

APPENDIX D

ExCAL Preliminary Risk Assessment (October 2009)
ExCAL Site Investigation Report (August 2010)

**TROSTRE LANDFILL SITE
LLANELLI, CARMARTHENSHIRE**

PRELIMINARY RISK ASSESSMENT

OCTOBER 2009

Prepared for:

Carmarthenshire County Council

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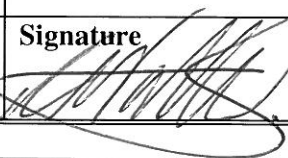
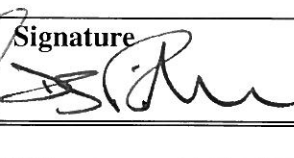
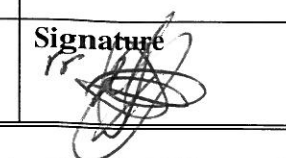
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PROJECT: TROSTRE LANDFILL SITE
LLANELLI, CARMARTHENSHIRE

JOB NUMBER: 44-05-01-09

TITLE: PRELIMINARY RISK ASSESSMENT (OCTOBER 2009)

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**TROSTRE LANDFILL SITE
LLANELLI, CARMARTHENSHIRE**

PRELIMINARY RISK ASSESSMENT

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1.0 INTRODUCTION

1.1 Scope

ExCAL Limited has been commissioned by Carmarthenshire County Council to carry out a Preliminary Risk Assessment at Trostre Landfill Site, Llanelli.

The purpose of this assessment is to develop an outline conceptual model and to establish whether or not there are any potentially unacceptable risks from contamination on the site. Where unacceptable risks are identified an investigation strategy is required to ascertain the extent of vertical and horizontal contamination across the site.

1.2 Background

The site is a licensed Inert Landfill (Licence No: LLN/WD/007) owned by Carmarthenshire County Council and operated by the Highways and Transportation Department at Dyfed County Council. Currently the western area of the site is being utilized for the construction of a new highway access to the “Trostre Retail Park” and the eastern area of the site is currently being used as an overflow car park for the “Park Y Strade” development. The waste management licence is currently under review with the intention of submitting an application for its surrender.

2.0 SITE DETAILS

2.1 Site Location

The site is located approximately 300m east of Parc Trostre, near Cefncaeau, Llanelli, Carmarthenshire. The approximate centre of the site is location at NGR: 252799 199700. Site location is shown in Drawing 44-05-01-09D001.

2.2 Site Description

A description of the site and its surrounding has been generated from a review of information presented in Appendices B, B1, B2 and observations made during a walkover survey undertaken during August 2009.

The ground conditions within the site boundary can be sub-divided in to two main elevations. A newly constructed highway currently cuts through the western area of the site leaving the far west area of the site at an elevated level.

The two sub-sections of the site are also highlighted by the contrasting ground. The eastern section is surfaced with crushed rock and is bunded by a soil material, whilst the western area of the site is dominated by tall grasses, shrubs and bushes. There are tall tree species and shrubs along the south and south western boundaries of the site and the northern boundary is dominated by shrubs and tall grasses.

A part culverted drainage trench runs along the site's northern boundary where it runs beneath the newly constructed highway and remaining land within the site boundary to meet the River Dafen.

Immediately to the north of the site boundary runs the main public highway (A484).

To the north of the site beyond the A484 is "Parc y Scarlets" rugby stadium. Further residential dwellings extend north and east of the stadium.

To the east of the site another public highway runs along the site boundary. Further residential dwellings and a commercial unit extend to the east of this highway.

To the south of the site a large tin plate works is situated, with tall tree species separating the land along the boundary.

To the west of the site runs the River Dafen. The new highway also runs through the western area of the site crossing the river. Extending beyond the River Dafen are commercial units (Parc y Trostre) and a pond.

The only evident services during the walkover survey were the part culverted drainage trench which runs east to west along the northern and north western boundaries of the site before crossing beneath the highway and joining the River Dafen.

2.3 Client Supplied Information

Prior to commencing this study ExCAL were given Drawing Plan 1, titled "Trostre Tip Phase 2" dated July 2002 and an unreferenced Ordnance Survey map dated 20th May 2009 showing the current site layout by Carmarthenshire County Council. These drawings are presented in Appendix A.

The Ordnance Survey map indicates that since July 2002 a highway has been constructed through the western area of the site and the eastern area of the site is being used as a car park.

A data set of chemical analysis used in the re-profiling phases of the landfill site was also presented by Carmarthenshire County Council supported by an Environment Agency letter referenced DJ/CL/SITE/Trostre, dated 24th June 2002. The letter states that the majority of the six samples taken from the site for chemical analysis are within the lower threshold concentration limits quoted in "Guidance for the disposal of contaminated soils". There are Arsenic, Zinc and Copper exceedences but the Environment Agency regard these as minor and too insufficient to pose any constraint on planned site re-profiling works. The letter is presented in Appendix C

The site licence was issued on 2nd March 1994 and the site ceased to accept waste on the 26th February 2000.

3.0 SITE HISTORY

An extensive study of historical mapping was carried out in order to determine the historical land use both on site and in the surrounding area. The following lists of maps were studied: -

1878 County Series Scale: 1:10,560
1880 County Series Scale: 1:2,500
1901-1905 County Series Scale: 1:10,560
1907 County Series Scale: 1:2,500
1913 County Series Scale: 1:10,560
1916 County Series Scale: 1:2,500
1938 County Series Scale: 1:10,560
1948 Provisional Scale: 1:10,560
1948 County Series Scale: 1:10,560
1950-1953 National Grid Scale: 1:1,250
1952-1953 National Grid Scale: 1:2,500
1964-1969 National Grid Scale: 1:1,250
1973-1974 National Grid Scale: 1:10,000
1990-1991 National Grid Scale: 1:10,000
2002 10,000 Raster Scale: 1:10,000
2008 National Grid Scale: 1:10,000
2008 National Grid Scale: 1:2,500.

All historical maps are presented in Appendix B2.

1878-1901 – The site consists of undeveloped farmland. Residential dwellings surround the north east, east, south and south western borders of the site. The dwelling “Forest Villa” is situated directly adjacent to the site’s eastern boundary while “Maes ar Ddafen Fach” is situated approximately 50m south of the site’s southern boundary. An access track way is situated west of the site’s perimeter.

There are water courses running within and outside the sites boundary. Within the site there are two water courses, one running south west through the site which joins the River Dafen and one that runs through the centre of the site into a small pond situated on the site’s southern boundary.

Outside the site’s western border runs the River Dafen. There is also a water course running outside the site’s north westerly boundary. There is also indication of a pond approximately 100m south west of the site perimeter.

1901-1907 – The site remains undeveloped. The water courses remain with exception of the pond on the site’s southern boundary. There has been the sinking of a coal shaft approximately 5m south of the site’s southern boundary and an air shaft approximately 60m east and south of the sites boundary.

1907-1916 – The site remains undeveloped with the water courses unchanged. The Coal Shaft is now referenced as the “Old Shaft (Coal)” which suggests the

use of the shaft has ceased. There are three new buildings adjacent to the sites southern boundary.

1916 – 1953 – During this period there has been considerable development on the land surrounding the site. The residential area of Cefncaeau has been developed approximately 200m to the north east of the site. A series of buildings were constructed immediately south east of the site's boundary and a large area 110m south of the site was developed which consisted of an electricity sub station and a series of buildings referenced "Works".

The site itself remained undeveloped and the water courses continued to be shown on the historical maps.

1953-1969 – During this period changes have been made to the land surrounding the southern area of the site. The series of buildings constructed immediately south east of the site's boundary have made way for a tennis court. Directly south of the tennis court a bowling green and pavilion have been constructed. The tin plate works 110m south of the site's boundary has also been further developed with the construction of a number of new buildings.

The site itself remained undeveloped and the water courses continued to be shown on the historical maps.

1969-1994 – During this period a highway was constructed (A484) which runs adjacent to the north of the site. A link road was also constructed to allow access to the tinplate works. The link road runs along the site's northern boundary. Further development has taken place in the tinplate works situated 110m south of the site's boundary. The development consists of the construction of a number of new buildings. A garage and a number of buildings have also been constructed 150m north west of the site. The site remained undeveloped and the water courses remained.

1994-Present – The area has undergone major development during this period. The construction of a highway across the western area of the site has split the site into two different elevations. The land within the site boundary that lies to the west of the highway is elevated, while the land lying to the east is at a lower elevation. The land to the east of the highway is currently being used as a car park. The car park is surfaced with crushed stone.

Since the site has undergone development the water course that runs through the centre of the site has been redirected to run into the water course that runs diagonally through the western area of the site, where it is culverted beneath the highway before flowing into the River Dafen. A concrete lined drainage ditch runs within the site's northern boundary where that too joins the diagonal water course which flows into the River Dafen.

The land situated to the north and west of the site has undergone major development. This development includes a new stadium (Parc Y Scarlets), a retail park and various other commercial properties.

4.0 ENVIRONMENTAL SETTING

4.1 Sources of Information

Information presented in this section has been sourced from the GeoInsight and EnviroInsight reports supplied by GroundSure, which are presented in Appendices B & B1 respectively.

4.2 Geology

The solid geology of the area is comprised of the Carboniferous Upper Coal Measures, Swansea Beds; the strata predominantly a sequence of mudstones, siltstones and sandstones with inter-bedded coal seams. The permeability of these rocks is classified as low to moderate via fracture flow.

Devensian Glacio-lacustrine and tidal flat Alluvial Deposits form the drift geology over the site. The permeability of these deposits is very low to low.

4.3 Hydrogeology & Hydrology

The geology (solid and drift) beneath and surrounding the site is classified as a minor aquifer with an intermediate leaching potential.

OS Maps indicate 28 exploratory boreholes within 250 meters of the site. These are located: -

- 11 meters south east of the site boundary;
- 15 meters south east of the site boundary;
- 28 meters south of the site boundary;
- 91 to 96 meters west of the site boundary;
- 144 meters south of the site boundary;
- 163 meters north east of the site boundary
- 174 meters north west of the site boundary;
- 197 to 249 meters south of the site boundary; and
- 215 to 250 meters south west of the site boundary.

The Afon Dafen is located immediately to the site's western boundary. The current chemical grade of this hydrological unit is 'B' Grade and the current biological grade of this hydrological unit is a 'C' grade. There are no Environmentally Sensitive Sites within 500m of the site boundary.

The nearest surface water feature is an unnamed tributary of the Afon Dafen which runs south west directly through the site. The source of this tributary is approximately 100m north of the site. The tributary is culverted beneath the new highway construction.

Local topography would suggest that all surface waters would drain to the River Dafen.

There are 11 authorised discharges within 500m of the site. These are located:-

- 122 meters north of the sites boundary;
- 198 to 295 meters north west of the site; and
- 235 to 407 meters south west of the site.

Details of the authorised discharge effluent are unknown. It unlikely that this discharge will have any impact on the site but the geology beneath and surrounding the site is classified as a minor aquifer with an intermediate leaching potential.

The site is within 250m of a Zone 2 and Zone 3 floodplain.

There is a groundwater flood susceptibility area within 50m of the site and the British Geological Survey (BGS) confidence rating for this susceptibility area is moderately low.

4.4 Artificial Ground and Features

The Groundsure Report obtained for the area states that there is no made ground present, however due to the nature of the site's previous use as a landfill it must be assumed that there is an unknown depth of made ground at the site.

The site walkover survey identified ground workings on the site which include a storm water drain running east to west along the site's northern boundary where it meets the unnamed River Dafen tributary. The site has been divided by the construction of a new highway in the western area of the site. The area to the east of the site is surfaced with crushed aggregate, whilst the area to the west of the new highway construction is elevated and consists of tall grasses, shrubs and bushes.

4.5 Pollution Potential

The Groundsure Report contained within Appendix B indicates no recorded pollution incidents within 250m of the study site, however a site investigation undertaken for the construction of the highway in March 2005 indicates residual hydrocarbon and possible asbestos contamination. The residual hydrocarbon contamination is highlighted in both trial pit logs and chemical analysis of the environmental soil samples taken from the trial pits. The asbestos contamination was visually identified on the trial pit logs. The trial pit logs and subsequent chemical analysis data are presented in Appendix C.

Methane and Carbon Dioxide was also identified in the gas and groundwater monitoring results. These results are presented in Appendix C.

5.0 IDENTIFICATION OF KEY CONTAMINANTS

On review of the historical and environmental setting information it would seem that the most significant potential sources of pollution would be as a result of the material contained within the site. Specific details regarding the material is unavailable so consequently based on the small amount of data available a worst case scenario must be assumed during determination of the potential contaminants. A review of CLR8 (Potential contaminants for the assessment of Land) published by the Environment Agency was also undertaken to identify possible key contaminants.

The key contaminants identified within this review are: -

- Metals and Metalloids (including their compounds);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Petroleum Hydrocarbons (TPH);
- BTEX (Benzene, Toluene, Ethylbenzene, Xylene);
- Phenols;
- Cyanide (Free);
- Total Organic Content (TOC);
- Sulphur;
- Sulphide;
- pH;
- Asbestos;
- Methane (CH₄);
- Carbon Dioxide (CO₂).

6.0 CONCEPTUAL MODEL

A vertical cross sectional representation of the site is presented in Drawing 44-05-01-09.D002 in Appendix A

The site history shows it to be undeveloped before being utilised as a landfill site in the mid 1990's.

There are three surface water features on and directly adjacent to the site. The first consists of a part culverted drainage trench which runs along the site's northern boundary where it meets an unnamed tributary of the River Dafen which flows south westerly through the site before entering beneath a highway and into the River Dafen, and the second being the River Dafen itself which runs directly adjacent to the site's western boundary.

The conceptual model shows that there are a number of ways in which links can occur between potential sources of contamination, pathways and receptors.

Potentially the storm water drainage running along the site's northern boundary could act as a pathway for contaminated water from the A484 road to discharge and filter into the site via a section of unculverted drainage and into the fill material, and also the unnamed River Dafen tributary.

The primary potential of creating a pathway between the source and receptor would be surface water infiltration into the potentially contaminated site due to inappropriate capping. This would allow the possible movement of contaminants into the groundwater and subsequently into the River Dafen due to the underlying levels of clay beneath the potentially contaminated fill material.

The potential pollution linkages are shown in Table 6.1 below.

Source	Pathway	Receptor
High level of contaminants within soil	Leaching to groundwater	Groundwater
	Volatilisation to air	Wildlife; Plants; Humans
	Direct contact with soils	Humans, Plants & wildlife (on site at near site boundary)
	Windblown	Humans, Plants & wildlife (on site at near site boundary)
	Plant uptake	Wildlife; Humans
High level of leached contaminants	Groundwater	Surface waters in hydraulic continuity; Wildlife; Habitats; Sensitive sites (SSSI, SAC, NNR)

7.0 CONCLUSIONS

On review of the site history, limited available data and environmental setting it is concluded that a site investigation should be undertaken. This will provide a more complete characterisation of the potential contaminants present and their possible environmental effects, and should be designed to target the whole site if achievable.

Additional sampling locations at the River Dafen are also required. This will enable the determination of any pollution linkage between off-site movements of contaminants in groundwater to surface waters and subsequent receptors.

The investigation should specifically target the key contaminants identified. These should include: -

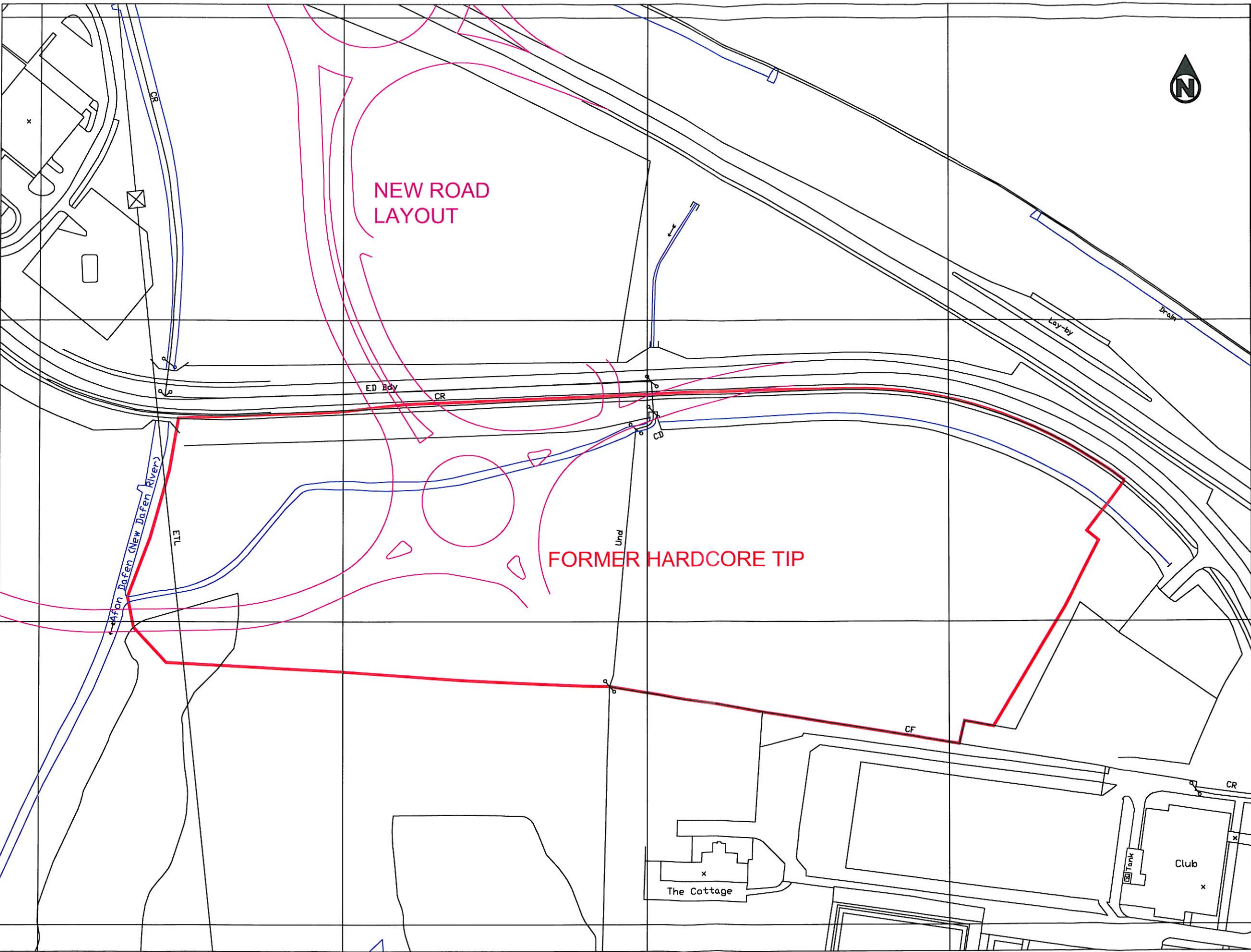
- Metals and Metalloids (including their compounds);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Petroleum Hydrocarbons (TPH);
- BTEX (Benzene, Toluene, Ethylbenzene, Xylene);
- Chlorinated Aliphatic Hydrocarbons;
- Chlorinated Aromatic Hydrocarbons;
- Phenols;
- Cyanide (Free);
- Sulphur;
- Sulphide;
- pH;
- Asbestos;
- Methane (CH₄);
- Carbon Dioxide (CO₂).

8.0 REFERENCES

DEFRA/Environment Agency, 2002. CLR8: Potential Contaminants for the Assessment of Land.
(Currently withdrawn)

APPENDIX A

Drawings



Job: Carmarthenshire CC
Preliminary Risk Assessment
and Site Investigation Plan for
Former Hardcore Tip, Pemberton

Title:
New Road Development Affecting Site

Date: September 2009

Scale: 1:1250

Drawn by: MKI

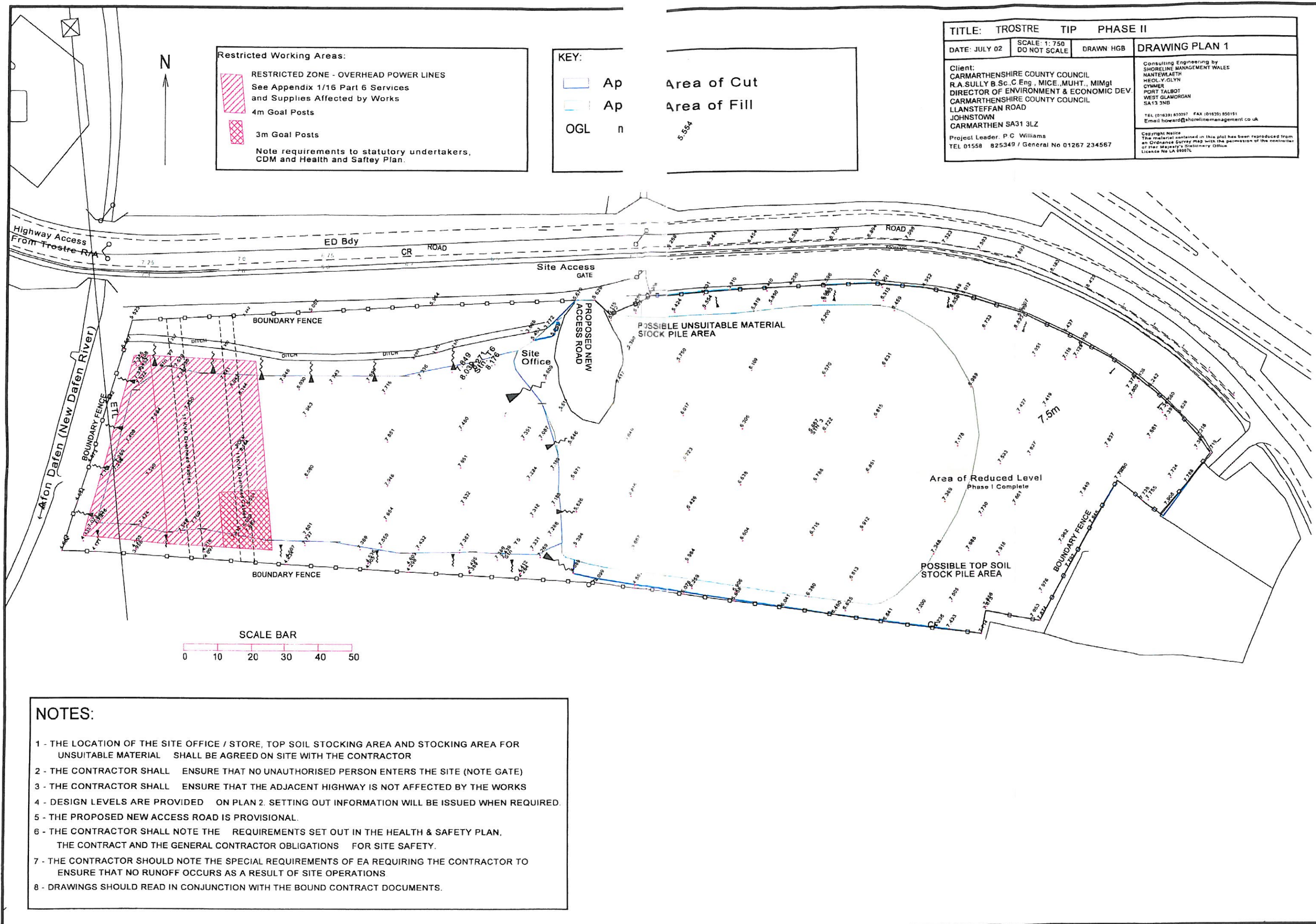
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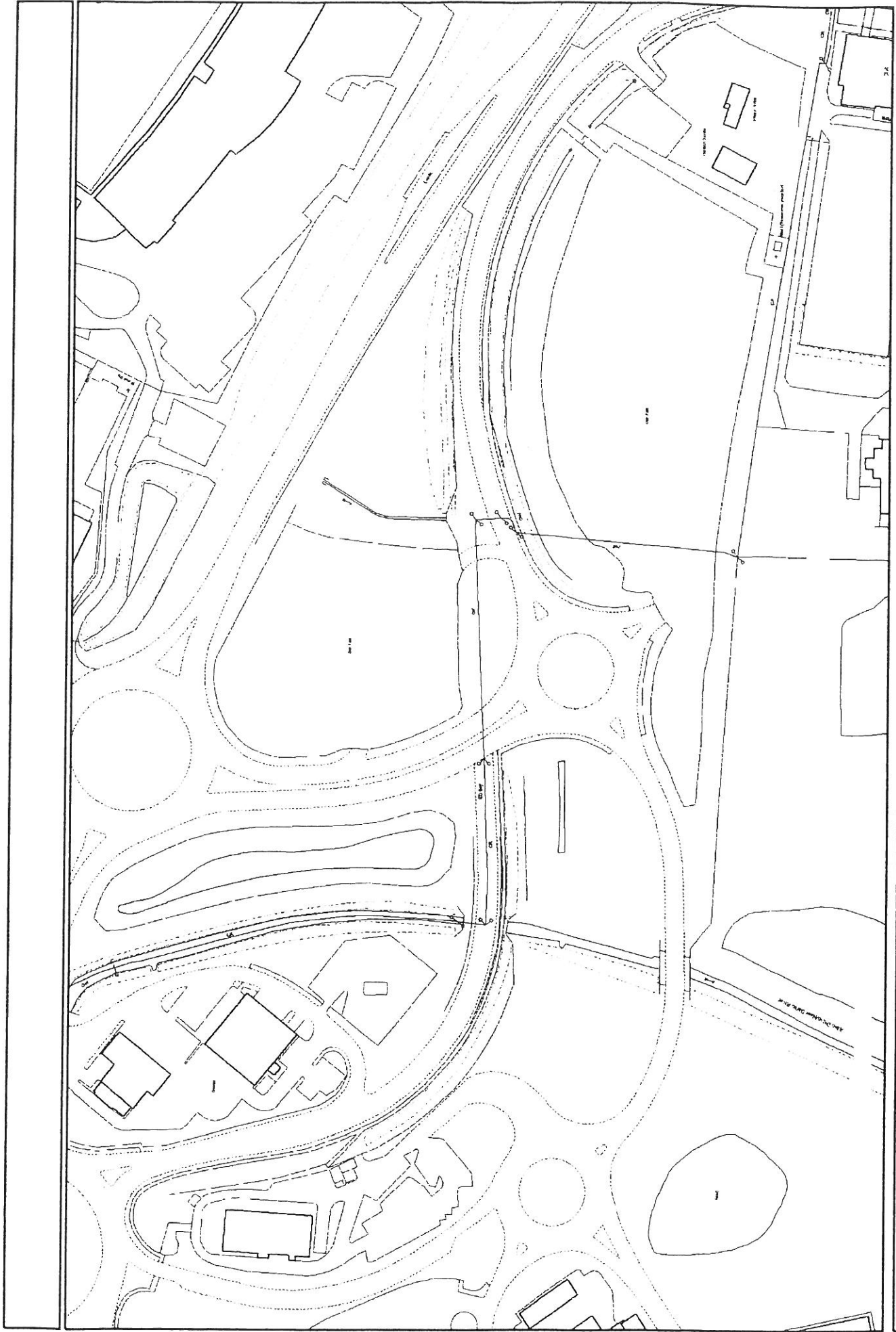
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Scale 1/2000

Centre = 252744 E 199777 N

Date 20/5/2009