There are no IPC/APC authorised processes held by the site or within 250m.

3.3 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

Desk-based research of the local geology, hydrogeology and hydrology was carried out in order to establish the potential for migration of contamination onto or away from the site, and to assess the surface and groundwater sensitivity of the site area.

Information on the geological stratigraphy underlying the site was obtained from a number of sources, namely:

- Examination of published geological maps produced by the British Geological Survey (BGS) and associated sheet memoirs; and
- Examination of the BGS's "Hydrogeology of Scotland", "Groundwater Vulnerability Map of Scotland" and the "Hydrogeological Map of Scotland".

3.3.1 Geology

The BGS mapping of the area (NT27SW, 1:10,560, 1965) indicates that the site is underlain by Quaternary Boulder Clay Deposits.

The underlying solid strata are the Lower Oil-Shale Group of the Lower Carboniferous which consists of limestones and marls interbedded with sandstones, coals and shales.

Published BGS drift data may be supplemented by information provided by the site investigation at the adjacent site, outlined in Section 3.2.2. Natural soils were described as clayey gravely Sands (up to 1.3m in thickness) which in turn are underlain by sandy gravely Clay with cobbles (a proven depth of >5.7m).

3.3.2 Hydrogeology

The Groundwater Vulnerability Map of Scotland classifies the drift geology underlying the site as of low permeability and can be of substantial thickness. It typically does not offer significant potential for groundwater storage or movement, due to the presence of fine grained clays and associated low permeability. Information provided by the site investigation at the

adjacent site also indicates the presence of sand lenses within the Boulder Clay which may have the potential to support groundwater storage. However groundwater was only proven at one of the four locations drilled which may indicate that granular soils may be discontinuous and therefore unlikely to offer a significant lateral or vertical pathway for the movement of groundwater within the superficial deposits.

The solid Carboniferous Oil-Shale Group is classified by The Hydrogeological Map of Scotland as a highly productive, aquifer which is not laterally extensive, in which groundwater flow is dominantly in fissures and other discontinuities. It is classified as having moderate permeability by The Groundwater Vulnerability Map of Scotland. Borehole yields are generally not greater than 10l/s, but exceptionally 20l/s.

3.3.3 Hydrology

The nearest surface water course is the Stank River situated approximately 800m south-south west of the site which flows in a general easterly direction. The Stank River is not currently classified by SEPA under the River Quality Classification Scheme.

3.3.4 Environmental Sensitivity

The site is considered to be situated in an area of low sensitivity with respect to groundwater resources. The solid geology underlying this site is of moderate permeability and moderate potential to store exploitable quantities of water. The drift geology is Boulder Clay Deposit which is of limited permeability, and typically does not offer significant potential for groundwater storage or movement. Coarser grained lenses of sand and gravel may have the potential to support limited groundwater storage; however these are commonly discontinuous and considered unlikely to offer a significant lateral or vertical pathway for the movement of groundwater within the superficial deposits.

The site is considered to be in a low sensitivity setting with regard to surface water resources due to the distance of the nearest surface water feature i.e. the Stank River approximately 800m south-south west.

4.0 SITE INSPECTION

A site inspection was undertaken by Mary Lynch of ENVIRON on the 20th March 2006. The site visit was unaccompanied.

4.1 SITE SETTING AND DESCRIPTION

The site is located south off Station Road south of Corstorphine's High Street. Access to the Paddockholm housing estate and the government office is from Station Road which forms the western site boundary. There is also a pedestrian access way to Paddockholm housing estate from Station Road in the west of the site and also from a railway path in the east of the site. A wall forms both the northern and southern site boundary.

The site occupies an approximate area of 3.11ha which mainly comprises the residential development of Paddockholm, government offices and an area of vacant ground.

Paddockholm housing estate occupies the majority of the site i.e. an area of approximately 2.46ha. The housing estate comprises 1, 2, 3 storey terraced houses with residential gardens, landscaped areas and car parking spaces. A grassed/ planted area is also present in the north western section of the site at the entrance of the estate. All hardstanding areas (car parking and access ways) comprise tarmac surfacing which was observed to be in good condition.

The government offices are located in the south west of the site and comprise the General Register Office for Scotland. The office occupies an area of approximately 0.42ha and is a single storey concrete building with galvanised roofing. An area of vacant ground (approximately 0.23ha) is located adjacent (east) to the office which was secured from the government offices by a gate. An electrical substation was present in the east of this area and a wall was present in the west of the area. Demolition rubble was observed adjacent to the electrical substation. The area was covered by tarmac which was in poor condition with grass growing over the surfacing.

The overall slope of the site is from north to south. There was an approximate 2m slope from the adjacent site to the northern site boundary and there was also an approximate 1-2m slope from the southern site boundary to the adjacent site. The site also slopes gently from the entrance of Paddockholm housing estate eastwards.

4.2 SURROUNDING AREA

The immediate surrounds comprise:

- North: residential.
- East: residential; a railway path is located adjacent to the eastern boundary.
- South: residential; a construction site is located immediately south of the government offices on the site.
- West: Station Road; residential beyond.

5.0 POTENTIAL FOR CONTAMINATION

5.1 THE SITE

The present use of the site as residential and offices is not considered to represent a potential source of contamination. An electrical substation is present in an area of vacant ground adjacent to the office which has been present at the site by the 1970s. As the electrical substation was built/used prior to the ban on the use of PCB (Polychlorinated biphenyls) and PCTs (Polychlorinated terphenyls) in transformers/capacitors in 1986 (DoE SI 902), there is the potential for historical leaks/spillages of polychlorinated biphenyls (PCBs) which were used in transformer oils.

Review of historical map and aerial photographic information indicates the potential presence of contamination associated with the historical use of the site as a railway land i.e. the Corstorphine railway station.

The site had been developed as Corstorphine Station (a terminus and railway sidings) by the early 20th century. The site remained in use as a railway station and depot until the 1960s/early 1970s when the station was marked as disused and all the railway sidings were removed from the site and the railway line was marked as dismantled. A works building was present in the south western section of the site by 1949 which was extended in the 1950s/60s and appeared as two adjacent buildings. The largest of the buildings was marked as the General Register Office by 1973; at this time a depot and electrical substation was also present adjacent to the works building in the south west of the site. Redevelopment of the site to the residential development of Paddockholm occurred in the 1980s. The works building adjacent to the General Register Office was indicated as one large building by 2001 and was marked as government offices and the depot was no longer indicated.

The following potentially contaminative activities/ land uses were undertaken historically on the site associated with its former use:

- The railway line and sidings were present on the site from the early 20th century until they were dismantled in the 1960s/early 1970s. Possible contamination associated with railway land relates to materials which were used in the building of railways, railway

operation and maintenance. Associated contaminants include ash ballast; fuel oil, lubricating oils and greasers; herbicides (from weed control along railway lines); and contamination from spillages of cargoes or materials which were stored along the railway.

- The aerial photographs indicated loading and storage areas were present adjacent to the railway sidings. Contamination associated with loading and storage is dependent on the nature of storage activity that was undertaken at the site. Coal for domestic consumption formed the largest component of transshipment goods. Depots also were frequently used for storage of products for agriculture and industries. Contamination arising from the good sheds/depots results from possible spillages of materials stored and wastes which may have comprised scrap metals, drums, packaging material and combustible waste. General contamination of the site may also have occurred through wind dispersal of airborne contaminants e.g. coal dust, metal particulates and asbestos fibres.
- The presence of a works (1940s to 2001) and depot (1970s to 2001) in the south western section of the site. The original works building however was occupied by an office (General Register Office) from circa 1970s. Possible contamination associated with the historical presence of works/depots on site relate to the nature of storage activities undertaken. From the site inspection, it appears that the part of the walls of the former depot is still present on the site.

As indicated in Section 3.2.2, the Council does not hold any site investigation reports and details of remedial works undertaken for the redevelopment of the site from railway land to residential.

5.2 THE SURROUNDING AREA

The site has historically been located in the residential and commercial setting of Corstorphine. A number of potentially contaminative activities/industries with potential for limited contamination have been identified as follows:

- A small smithy was indicated approximately 200m west in 1895.
- Meadowhouse garage 100m north east in 1949 and garage approximately 400m south west in 1973.
- Two adjacent works 400m south/south west.
- Envirocheck information indicates the former presence of petrol filling stations 323m east and 332m south west.

The above past activities are not considered to represent a significant source of off site contamination as the site is underlain by Boulder Clay and therefore significant lateral and vertical migration of ground water and any associated contaminants from offsite sources is unlikely.

5.3 PRELIMINARY CONCEPTUAL SITE MODEL

The potential for the identified pollutant linkage to be significant has been assessed as low, medium or high. Risks are assessed based on a combination of the probability, or frequency, of occurrence of a defined hazard; and the magnitude of the consequences. Common pathways and uptake mechanisms for each type of sensitive receptor are outlined in Table 5.1.

Table 5.1 Common Pathways and Uptake Mechanisms for Sensitive Receptors

Receptor	Receptor Pathways and Uptake Mechanisms
Human	Uptake through the food chain e.g. eating vegetables grown on contaminated soils
	Direct ingestion – eating soils, the penetration of drinking water supply pipes by contaminants and surface groundwater abstractions for human consumption, either by drinking or food/drink manufacture
	Vapour migration and inhalation – in the case of volatile contaminants this would only be applicable if such contaminants were present in sufficient quantities to migrate through permeable ground and man made pathways (such as service corridors) and collect in confined spaces. Inhalation also relates to the inhalation of dust e.g. metal laden dust, asbestos fibres etc
	Direct contact e.g. during routine ground works, construction or demolition works. This can also include direct contact with contaminants present in surface waters e.g. during recreation (canoeing, swimming)
Groundwater	Vertical leaching from unsaturated zone
	Migration of contaminants in groundwater both laterally and vertically
Surface water	Direct spillage to surface waters
	Disposal of contaminants, through drainage systems which often discharge directly to watercourses
	Migration through shallow groundwater that is hydraulic continuity with surface water systems
Ecological Systems	Direct uptake from contaminated soils and groundwater. In the case of offsite ecological receptors, contaminants would need to be first transported via either soil or groundwater pathways. Ecological systems may also come into direct contact with contaminants (i.e. a source) on a site, depending on their location and proximity to the source
Property in the form of buildings	Direct contact with contaminated soil and groundwater. Certain contaminants can attack building fabric e.g. concrete piles and plastic pipes. Additionally, buildings can come into direct contact with sources of contaminants e.g. spills and the presence of contaminants in pipes
	Ingress of soil gas
Property in other forms	Migration of contaminants through air, soil, groundwater and surface water. Crops can uptake contaminants by direct contact with contaminated soils and groundwater; and livestock and animals can uptake contaminants through the food chain, by direct ingestion, direct contact and through the air by inhalation (vapours and dust)

Table 5.2 below shows the preliminary conceptual site model for the site. Pollutant linkages which are considered to be high or medium are represented graphically on a preliminary site conceptual model (Figure 4, Annex A).

Table 5.2 Preliminary Conceptual Site Model

Present Landuse	Source	Pathway	Receptor	Significance of pollutant linkage
Residential development of Paddockholm i.e. residential with gardens	Contamination within Made Ground present or drift deposits associated with historical use of the site as railway land	Uptake through the food chain	Humans – site residents	High
		Direct ingestion		High
		Vapour migration and inhalation		Medium
		Direct contact		High
Office	Contamination within Made Ground present/drift deposits associated with the historical presence of a works	Uptake through the food chain	Humans – site staff and site users	Low
		Direct ingestion		Low
		Vapour migration and inhalation		Low
		Direct contact		Low
Vacant Land	Contamination within Made Ground present/drift deposits associated with the historical presence of a depot and also electrical substation which is still present at the site	Uptake through the food chain	Humans-site staff/trespassers	Low
		Direct ingestion		Low
		Vapour migration and inhalation		Low
		Direct contact		Low
Whole site	Potentially contaminated soils	Vertical leaching from unsaturated zone	Shallow groundwater	Low
		Migration of contaminants in shallow groundwater	Stank River	Low
		Vertical migration of contaminants in shallow groundwater	Carboniferous Oil-Shale Group	Low
		Direct contact with contaminated soil and shallow groundwater	Ecological systems	Low
		Direct contact	Property in the form of	Medium

		with contaminated soil and shallow groundwater	buildings	
		Ingress of soil gas		Medium
		Migration of contaminants through air, soil, groundwater and surface water.	Property in other forms	Low
Whole site	Contamination migration from offsite sources	Lateral migration via shallow groundwater	Shallow groundwater on site	Low

5.3.1 Risks to occupants

Review of historical maps and aerial photographs of the site indicate the site was historically used as a railway station with associated sidings from the early 20th century until the 1960s/early 1970s prior to its redevelopment as residential. No records of environmental assessment reports, site investigation or remedial works are held by the Council for the redevelopment of the site. Therefore, the presence of contamination associated with the former railway land and goods station cannot be discounted. The site is predominately covered in buildings or hardstanding which reduces the potential for direct exposure pathways and reduces the potential for volatilisation of contaminants to air from the ground. There is however, the potential for direct exposure of site residents to contaminants as a result of the residential gardens. Given that railway land station was no longer present on the site after the 1960s/early 1970s, any contamination onsite is at least 30 years old and attenuation of such contamination is likely to have occurred over time, therefore the risks to occupants from volatilisation to air are considered medium.

Risks to site occupants i.e. office staff in the south western section of the site, as a result of the former use of this section of the site as a works, are considered low as this section of the site is covered by hardstanding, which will create a barrier between potential sources of contamination in the ground and site occupants (the receptors).

Risks to site staff / human receptors from the existing electrical substation and the former presence of a depot in the vacant area of ground in the south western section of the site are also considered low, given that access to this area is restricted and it is unlikely that site users would be exposed to this area for a significant period of time.

5.3.2 Risks to water resources

Risks to water resources are considered low as the site is underlain by Boulder Clay of limited permeability; the movement of any contaminants present within the Made Ground is significantly retarded by the presence of clay minerals within the drift deposits. Consequently risks to the underlying Carboniferous Oil-Shale Group are considered low.

The nearest surface water receptor is the Stank River approximately 800m south-south west; lateral migration of contamination is considered unlikely given the limited permeability of the drift deposits and the distance of the river from potential sources of contamination at the site.

5.3.3 Risks to ecological receptors

An area of unadopted green belt is located 157m north east and a local nature reserve is located 430m north east. Risks to ecological receptors are considered low given that it is unlikely that potential sources of contamination would migrate to the green belt/ local nature reserve via soil or groundwater pathways due to the limited permeability of the drift deposits and the distance of the ecological receptors from potential sources.

5.3.4 Risks to property

Risks to property in the form of building i.e. building fabric and underground structures, are considered medium due to the potential presence of materials which may be deleterious/aggressive/combustible materials or presence of ground gas beneath the site.

Risks to property in the form of crops and animals are considered low as the site is currently used for residential and office land use.

5.3.5 Risks to offsite properties

Risks to offsite properties are considered low given the limited permeability of the underlying drift deposits i.e. Boulder Clay, which will inhibit the lateral migration of contamination offsite.

6.0 SUMMARY AND CONCLUSIONS

On behalf of City of Edinburgh Council, ENVIRON has conducted a Phase 1 Environmental Appraisal of the former Corstorphine Station, off Station Road (the Paddockholm), Edinburgh, EH12 7XP. The purpose of the appraisal was to provide an initial assessment of the likelihood of any sources of contamination being present on the site from previous uses, in order to assess what the potential impact of these contaminants would be on future users or operations at the site and associated potential liabilities.

The site is located off Station Road south of Corstorphine's High Street. The site occupies an approximate area of 3.11ha which mainly comprises the residential development of Paddockholm (2.46ha) with the General Register Office of Scotland office and an area of vacant ground in the south western section of the site. An electrical substation is also present on the area of vacant ground.

The site is considered to be situated in an area of low sensitivity with respect to groundwater resources. The solid geology underlying this site is of moderate permeability and moderate potential to store exploitable quantities of water. However, the drift geology comprises Boulder Clay Deposits which are of limited permeability and typically do not offer significant potential for groundwater storage or movement. Coarser grained lenses of sand and gravel may have the potential to support groundwater storage; however these are commonly discontinuous and considered unlikely to offer a significant lateral or vertical pathway for the movement of groundwater within the superficial deposits. The site is considered to be in a low sensitivity setting with regard to surface water resources due to the distance of the nearest surface water feature i.e. the Stank River approximately 800m south-south west.

Review of historical map and aerial photographic information indicates the potential presence of contamination sources associated with the historical use of the site as a railway land i.e. the Corstorphine railway station. The site had been developed as Corstorphine Station (a terminus and railway sidings) by the early 20th century. It remained in use as a railway station and depot until the 1960s/early 1970s when the station was marked as disused and all the railway sidings were removed from the site and the railway line was marked as dismantled. A works building was present in the south western section of the site by 1949 which was extended in the 1950s/60s and appeared as two adjacent buildings. The largest of the buildings was marked as the General Register Office by 1973; at this time a depot and electrical substation

was also present adjacent to the works building in the south west of the site. Redevelopment of the site to the residential development of Paddockholm occurred in the 1980s. The works building adjacent to the General Register Office was indicated as one large building by 2001 (marked as government offices) and the depot was no longer indicated.

The site has historically been located in the residential and commercial setting of Corstorphine. A number of potentially contaminative activities/industries with potential for limited contamination have been identified (a small smithy, a number of garages/petrol stations and works 400m south/south west). As the site is underlain by low permeability Boulder Clay, significant lateral and vertical migration of ground water and any associated contaminants from offsite sources is considered unlikely.

The preliminary conceptual model which has been devised for the site has identified potential pollutant linkages as a result of the historical uses of the site. It is considered that there is a high risk to human receptors (i.e. site residents) from potential historical contamination associated with potentially impacted Made Ground/drift deposits resulting from the former use of the site as a railway station and railway land. Risks to building fabric and underground structures are considered medium due to the potential presence of materials which may be deleterious/aggressive/combustible materials or presence of ground gas beneath the site.

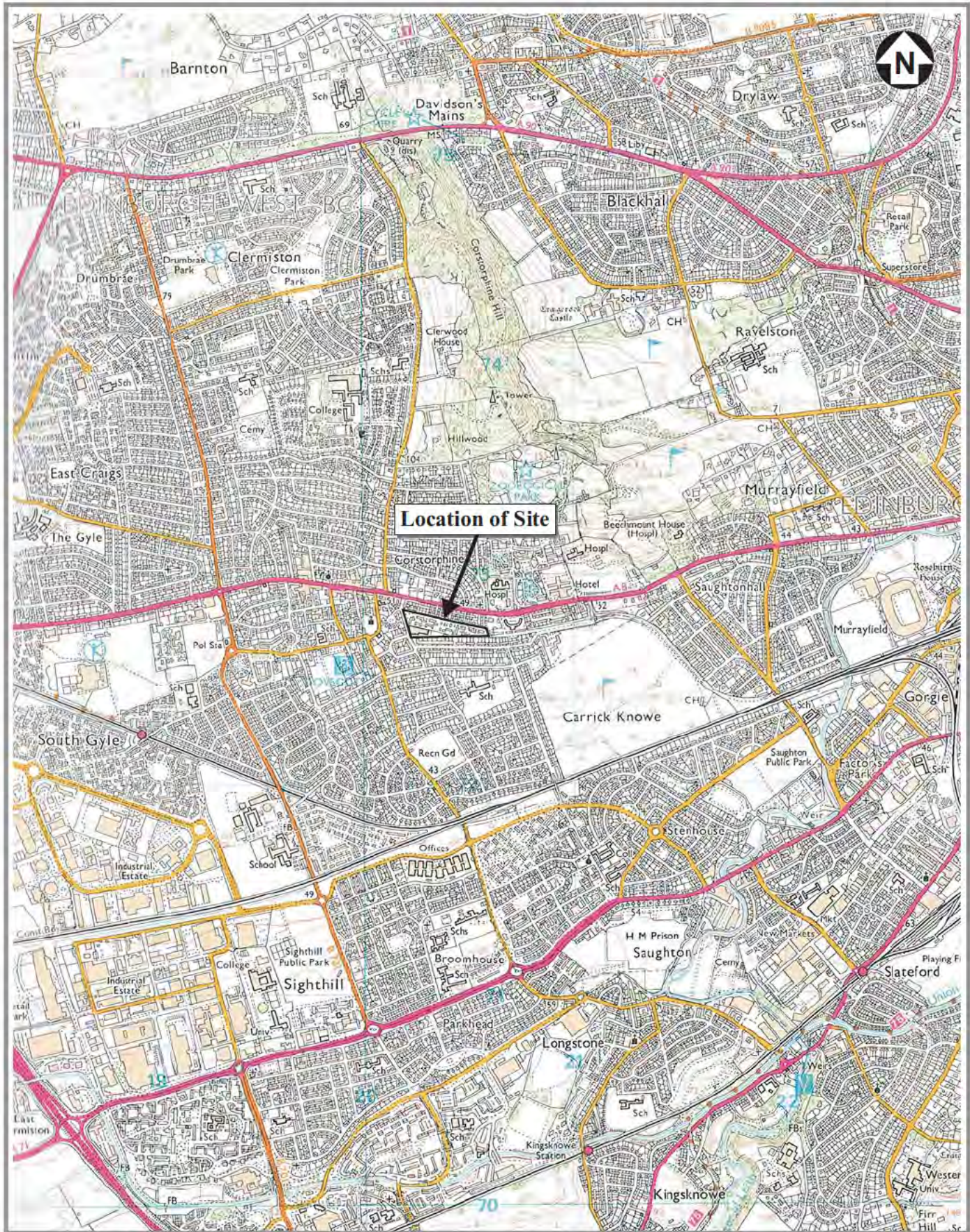
In accordance with Part IIA of the Environmental Protection Act 1990, a potentially significant pollutant linkage represent a “significant possibility of significant harm is being caused or there is a significant possibility of such harm being caused” to sensitive receptors, “or pollution of controlled waters is being, or is likely to be, caused”.

A pollutant linkage has been identified between human receptors (residents) and a potential source of residual contamination originating from historic railway land. This pollutant linkage is considered potentially significant in terms of the presence of ‘contaminated land’ as defined in Part IIA of the Environmental Protection Act 1990 given the sensitive nature of the site’s current land use i.e. residential housing with garden.

An intrusive investigation is therefore recommended to determine the presence, nature and extent of any contamination sources and the effect on current site users.

ANNEX A :FIGURES

Figure 1
Site Location : Corstorphine Station



Reproduced from the Ordnance Survey with the permission of the controller HMSO Crown Copyright Reserved. Licence No. ES 100012174

ENVIRON

ENVIRON UK Limited

7 Walker Street
Edinburgh EH3 7JY
Tel. +44(0)131 225 9899
Fax. +44(0)131 220 3411

Client **The City of Edinburgh Council**

Scale

1:25 000

Date

May 2006

Project No

62-C9251

Drawn by

MAS

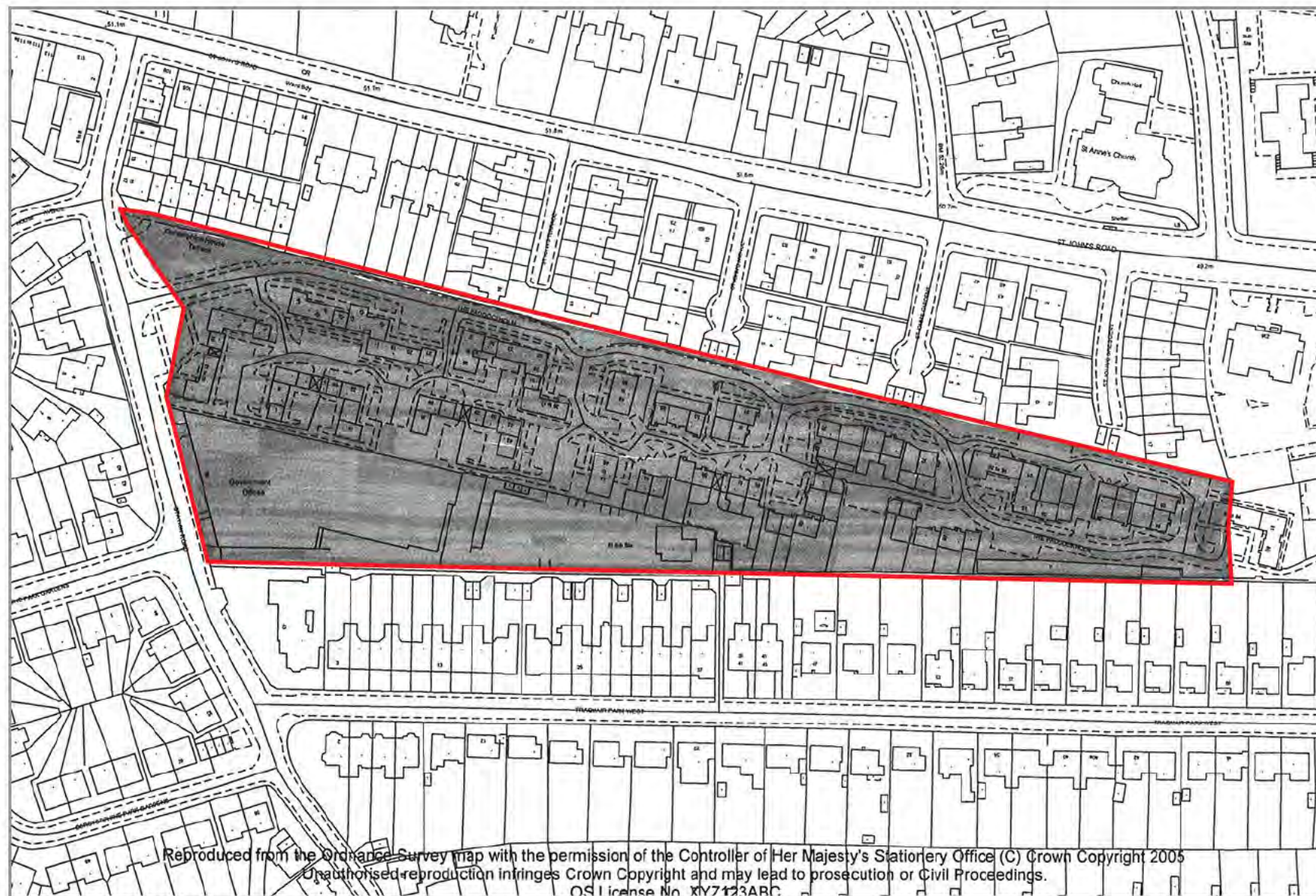


Figure 2
 Site Layout : Corstorphine Station

Client The City of Edinburgh Council			
Scale	Not to scale	Date	May 2006
Project No	62C9251	Drawn by	MAS



Figure 3
Historical Plan of Corstorphine Station
Dated 1965

