Rail Central, Milton Malsor

Northamptonshire

Main Strategic Rail Freight Interchange

Remediation Method Statement

Final Report for

ASHFIELD LAND

September 2017, Updated February 2018

Hydrock Ref: R/151171/006 Issue 2

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1	11th September 2017	Original issue.
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APPENDICES

1.0 INTRODUCTION

1.1 Terms of Reference

Hydrock Consultants Limited (Hydrock) has been commissioned by Ashfield Land (the Client) to prepare a Remediation Method Statement (RMS) in relation to the proposed Rail Central development at Milton Malsor, Northamptonshire.

The site covers approximately 260 ha and is currently farmland.

Hydrock have previously undertaken ground investigation works at the site. This RMS provides further information with regards to remediation that will be undertaken at the site.

The proposed development is to comprise a Strategic Rail Freight Interchange (SRFI) including warehousing, an intermodal facility, express freight platform, lorry park and associated infrastructure.

A site location plan (Drawing 151171/D001), a Site Extents Plan (151171/D002) and a proposed development layout are presented in Appendix A.

1.2 Objectives

The objective of this RMS is to present details of the outline remedial objectives; how the remediation of the site will be undertaken and how the works will be validated. In addition, the RMS explains how the works will be permitted under current regulatory regimes.

The remediation will ensure that upon completion of the development the ground conditions at the site can be shown to be appropriate for the intended use and that they will not pose unacceptable contamination risks to identified receptors. This document therefore covers the protective measures to be installed during the enablement and construction phases of the redevelopment for a commercial/industrial end use.

This document is a working document and may need to be updated, in agreement with the relevant regulatory bodies (the Local Authority and Environment Agency), at any stage during development, dependent on the conditions encountered. This issue is R/151171/006 Issue 002. Please contact Hydrock Consultants if you are unsure of the current issue.

This document is subject to the approval of the relevant regulatory bodies.

1.3 Scope

The scope of the RMS comprises:

- a summary of the conceptual model;
- a summary of the results of the risk assessment undertaken at the site;
- a remediation options assessment; and
- requirements for remediation works.

1.4 Sources of Information

In preparing the remediation strategy the following documents were consulted and should be read in conjunction with it:

- Hydrock Consultants Limited. April 2015. Updated July 2017. 'Milton Malsor Northamptonshire - Desk Study Report', Ref R/151171/001 Issue 8.
- Hydrock Consultants Limited. April 2015. Updated July 2017. 'Rail Central. Milton Malsor, Northamptonshire. Ground Investigation Report - Main SFRI Site', Ref R/151171/002 Issue 4.
- Hydrock Consultants Limited. July 2017, Updated February 2018. 'Rail Central, Milton Malsor. Ground Conditions Desk Study Report, M1 Junction 15A Improvements', Ref R/151171/003 Issue 2.
- Hydrock Consultants Limited. February 2018. Rail Central SFRI Northamptonshire. Construction Environmental Management Plan'. Ref. RCL-HYD-XX_VAL-RP-GE-5001-S2-P4.
- Hydrock Consultants Limited. February 2018. 'Rail Central SFRI Northamptonshire. Materials Management Plan'. Ref. RCL-HYD-XX_REM-RP-GE-3001-S2-P4.
- Tim O'Hare Associates LLP. July 2017.'Rail Central Development, Milton Malsor, Northamptonshire. Soil Resource Survey.
- Hydrock Consultants Limited. February 2018. 'Rail Central SFRI Northamptonshire. Pollution Prevention Method Statement'. Ref. Hydrock Ref. RCL-HYD-XX_REM-RP-GE-3003-S2-P4.
- Ashfield Land. February 2018. 'Illustrative Colour Masterplan – Sheets 1 and 2'. Drawing no. MSA-30708-PL-DCO-112.

1.5 Limitations

The report has been prepared by Hydrock on the basis of available information obtained during the study period. Although every reasonable effort has been made to gather all relevant information, all potential environmental constraints or liabilities associated with the site may not have been revealed.

The report has been prepared for the exclusive benefit of Ashfield Land and those parties designated by them for the purpose of providing information on the remediation and validation works to be undertaken during the enablement and construction phase of the development. The report contents should only be used in that context. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

Hydrock has used reasonable skill, care and diligence in the design of the remediation of the site. The inherent variation in ground conditions allows only definition of the actual conditions at the locations and depths of trial pits and boreholes at the time of the investigation. At intermediate locations, conditions can only be inferred. Information provided by third parties has been used in good faith and is taken at face value. However, Hydrock cannot guarantee the accuracy or completeness of any information provided by others.

The work has been carried out in general accordance with recognised best practice as detailed in guidance documents such as in the CLR 11 Model Procedures (Environment Agency 2004), BS5930:1999 and BS10175:2011.

This report is subject to change based on the requirements of the regulators.

2.0 GROUND MODEL

Presented below is a summary of the ground model for the site. For further details, please refer to Hydrock Reports Ref R/151171/001 Issue 8 and R/151171/002 Issue 4.

This section summarises the background and environmental site conditions.

2.1 Site Location

The site is located at:

Rail Central,
Main SFRI Site,
Milton Malsor,
Northamptonshire

NGR: 473080, 254830.

A site location plan (Drawing 151171/D001), and a Site Extents Plan (151171/D002) are presented in Appendix A.

2.2 Site Description and Setting

A summary of site conditions and the immediate surroundings is detailed in Table 2.1 below.

Table 2.1: Site Description

Item	Brief Description
Site description	Predominantly agricultural, bounded by the A43 to the west, the West Coast Main Line to the south and the Northampton Loop Railway Line to the east. There are two farms, a derelict filling station, two former sand pits, a horticultural nursery and a private dwelling on site.
Site area	Approximately 260 ha.
Elevation, topography and any geomorphic features	Generally the site is located within a shallow south to north orientated valley associated with the Milton Malsor Brook. Higher ground is present in the northwest, north and east reflecting variation in the geological conditions, specifically the occurrence of Glaciofluvial sands in the north and Glacial Till in the west and east. There are a number of small ponds or springs within the site. Earthworks are present in the southwest of the site in the form of embankments for the Grand Union Canal and former Great Central Railway, and in the southeast of the site; understood to be arisings deposited following excavation of Roade Cutting which is located to the southeast of the site along the West Coast Main Line.
Present land use	The site consists of predominately agricultural land. There are two farms: Lodge Farm and Manor Farm, in the east and centre of the site respectively. Lodge Farm is a fully operational farm, whereas Manor Farm is a private residence and stables. There is a horticultural nursery and a private dwelling within the centre and east of the site.
Vegetation	The majority of the site is used for agriculture, predominantly arable but with some grassland supporting livestock. Field boundaries are generally characterised by mature hedgerows and trees with occasional trees within fields. There is a small plantation in the west of the site immediately to the north of the former filling station.

Item	Brief Description
Site boundaries and surrounding land	The site is generally in a rural setting and surrounded by the A43, Gayton Marina and farmland to the west, the village of Milton Malsor to the north, the Northampton Loop Line and farmland to the east, and the West Coast Main Line Main Route and village of Blisworth to the south. The M1 motorway is located approximately 1km to the east.

2.3 Site History

A detailed summary of the site history derived from a review of historical mapping is provided in the desk study report. The site has remained mainly as farmland since the earliest map edition of the late 19th century with development essentially limited to:

- a filling station in the west adjacent to the A43 (now disused, the tanks were decommissioned and filled with foam in 2004);
- Lodge and Manor Farms in the centre and east of the site;
- two former sand and gravel pits in the northwest and north of the site, with the pit in the northwest later filled as an inert landfill; and
- embankments carrying the Grand Union Canal and former Great Central Railway in the southwest corner of the site.

In addition, numerous small farm buildings have been constructed across the site and demolished later in the 20th century. Adjacent development includes the existing highways and railways, the transport yard to the northwest and the Business Park and housing to the south.

2.4 Geology and Hydrogeology

The general geology of the site area is shown on the 1:50,000 geological map of Towcester (Sheet 202) and is summarised in Table 2.2.

Table 2.2: Geology

Location	Stratigraphic Name	Description	Aquifer Designation
Central valley	Alluvium	Normally consolidated sandy clay.	Secondary Undifferentiated Aquifer
Northeast			
North	Glaciofluvial Deposits	Sand and gravel.	Secondary A Aquifer
Locally in the northwest	Glacial Till (Oadby Member)	Overconsolidated gravelly clay with associated sand and gravel deposits.	Unproductive Strata
Locally in the east			
Entire Site	Whitby Mudstone Formation	Dark grey, fossiliferous mudstone and siltstone with fine grained sandstone beds and fossiliferous limestones.	Unproductive Strata
Centre and northwest	Marlstone Rock Formation	Sandy, ooidal, ferruginous limestone with shell fragments.	Secondary A Aquifer
Centre and northwest of the area	Dyrham Formation	Pale to dark grey, silty, sandy mudstone weathering to a yellow clay.	Secondary Undifferentiated Aquifer

Made Ground may be present associated with areas of former or current development and landfilling.

The site is not within a Source Protection Zone (SPZ) and there are no SPZ in the vicinity. There are no recorded groundwater abstraction licenses within 2km of the site.

2.5 Hydrology

The following surface waters are present at the site (Table 2.3).

Table 2.3: Surface Water Features

Feature	Location Relative to Site
Milton Malsor Brook	Crosses the western side of the site on a south to north course.
Ditches	The centre and west of the site is drained by open ditches which ultimately fall to the Milton Malsor brook. The ditches appear to originate at the railway, and may collect water from small ponds or springs present within the site at various places along the field boundaries.
Wootton Brook	The Wootton Brook rises in a marsh area to the northwest of Lodge Farm in the east of the site.
Grand Union Canal	The Grand Union Canal is carried on an embankment adjacent to the southwest corner of the site. There is a culvert underneath the canal carrying surface water, presumably originating from existing land drainage constructed prior to the canal and railway. The canal appears to be leaking causing overland flow over the field in the southwest corner of the site.

There are three former sand pits on site in the northwest, north and northeast. The pit in the northwest was landfilled under license, and may extend further to the west into the transport yard adjacent to the site in the northwest corner. The sand pit in the north of the site remains open. In the northeast, the sand pit has been infilled in an uncontrolled manner.

Anecdotal information (confirmed by site investigation) suggests the infill material of the northwestern pit consists of arisings from the construction of the M1. Based on the site topography, it is possible the pit in the northeast of the site is filled above the pre-quarrying level.

2.6 Waste Management and Hazardous Substances

The following waste management sites are recorded within 500m of the site:

- Gayton Road, Milton Malsor (surrendered), located in the northwest corner of the site and occupies the former gravel pit identified on the historical maps. No details are available on the waste placed here beyond the designation 'Inert'.
- Milton Malsor Landfill - Weldon Plant Ltd (surrendered), located adjacent to Gayton Road, 10m north of site and historically licensed to receive non-biodegradable wastes.
- Milton Sand Pit (surrendered), located adjacent to Gayton Road approximately 90m north of site and historically licensed to receive inert liquid sludge.

- Rothersthorpe (surrendered), located 125m north of site and historically licensed to receive inert waste.
- Gayton Landfill Site (surrendered), located 335m west of site and historically licensed to receive inert, industrial, commercial and household liquid sludge. This site is classified as being Contaminated Land under Part IIA of the Environmental Protection Act 1990.

A former sand pit is present in the northeast of the site (Rathvilly Farm). Whilst not recorded as a landfill, it is understood from local anecdotal information that this pit was filled with excavated arisings from the construction of the M1.

The only waste transfer site recorded within 500m of the site is a proposed recycling centre, located at the old Sewage Works 85m west of the site. Planning application for a recycling centre for storage and transfer of hardcore waste and recycled aggregates.

There have been two recorded pollution incidents within 250m of the site.

- A single incident of unspecified hydraulic oil pollution is recorded in 2003 in an area adjacent to the railway line on the southern boundary of the site. This is considered likely to have had only a minor impact on the soils at the site.
- A significant pollution incident occurred at Gayton Marina in June 2015 when kerosene leaked from the BPA pipeline into the Grand Union Canal. There is a small possibility of impact in the southwest as it is anecdotally reported that the canal may have been leaking at the time.

2.7 Physical Ground Conditions

The ground conditions at the site, as proven during the ground investigation in 2016 and 2017 were in general accordance with the expectations from the published geological literature, the desk study information and previous investigation works. A summary of the ground conditions is presented below.

The main features of the site are summarised on the Site Zonation Plan at Appendix A.

Subsequent to the ground model described in the Desk Study and summarised in Section 2.0, the ground investigation has confirmed ground conditions below the site to comprise:

- Topsoil over the majority of the site consisting predominantly of clay and sandy clay;
- Variable Made Ground comprising:
    - Landfill Made Ground in the northwest of the site extending to a proven depth of 7.50m (and possibly deeper based on topographic levels) and consisting of variable gravelly clay and gravelly sand, with cobbles and boulders and locally organic material;
    - Made Ground derived from arisings from Roade Cutting in the southeast of the site consisting of clay with cobbles and boulders of limestone and proven to be greater than 3.00m thick in places;
    - Made Ground at Rathvilly Farm pit consisting predominantly of soft sandy gravelly clay, with some deposits of clayey gravelly sand and fine gravel of ash and with

cobbles and boulders. Asbestos containing materials are also present. The Made Ground at Rathvilly Farm extends to a depth of at least 4.50m, and may possibly be deeper in places.

  - Made Ground consisting of imported aggregates and reworked natural clay at the former filling station, proven to be up to 1.70m in thickness;

  - Made Ground consisting of variable clay, sand and gravel present to a depth of up to 1.30m at Lodge Farm. The Made Ground at Lodge Farm includes ash and clinker and cobble size particles of demolition type material;

  - Made Ground consisting of sandy gravelly clay with cobbles placed to form the embankment of the Grand Union Canal, proven to up to 1.70m thickness;

  - Other discrete areas of Made Ground associated with agriculture proven to be up to 1.25m thick and consisting of variable sand, gravel and clay with man-made inclusions.

- Variable superficial deposits comprising:

  - Alluvium located through the centre of the site around the Milton Malsor Brook and consisting of clay and sandy clay. Locally there is a basal bed of sand and gravel across the low lying ground in the south of the site. The Alluvium is typically 2.50m thick in the south of the site. In the north of the site, the Alluvium includes deposits of clay, silt, organic clay and sand and has been proven to a maximum thickness of 3.00m.

  - Glaciofluvial Deposits are present in the north of the site and consist of sand and gravelly sand with a variable fines content and occasional beds of sandy clay. The Glaciofluvial Deposits are greater than 10m thick in the north of the site.

  - Glacial Till is present along the eastern edge of the site and in the northwest corner. The Glacial Till consists of slightly sandy slightly gravelly and gravelly clay with gravel of flint, limestone, chalk and mudstone. The Till has been proven to a maximum depth of 3.20m in the vicinity of Lodge Farm.

- Whitby Mudstone is present under the majority of the site and consists of stiff fissured clay with mudstone lithorelicts and fragments, along with fossils and frequent crystals of gypsum.

- The Marlstone Rock Formation is present underlying the Whitby Mudstone and outcrops approximately as anticipated by the Desk Study. The Marlstone Rock consists of limestone with ironstone gravel and fossils, and in places is weathered to sand and gravel. A maximum thickness of 2.00m was encountered. However, it is mostly less than 1.00m in thickness.

- The Dyrham Formation is present underlying the Marlstone and outcrops in the northwest of the site. The Dyrham Formation consists of stiff clay and sandy clay with relict rock fragments and gypsum crystals.

2.8 Groundwater

Groundwater is present underlying the site, with a general northward flow direction prevalent.

Groundwater is present within all the geological units on site depending on their elevation. However, within the Whitby Mudstone groundwater is generally found towards the base and may in places be confined within the underlying Marlstone.

Locally, in some areas of Made Ground and in the Glacial Till in the east, a perched water table is present within the superficial deposits.

The groundwater is in continuity with the Milton Malsor Brook.

2.9 Obstructions

No impenetrable man made obstructions were encountered during the investigation. Boulders (>200mm) are present in the Made Ground (landfill, Roade Cutting and Rathvilly Farm pit). In addition, obstructions are anticipated as a legacy of buildings and infrastructure.

It is envisaged that standard plant will be sufficient to remove obstructions.

Development will necessitate demolition of the existing buildings. It is likely that foundations and other buried obstructions will be present and it is recommended that the demolition contracts allow for the removal of buried obstructions. There are underground storage tanks at the former filling station. The tanks have been filled

2.10 Visual and Olfactory Evidence of Contamination

Visual and olfactory evidence of contamination, in addition to the more common man-made constituents described above, was noted in a number of trial pits and boreholes and is summarised in Table 2.4.

Table 2.4: Visual and Olfactory Evidence of Contamination

Exploratory Hole	Depth	Description	Stratum
WSLF002	0.00 – 0.60	Very slight chemical odour	Made Ground (Lodge Farm)
WSLF004	0.30 – 0.90	Very strong creosote odour	Made Ground (Lodge Farm)
WSLF005	0.30	2 no. fragments of asbestos cement sheeting	Made Ground (Lodge Farm)
TPL010	2.70	Odour of creosote	Made Ground (Landfill)
WSBL06	3.00	Asbestos Containing Material	Made Ground (Rathvilly Farm pit)

2.11 Ground Gases (Carbon Dioxide and Methane)

Gas monitoring standpipes have been monitored on eight occasions between October 2016 and June 2017. Records from the gas monitoring boreholes are presented in Appendix D and summarised in Table 2.5.

Table 2.5: Range of Ground Gas Data

Area (conceptual gas risk)	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Flow Rate (l/hr)
Landfill	<0.1	0.1 – 2.9	5.5 – 20.9	<0.1
Rathvilly Farm pit	<0.1 – 26.5	1.9 – 5.9	0.1 – 16.7	<0.1
Other	<0.1	0.1 – 3.8	2.3 – 20.9	<0.1 – 4.4

2.12 Radon

A British Geological Society (BGS) radon risk report (GR210997/1) has been obtained for the site and indicates that it is in a Radon Affected Area, where recorded radon concentrations in 1-3% of homes are above the action level. The source of radon at this site is likely to be the Marlstone Rock Formation.

Consideration should be given to fitting basic protection measures on the 'as low as reasonably practicable' principle in view of the legal responsibilities of employers with commercial properties.

3.0 RISK ASSESSMENT REVIEW

3.1 Introduction

This section summarises the risk assessment findings as presented in Hydrock Report R/151171/002 Issue 4.

3.2 Human Health Risks

The 'averaging areas' used for assessment and reported in Hydrock Report R/151171/002 Issue 4 are based on the conceptual model and the proposed development and are summarised as:

- Topsoil;
- Natural soils (subsoils excluding topsoil);
- Landfill area;
- Roade Cutting Made Ground;
- Rathvilly Farm pit; and
- Filling station area.

Made Ground associated with farming, including the areas surrounding Lodge Farm buildings, an area of hardcore adjacent to the Northampton Loop Line underbridge, and an area of rubbish in the west of the site, has been excluded from the statistical assessment due to the limited datasets presently available.

3.2.1 Inorganic Determinands, PAH and Phenols

All areas assessed to date pass with regards to commercial / industrial land use, apart from one data point at lodge Farm (WSLF004 at 0.20m) that exceeds the GAC for benzo(a)pyrene (21 mg/kg concentration compared to the GAC of 14 mg/kg). However, Hydrock believe that based on the assessment to date, a review of the ground conditions and the potential for as yet unrecorded Contaminants of Concern, the Made Ground at the Filling station area, the Made Ground at the Rathvilly Farm pit and the Made Ground at the farm complexes should be treated as potentially contaminated and requiring mitigation.

3.2.2 Petroleum Hydrocarbons (PHC)

Petroleum hydrocarbons were detected in a number of samples, above the detection limit of the analytical apparatus in ten samples:

- Low concentrations of petroleum hydrocarbons were detected at the filling station area. Whilst these concentrations are all below the GAC, given the history of this part of the site and the potential for significant concentrations of petroleum hydrocarbons, this area should be considered a potential risk area with regards to petroleum hydrocarbons.

- At Rathvilly Farm pit, petroleum hydrocarbons were detected in nine samples at concentrations of between 17 mg/kg and 450 mg/kg (total). Level 2 analyses indicated detection in carbon fractions from C12 to C44 in both aliphatic and aromatic fractions. In

one instance (WSBL08 at 2.50m), the GAC for commercial end use was exceeded in the aromatic carbon fraction C16 to C21. All other sample concentrations were below the GAC for the corresponding carbon fraction for both aliphatic and aromatic compounds.

- At Lodge Farm, petroleum hydrocarbons were detected at two locations, one (WSLF004) within the farmyard and one (TPT027) within the Made Ground at the Northampton Loop Line underbridge. In the farmyard, aliphatic and aromatic petroleum hydrocarbons were detected in the Made Ground in the carbon ranges C10 to C44. The concentration of aromatic hydrocarbons in the range C16 to C44 exceed the corresponding GACs for commercial / industrial land use. At the bridge, aliphatic hydrocarbons were detected in the range C16 to C44 at concentrations below the appropriate GACs.

- At one location in the northwest of the site (TPT004 at 0.30m), aliphatic and aromatic petroleum hydrocarbons were detected in the topsoil in the carbon range C12 to C44. The detected concentrations were all below the corresponding GACs. The source of the petroleum hydrocarbons at this location is not clear. The area had previously been identified as a potential source of contamination due to the presence of a nearby IBC tank. However, it has since been established that the IBC is used to store water for an adjacent pheasant enclosure. There is no specific evidence of any other sources of petroleum hydrocarbons at this location, other than continued use by agricultural vehicles.

- In the southwest of the site, petroleum hydrocarbons were detected in one of the four shallow soil samples recovered where water leaking from the Grand Union Canal flows over land. Aliphatic hydrocarbons were detected in the carbon range 10 to 35, with no aromatic hydrocarbons detected. The concentration in the range C12 to C16 exceeds the GAC for a commercial/industrial land use. Detection of aliphatic hydrocarbons in the carbon range C10 to C35, with no corresponding aromatic compounds, may indicate the presence of weathered kerosene. However, this field is also used annually for motocross racing so there are potentially other sources of petroleum hydrocarbons.

Mitigation with regards to petroleum hydrocarbons will be required for discrete areas of the site.

3.2.3 Volatile Organic Substances (VOC)

No VOCs were detected during the investigation.

3.2.4 Asbestos

Asbestos was found at two locations at Lodge Farm (at the farm itself and near the railway underbridge) and three locations at Rathvilly Farm:

- At Lodge Farm, fragments of asbestos cement sheeting were found in WSLF004 at 0.20m.

- At the Northampton Loop line underbridge to the northeast of Lodge Farm, free chrysotile fibres were found (TPT028 at 0.30m).

- At Rathvilly Farm, chrysotile loose fibres were found in samples from boreholes WSBL09 and WSBL10 at 2.20m and 1.50m respectively. In one borehole (WSBL06), a fragment of amosite insulation board was found at 3.00m.

Mitigation will be required with regards to asbestos associated with Made Ground located at the Rathvilly Farm pit and the Made Ground located at the farm complexes.

3.3 Plant Life

Boron is elevated across the site and copper is elevated at TPT027, associated with the Made Ground at the railway underbridge at Lodge Farm.

With regards to boron, the solid geology of the site and the adjacent geology (Blisworth Limestone) which is in effect upstream in terms of groundwater flow, is abundant in marine evaporates including gypsum and carbonate rocks. Boron containing minerals commonly occur in brine associated with the formation of solid evaporates. In the absence of any anthropological source of boron, it is likely that the boron identified on site is present as a result of natural geological processes. As such, no unacceptable risk to plant life is perceived in relation to boron.

With regards to the presence of elevated copper associated with the Made Ground at the railway underbridge at Lodge Farm. The farm area is effectively a contamination hot spot and the additional investigation and risk assessment recommended in respect of human health would apply to metals in respect of plant life. Therefore no specific action is considered necessary for plant life.

3.3.1 Permanent Gas Risks

Radon

Current advice based on the BR 211 Report is that basic radon protection is required for new buildings at this location.

Ground Gases (Carbon Dioxide and Methane)

An assessment of the ground gas regime and the likely scope of protection measures is presented below.

The typical worst case GSV to date have been calculated as <0.07 l/hr for both methane and carbon dioxide. In one instance, a GSV of 0.11 l/hr has been calculated in borehole RB02 at the proposed A43 Bridge based in the main part on a relatively high flow rate in one visit. At Rathvilly Farm pit, methane has been detected at a concentration of 26.5% in one borehole (WSBL06), albeit with a corresponding flow rate of <0.1l/hr. As this location is a significant distance from proposed buildings, no specific consideration is considered necessary.

Hydrock has undertaken eight ground gas monitoring visits to date and monitoring is continuing for a period of 12 months. Based on data to date, and subject to ongoing monitoring, the site is provisionally classified as Characteristic Situation 1 (Situation A) for commercial/industrial buildings and no mitigation measures are required.

Ground Workers

It is noted that concentrations of carbon dioxide (an asphyxiant) in the soil exceed HSE Workplace Exposure Limits for personnel in the working environment of 1.5% for short term (15 minutes) exposure and 0.5% for long term exposure. Furthermore, soil concentrations of oxygen are below the HSE recommendations of 18%. Whilst risks to construction workers are not generally discussed in this report, and soil gas concentrations are not necessarily reflected by those in the breathing zone, all contractors and maintenance workers should be made aware of the possible presence of carbon dioxide and should take all necessary health and safety precautions when working in trenches or confined spaces.

3.4 Pollution of Controlled Waters Risk Assessment (PoCW)

Whilst there are a number of substances exceeding the DWS and/or EQS in groundwater samples. These substances are believed to be either:

- naturally occurring;
- present as a result of agricultural activity; or
- are only slightly elevated.

As there is no evidence of contamination of the adjacent surface waters, and subject to agreement with the Local Planning Authority, who may in turn consult the Environment Agency, Hydrock does not believe the site poses an unacceptable risk to Controlled Waters.

No specific mitigation is proposed with respect to risk to Controlled Waters.

3.5 Utilities

The majority of the site is greenfield and the investigation and assessment has indicated no exceedance of the threshold values. It is envisaged that standard pipework will be suitable for the majority of the site.

In the landfill and Lodge Farm areas, a number of the threshold values for PAH species and petroleum hydrocarbons are exceeded. In these areas, it is anticipated that barrier pipework will be required.

Guidance from Anglian Water indicates that for large sites such as this it may be possible for the site to be classified as ‘dual status’, i.e. contaminated and non-contaminated, from the perspective of the water supply pipe requirements

To reduce the risk to future maintenance workers coming into contact with the Made Ground soils which contain asbestos fibres, metals and PAH, it is recommended that where Made Ground is present, all service trenches be over-excavated and the resultant excavation filled with suitable clean validated backfill.

3.6 Summary

The source-pathway-receptor linkages given in Table 3.2 are those which, following the risk evaluation process, require further consideration.

Table 3.2 Final Conceptual Model and Residual Risks Following Risk Evaluation

Contaminant Linkage			Comments	
Sources	**Pathways**	**Receptors**	**General**	**Mitigation**
PAH and petroleum hydrocarbons at Lodge Farm	Ingestion, inhalation or direct contact.	Human health.	GACs are exceeded by direct comparison. Hot spot, insufficient data for full statistical assessment	Further investigation and mitigation required.
PAH and petroleum hydrocarbons at the former Petrol Filling Station	Ingestion, inhalation or direct contact.	Human health.	GACs are exceeded by direct comparison. Hot spot area associated with the PFS	Further investigation and mitigation required.
Asbestos in the Made Ground at Lodge Farm	Inhalation of fugitive dust.	Human health.	Made Ground seen to contain asbestos-containing materials. Asbestos fibres detected in soil samples.	Further investigation and mitigation required.
Asbestos in the Made Ground at Rathvilly Farm pit	Inhalation of fugitive dust.	Human health.	Made Ground seen to contain asbestos-containing materials. Asbestos fibres detected in soil samples.	At this stage it is understood that this material is to remain in situ therefore no further action is required. However, mitigation will be necessary if earthworks or groundworks is proposed in this area of the site.
Petroleum hydrocarbons in the vicinity of the Grand Union Canal leak	Ingestion, inhalation or direct contact.	Human Health	Minor exceedance of the GAC in the aliphatic C12 to C16 fraction.	Further investigation required. Mitigation may be required, subject to findings. Allow mitigation at the current time.
	Overland flow	Surface Water		
Radon	Migration through soils to indoor air.	End users of new buildings.	BR211 indicates basic radon protection required.	
PAH and petroleum hydrocarbons in the Landfill and Rathvilly Farm pit	Leaching through unsaturated zone.	Groundwater and possible abstractors.	WQT exceeded.	The site is not considered a risk to Controlled Waters as there is no impact on the Milton Malsor Brook. Consultation with the Local Authority is recommended.
		Surface waters and ecosystems.		

4.0 REMEDIAL STRATEGY OVERVIEW

Remediation will be undertaken such that the site is suitable for its proposed use, as a Strategic Rail Freight Interchange (SRFI) including warehousing, an intermodal facility, express freight platform, lorry park and associated infrastructure and landscaping.

The required standard of remediation will be achieved through a variety of techniques as outlined in the following sections.

The implementation of the remediation strategy will be in accordance with documented quality assurance procedures, including the following:

- *Detailed Remediation Method Statement* – This sets out the requirements for gathering data to demonstrate the effectiveness of the remediation in terms of meeting the remediation objectives. These are detailed in the following sections of this report.
- *Verification Report* - this will provide a complete record of the remediation activities undertaken at the site and the data collected as part of the verification plan to support compliance with remediation objectives and criteria. It will also include descriptions of the works with associated 'as built' drawings and details of any unforeseen conditions encountered during the works and how they were dealt with.

In addition to the above, the Contractor will be required to secure all necessary permits and licences to allow remediation to be undertaken and prepare appropriate Health and Safety Risk Assessments and Method Statements (refer to Appendix E for further details).

4.1 Summary of Soil Remediation Proposals

Further investigation and risk assessment is necessary to determine the full extent of remediation measures necessary. However, based on the findings of the works to date, the scope of remediation is likely to consist of the following:

- Removal by specialist Contractor of asbestos from buildings in accordance with relevant legislation;
- Controlled decommissioning, decontamination and demolition of site buildings and ancillary structures such as tanks and the existing drainage system.
- Removal of the former fuel tanks at Lodge Farm and the Filling Station together with any petroleum hydrocarbon impacted soils around and below the tanks. Whilst not expected, any free phase hydrocarbons should be removed from the surface of the groundwater and treated or disposed.
- It is anticipated that remediation can then be undertaken by excavating the impacted Made Ground soils (where required) which can then be stockpiled, screened or otherwise treated on site (e.g. bioremediation).
- Suitable material can be reused where appropriate under a Materials Management Plan and the unsuitable material removed from site. Given the volume of earthworks, it is anticipated that all materials are likely to be suitable for use on the site, as unsuitable material from the perspective of human health is likely to be suitable for reuse in the platforms in areas external to the proposed buildings, e.g. in noise bunds.

- At this stage, with regards to the Rathvilly Farm pit, no specific remediation is anticipated as this area will form part of the landscape buffer zone.
- If Made Ground is to remain *insitu* at surface (e.g. former landfills in the north and northeast and the Rathvilly Farm pit), Hydrock propose that as a minimum 450mm of topsoil / subsoil growing medium is placed over these sections of the site.
- Earthworks and remediation on site should be subject to a watching brief by an independent geo-environmental specialist to identify any areas of suspected contamination, and recommend remedial measures.
- Since the site is in a Radon Affected Area with recorded radon levels in 1-3% of homes above the action level, it is recommended that consideration be given to incorporating basic protection measures.
- Protectaline pipework is potentially required, subject to discussion with the Water Authority.

The current earthworks model is shown on RPS drawing NK018318-RPS-00-XX-DR-C-SK0009. The earthworks will involve the placement of approximately 1,330,000m^3 of material to form the development platforms. A surplus of approximately 100,000m^3 of material and 360,000m^3 of topsoil will be generated that is to be used in landscaping and to construct vision and noise bunds along the northern edge of the development to screen Milton Malsor village from the development.

Based upon the findings of the ground investigations, risk assessment and the Remediation Options Appraisal (presented in Appendix F), the following remedial activities will be undertaken to deliver the site Suitable for Use (SFU) for the defined commercial end use. These are separated into Enablement Remediation Works and Groundworks:

Enablement Remediation Works (See Section 5.0)

- Task E1: Site preparation, demolition of existing buildings and site clearance.
- Task E2: Break out of hardstanding and below ground structures.
- Task E3: Processing of arisings from demolition works for future reuse.
- Task E4: Removal of tanks, existing drainage system and associated pipework.
- Task E5: Examination of soils below and around all hotspots, tanks, pipes and drains and excavation of areas of contamination.
- Task E6: Excavation of Made Ground at Lodge Farm, the Filling Station and pockets of Made Ground associated with general agricultural activity and handpicking of visible ACM (if present) by a suitably qualified contractor.
- Task E7: Excavation of Made Ground at the Grand Union Canal leak, examination and testing with regards to petroleum hydrocarbons
- Task E8: Treatment of excavated soils to enable reuse.
- Task E9: Cut to fill and management of soils.
- Task E10: Off-site disposal of waste material.
- Task E11: Enablement Contractor's Validation Report.

Groundworks Remediation Works (See Section 6.0)

- Task G1: Excavation and Reuse of Soils
- Task G2: Over-excavation of service trenches and installation of barrier pipe.
- Task G3: Installation of basic radon protection measures
- Task G4: Groundworks Contractor's Validation Report.

The tasks are described in detail in the following sections. Please refer to Appendix E for additional information and general requirements. In addition to undertaking all works in accordance with this RMS, the Contractor (both for the Enablement works and the Groundworks) will comply with the Construction Environmental Management Plan (Hydrock report ref. RCL-HYD-XX_VAL-RP-GE-5001-SO-P1.1).

In addition to the works and the validation undertaken by the Contractors, a watching brief and verification reporting will be undertaken by Hydrock with regard to the remediation and the earthworks.

Geotechnical design is not considered here and the Contractor will ensure all works are undertaken to the Earthworks Method Statement and Specification.

4.2 Project Setup and Management

Prior to commencement of site activities, detailed planning of the project will be undertaken including liaison with the stakeholders listed in Table 4.1 and will include issue of this report along with copies of previous environmental reports regarding the site, to the Local Authority.

4.2.1 Project Team

The project is to be operated under the Construction, Design and Management (CDM) Regulations, (2015). Under the CDM regulations, Ashfield land should appoint a Principal Designer, who would provide the Pre-construction Information Report (PCIR) and a Principal Contractor who would provide a site specific Construction Phase Health and Safety Plan (CPHASP) prior to works commencing. If the Client does not appoint a Principal Designer, they will assume the role.

The Principal Designer will review the CPHASP and notify the local office of the Health and Safety Executive (HSE) of the works prior to commencing (via form F10). Table 4.1 below provides a broad outline of the overall project team.

Table 4.1: Project Team

Principal Contractor	Consultant	Client	Other Stakeholders
To be appointed Remediation Enablement Contractor Groundworks Contractor	Hydrock (Geo-environmental Consultants)	Ashfield Land	Principal Designer (TBC). South Northamptonshire Council and Cherwell District Council Environmental Health Department (regulator). Environment Agency (regulator - controlled waters and waste regulation).

Roles and responsibilities are discussed further in Appendix H.

4.2.2 Appointment of Appropriate Contractors

At the time of writing this report the appointment of Contractors (for the purposes of this report, the relevant Contractors will be the Enablement Contractor and Groundworks Contractor) has not been undertaken.

The Contractors will need to have suitable experience working in a similar setting, with similar ground conditions, with the Contaminants of Concern present at the site (asbestos and the potential for tanks and petroleum hydrocarbons) and with materials management as a remedial solution.

The Contractor for each stage of works must manage the risks in accordance with their legal requirements and will need to prepare appropriate health and safety documentation and obtain appropriate approvals, licences, consents and permits prior to commencement. In addition, appropriate working methods, monitoring and reassurance testing will need to be undertaken during the works.

Works on site during any phase of work will require the use of suitable air, dust and noise monitoring, personal protective equipment (PPE) and respiratory protective equipment (RPE) as required by current guidance, practice guidance, legislation and deemed necessary.

5.0 ENABLEMENT REMEDIATION WORKS

The following will be undertaken during the Enablement Remediation Phase of Works.

In addition to information provided by the Client, the Contactors' attention is drawn to the General Requirements set out in Appendix E, which details the general requirements and responsibilities of the Contractors in relation to health and safety, site set up and operational requirements.

5.1 Task E1: Site Preparation, Demolition of Existing Buildings and Site Clearance

There are a number of existing buildings present at Lodge Farm, Manor Farm, the private dwellings and the derelict filling station. In addition, there are a number of smaller ancillary structures present at the site. Demolition of all existing structures (as detailed by the Client) will be required.

The information provided in the following section will be undertaken in addition to any demolition Specification provided by the Client.

The Contractor will be responsible for the true and proper setting-out of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works and for the provision of all necessary instruments, appliances and labour in connection therewith. The Contractor will carefully protect and preserve all benchmarks, sight rails, pegs and other things used in setting out the works.

Should the Contractor find any discrepancies on the drawings he is to refer the matter to the Client for verification before proceeding with the part of the works affected.

Before starting the site clearance works, the Contractor will verify with the Client and/or Architect which existing buildings, fences, gates, walls, roads, paved areas, trees, shrubs, etc. are to be removed and undertake dilapidation survey of all adjacent features/construction including but not limited to boundary walls/fences, adjacent footpath and road constructions etc.

For Statutory Service records please refer to the works information. These records are offered for information only. The Contractor is to ensure that the records are current and complete through discussion with all appropriate statutory bodies and is responsible for all disconnection, diversion, sealing or removing of existing services as necessary.

Trees, shrubs, boundaries and other features of interest, which are to be retained, will be clearly identified and protected by a robust fence to avoid accidental impact damage and prevent excavation within the root zone of influence of foundations. All works will be undertaken in accordance with BS 5387: 1991 'Trees in relation to Construction'. All other trees and shrubs will be grubbed up and disposed of appropriately off site. Surface vegetation and Topsoil will be stripped from all areas prior to trafficking with heavy plant.

Existing watercourse and drains which are to remain open will be protected.

Existing watercourse and drains which are redundant will be removed and if necessary sealed.

Prior to any works, all areas of the site will be cleared of rubbish, debris and approved vegetation. All unsuitable material, as defined in the Specification for Highways Works (SHW) and the Remediation Method Statement, to be removed as part of the site clearance will be transferred by the Contractor to an approved and appropriately licensed facility. All movement of materials will be recorded, and records will be kept detailing the nature and quantity of materials, haulier details, final destination and any other relevant information.

Demolition is to generally encompass all above ground buildings and structures to slab level and will be undertaken by a suitably experienced and qualified Contractor in a safe, systematic and controlled manner.

All operations will be carried out in accordance with all current and relevant British Standards, codes of practice, guidance, statutory, local authority and fire officer requirements and Legislation (in particular but not exclusively, BS6187:2011, BS 8004 and the Health and Safety Executive Guidance Notes GS29 Parts 1-4 and any amendments thereto or successors thereof).

Prior to demolition, a refurbishment/demolition asbestos survey compliant with the requirements of HSG 264 will be undertaken by the Contractor on all structures to be demolished.

Prior to commencing the asbestos removal operations, the Contractor is to submit a detailed Method Statement, the name of the Site Supervisor and any other necessary information to the Client. It will be the responsibility of the Contractor to ensure that the methods adopted for the removal of the asbestos will be of a standard acceptable to the Health & Safety Executive.

All asbestos in the buildings will be removed prior to demolition, by appropriately trained staff with regards to asbestos removal (Category B or Category C trained staff as required), together with appropriate insurances and Method Statements for this particular project and type of work. The Contractor is to provide evidence as to how the works are classified under CAR 2012. The Contractor is required to safely remove (by suitably qualified staff) and dispose of all asbestos containing materials encountered during the works to a suitably licenced facility. All works will be undertaken in compliance with the all current guidance, regulations and relevant legislation.

The safe disposal of all materials containing asbestos fibres will be carried out in compliance with all current and relevant legislation. The Client (or their representative) may engage an independent analytical consultant to check the airborne asbestos concentration at any time. If testing shows that the precautions are in any way inadequate, the Contractor will be obliged to comply with the Clients recommendations, meeting all costs arising therefrom.

Following completion of asbestos removal work, the Contractor will undertake four stage clearance representative swab testing of all remaining site surfaces to prove the absence of any asbestos fibres to prove the site is suitable for reoccupation.

The Contractor is to note there may be a requirement for working at height during the demolition process and all necessary legislation and precautions must be followed.

The Contractor will submit all necessary notices to the Local Authority to obtain permission to demolish the buildings. The Contractor will comply with any additional restrictions or requirements that the Authority may impose.

The Contractor is responsible for all temporary works.

If necessary, the Contractor will be responsible for the application of any necessary licenses from the Local Authority and will ensure that all necessary traffic management is put in place.

The Contractor will give notice to the Hydrock and the Client if features are encountered which might affect the progress or performance of the permanent or temporary works.

During all stages of the works, water or liquids will not be pumped or emptied into the existing sewers/drainage system, brooks or off site without the written permission of the relevant authority. If mobile tankers/bowsers are to be used, then disposal will be at suitably licensed facilities in accordance with current legislation. If discharge is undertaken, it will need to be in accordance with the relevant licences/permits and only following treatment to appropriate concentrations of the CoPC and removal of any silt.

All materials deemed unsuitable for reuse on site as part of the works will be removed prior to demolition and taken from site to a suitable waste or treatment facility. Documentation/ certification of all materials disposed will be included in the H&S file prepared by the Contractor.

5.2 Task E2: Break out of Hardstanding and Below Ground Structures

Following demolition, the Contractor will demolish, break up and remove all below ground structures. These include, but are not limited to: slabs, pits, drains, hardstanding, basements, foundations, relic structures, service ducts, underground storage tanks and services.

It should be noted that based on the site history, there is the potential for underground tanks and pipes to be encountered at the farm complexes and the former filling station. If any pipes or structures containing liquids are located, the Contractors will take care to assess the contents prior to any disturbance to avoid the uncontrolled release of contaminants (including but not limited to petroleum hydrocarbons, VOCs and asbestos). The Contractor is to undertake testing of the liquid prior to collection and discharge at an appropriate waste disposal facility. Refer to Task E4 for further details with regards to removal of tanks.

All broken up materials will be segregated and stockpiled within the approved working area of the site. Material will be stockpiled at locations to be agreed with the Client and after submission of the detailed Method Statements.

The Contractor will survey to Ordnance Survey Grid (using Total Station survey equipment) the base and sides of all excavations to provide composite base of excavation drawings for reference during the works, and as-built records.

The Contractor will provide adequate protection against collapse of the excavations and suitable groundwater control measures will be put in place until the voids are infilled.

The Contractor will ensure that, where structures or services cross the site boundary and are to remain, the risk of any future contamination entering or leaving the site area through these pathways is negligible.

All unsuitable material are to be removed from site to a suitably licensed facility.

5.3 Task E3: Processing of Arisings from Demolition Works for Future Reuse

Where appropriate, soil, brick, concrete etc. arising from the demolition works (including below ground structures) are to be screened, crushed and processed for reuse in the permanent works.

The Contractor will segregate excavated materials, having due regard for their subsequent reuse and the classifications as per the Earthworks Specification.

The Contractor is to sort, screen, crush, process and test all arisings to comply fully with the requirements of the Earthworks Specification, including, but not limited to:

- Landscape Fill – Excavated Made Ground following handpicking and treatment as necessary;
- Class 1 - general granular fill;
- Class 2 – general cohesive fill;
- Class 6F2 - Selected granular fill (coarse grading).

All concrete will be separated from other constituents and crushed to a 6F2 specification. It should be noted this will require high levels of quality control by the Contractor.

Brick, etc will be separated from the concrete and crushed to a Class 1 Specification (6F2 graded) material.

In accordance with the Specification, the Contractor will inspect the crushed product and remove any unsuitable material, including, but not limited to, metal, steel reinforcement, rags, plastic, timber and degradable material. All unsuitable materials are to be removed from site at the Contractor's cost.

Any Made Ground and natural soils excavated, are to be stockpiled separately for reuse in the cut to fill works.

All materials will be inspected, sorted and tested to ensure they are geotechnically and chemically suitable for use on site in accordance with the RMS and the Earthworks Specification.

The Contractor will include for all necessary testing (in accordance with this RMS and the Earthworks Specification) to demonstrate that material conforms to the relevant requirements and material properties described in Table 6/1 of the Earthworks Specification, or in the case of Type 1 unbound mixtures in accordance with relevant SHW clauses 801 and 805 and that unacceptable levels of foreign matter are not present.

The Contractor will test all stockpiles in accordance with the requirements of this RMS and the Earthworks Specification and will supply all test results and test certificates as soon as they are issued (refer to Section 6.5).

With regards to the reuse criteria for granular soils (Type 1/6F5/6F2 etc.), which are to be used as part of pavement or road construction, Hydrock propose the following guidelines:

- no visual contamination (oil staining, asphalt, etc.) as confirmed by Hydrock Consultants watching brief;
- limited deleterious material (organics, wood, metal etc.) (in accordance with the SHW);
- no asbestos containing material (ACM) as confirmed by Hydrock Consultants watching brief; and
- no asbestos fibres as confirmed by testing (at a rate of 1 test per 1000m^3).

5.4 Task E4: Removal of Tanks, Existing Drainage System and Associated Pipework

The existing drainage system and any tanks and associated pipework encountered are to be subject to controlled decommissioning, decontamination and removal in accordance with relevant guidance detailed within 'Groundwater Protection Code: Petrol Stations and Other Fuel Dispensing Facilities Involving Underground Storage Tanks' (Defra, November 2002).

The contents of any tanks are to be investigated and tested by suitably qualified specialist subcontractors. Demolition activities will be undertaken in a manner to prevent spills and leaks of oils, chemicals etc. prior to demolition.

All tanks are to be recorded and reported to the Consultant immediately on discovery and protected. Following receipt of the testing, the contents of any tanks are to be disposed of off site by a specialist contractor to a suitably licenced facility.

A watching brief will be kept during the works by an independent Environmental Consultant employed by the Contractor and if impacted material is present during excavation, these materials will be stockpiled separately for testing prior to reuse if suitable. Hydrock will also attend to undertake a watching brief as necessary.

The excavation of buried tanks will be witnessed by the Consultant.

5.5 Task E5: Examination of Soils Below and Around All Tanks, Pipes and Drains and Excavation of Areas of Hotspot Contamination.

Petroleum hydrocarbon hotspots and contamination associated with tanks, pipework and drains are potentially present. These areas, or additional areas of visual/olfactory evidence of hydrocarbon contamination below the slabs uncovered during enablement works, will be inspected, remediated if necessary and the remediation excavations validated by chemical testing. Additional investigation (by visual inspection) will be undertaken by the Contractor and Hydrock as slabs are lifted, with any additional plausible source-pathway receptor linkages identified (hotspots/tanks/drainage runs etc) to be added to the remedial requirements.

For any areas of petroleum hydrocarbon impact, the soils will be excavated to a point where the remaining *in situ* soils achieve the required RTVs. The delineation of the full extent of hotspots has not been undertaken to date and will be required during the remediation works. Any Hydrock drawings indicating the extent of contamination or volumes are schematic. The Contractor is to satisfy itself with regards to volumes of soil to be excavated, remediated or disposed of and replaced.

With regards to the hotspot excavations, the soils below/around all hotspots or areas of visual /olfactory evidence of contamination uncovered during enablement works will be inspected, remediated if necessary and validated by chemical testing to comply with the RTVs set out in Table 5.1.

Table 5.1: Remedial Target Values – Enablement Works – Petroleum Hydrocarbons

Contaminant	Proposed RTV mg/kg				Contaminant	Proposed RTV mg/kg		
	(1% SOM)	(2.5% SOM)	(6% SOM)			(1% SOM)	(2.5% SOM)	(6% SOM)
Aliphatics EC5-EC6	300	560	1200		Aromatics EC5-EC7	1200	2300	4700
Aliphatics >EC6-EC8	140	320	740		Aromatics >EC7-EC8	870	1900	4400
Aliphatics >EC8-EC10	78	190	450		Aromatics >EC8-EC10	610	1500	3600
Aliphatics >EC10-EC12	48	120	280		Aromatics >EC10-EC12	360	900	2200
Aliphatics >EC12-EC16	24	59	140		Aromatics >EC12-EC16	36000	37000	38000
Aliphatics >EC16-EC35	1000000	1000000	1000000		Aromatics >EC16-EC21	28000	28000	28000
Aliphatics >EC35-EC44	1000000	1000000	1000000		Aromatics >EC21-EC35	28000	28000	28000

The remediation excavation will cease when recorded concentrations of the CoPC in samples taken from the base and sides of the excavation are below the Remedial Target Values.

Validation of the removal of the hotspots is proposed by the chemical analysis of samples recovered from the sides and base of hotspot excavations. For large excavations a 20m validation grid (base and sides) is proposed.

Once concentrations of CoPC in soils at the edges of the excavation are proven to be below the relevant RTVs, the edges of the excavations are to be stepped (1:1 V:H in 0.5m steps) to assist with future backfilling or ground improvement works.

Whilst unlikely to be encountered, any free phase hydrocarbons encountered during excavations will be removed from the surface of the groundwater and treated or disposed of according to current legislation. The method of discharge and the RTVs for groundwater discharge will be agreed with the relevant licencing or permitting authority and the Contractor will have allowed for treatment to the appropriate concentrations.

The Contractor will need to have an experienced Geo-environmental Engineer present during hotspot excavation to inspect for suspect material and oversee effective segregation, stockpiling and validation of soils. In addition, Hydrock will undertake a watching brief.

All remediation excavations are to be filled in accordance with the Earthworks Specification.

Materials excavated from the hotspots can be reused on site in accordance with the Materials Management Plan once they have been treated (See Section 5.8), tested and assessed to confirm that they comply with the RTVs.

5.6 Task E6: Excavation of Made Ground (Where Required) and Handpicking of Visible ACM by a Suitably Qualified Contractor

The Made Ground present at Lodge Farm, the Filling Station and any pockets of Made Ground associated with general agricultural activity may contain asbestos and PAH and are present in areas of proposed future construction (roads, parking or buildings). In these areas it is recommended that all Made Ground is excavated, handpicked of ACM and any other visual or olfactory evidence of contamination and reused in accordance with the MMP in landscape areas.

Other areas of Made Ground exist at the site. However, these are unlikely to require excavation as:

- The Landfill area in the north of the site is located in an area of landscape and based on the current layout, no development is proposed for this area.
- Roade Cutting Made Ground is comprised of natural soils, and whilst this area will require over-excavation with regards to the geotechnical solution for the site, does not require excavation due to geo-environmental reasons.
- Rathvilly Farm pit in the northeast of the site is located in an area of landscape and based on the current layout, no development is proposed for this area.

For areas of proposed landscaping, there is no requirement to excavate the Made Ground and remediate the Made Ground as this will be covered with landscape fill and topsoil during the cut to fill earthworks.

For areas of Made Ground which have been excavated, in addition to a visual assessment by the Contractor and Hydrock, the formation level (i.e. the natural ground) will be tested on a grid of 30m^2, to prove the Made Ground has been removed. The formation level will be tested for the following general suite of contaminants:

- As, B (water soluble), Be, Cd, Cr (total), Cr(VI), Cu, Hg, Ni, Pb, S (elemental), Se, V, Zn, cyanide (total), sulfide, pH, asbestos fibres, speciated polycyclic aromatic hydrocarbons (PAH, by GC-FID), total phenols and fraction of organic carbon; and
- total TPH.

Testing will be carried out by a UKAS accredited laboratory.

The results of the chemical validation testing will be compared to Table 5.2.

Table 5.2: Formation Validation Criteria (Commercial End Use) – Areas of Made Ground

Contaminant	Proposed RTV mg/kg			Contaminant	Proposed RTV mg/kg		
	(1% SOM)	(2.5% SOM)	(6% SOM)		(1% SOM)	(2.5% SOM)	(6% SOM)
Arsenic	250	250	250	Acenaphthene	84000	97000	100000
Beryllium	390	390	390	Acenaphthylene	83000	97000	100000
Boron	3	3	3	Anthracene	520000	540000	540000
Cadmium	220	220	220	Benz(a)anthracene	86	91	94
Chromium (III)	400	400	400	Benzo(a)pyrene	14	14	14
Chromium (VI)	25	25	25	Benzo(b)fluoranthene	97	98	99
Copper	100	100	100	Benzo(ghi)perylene	630	640	640
Lead	2330	2330	2330	Benzo(k)fluoranthene	140	140	140
Mercury, inorganic	3600	3600	3600	Chrysene	140	140	140
Nickel	600	600	600	Dibenz(a,h)anthracene	12	12	13
Selenium	13000	13000	13000	Fluoranthene	23000	23000	23000
Vanadium	9000	9000	9000	Fluorene	63000	68000	71000
Zinc	300	300	300	Indeno(1,2,3,cd)pyrene	58	59	60
Cyanide (free)	16000	16000	16000	Naphthalene	190	460	1100
Phenol (total)	760	760	760	Phenanthrene	22000	22000	23000
Total PAH	100	100	100	Pyrene	54000	54000	55000
Total TPH	50	50	50	Asbestos	Nil	Nil	Nil

For the Made Ground which has been excavated, prior to reuse as fill in landscape areas, handpicking of visible ACM (if present) by a suitably qualified contractor will be undertaken.

Asbestos fibres are likely to be present and Asbestos Containing Materials may be present in the excavated Made Ground from Lodge Farm, the Filling Station and any pockets of Made Ground associated with general agricultural use. As such, it is important that the control measures in place are sufficiently robust to prevent release of airborne asbestos fibres into the surrounding environment.

The Contractor should assume asbestos may be found in these soils (although based on the investigation works to date, likely to be present generally at a low concentration) and will have in place at the start of the contract, work procedures designed to ensure the Contractor is working in full compliance of all Health and Safety requirements (including, but not exclusively Control of Asbestos regulations (CAR) 2012).

All excavated soils and the formation level will be inspected for suspect material during excavation and placement and any visible Asbestos Containing Materials (ACM) will be handpicked and disposed of, by a suitably qualified Contractor. These works are to be undertaken under a Hydrock watching brief.

With regards to the excavation of soils and as far as reasonably practicable, the removal of gross ACM is required, if found. It should be noted that:

- In accordance with CAR 2012 (Regulation 16) there remains a duty of the Contractor to 'prevent or reduce the spread of asbestos anywhere where work is being carried out under their control'. Where complete prevention is not reasonably practicable (this would constitute such a case), the regulation requires the Contractor to reduce to the lowest level reasonably practicable the spread/potential for fibre release of asbestos from any place where work under the Contractor's control is carried out.
- CAR 2012 notes that the Contractor should select and use work methods that will reduce the disturbance and release of asbestos fragments and fibres to minimise the risk of spread, e.g. by removing items intact or whole and by using dust suppression techniques. ACMs must never be left loose or in a state where they can be trampled on or spread. All asbestos waste will be bagged or wrapped promptly after removal and the waste will be removed from the work area regularly.
- Additionally, where enclosures are not used (and this is one of those instances, as it is not reasonably practicable to do so), the Contractor's risk assessment will establish what will be required to make sure that, as far as is reasonably practicable:
    - the spread of asbestos is prevented (airborne fibres and asbestos in soils);
    - people not involved in the work are excluded from the area; and
    - the work area is totally cleaned after work is completed.

For the proposed activities, there are two activities which could release fibres: 1) excavation of soils containing gross ACM and 2) placement of soils containing gross ACM. It is reasonably practicable for visible 'gross'/highly fibrous materials to be handpicked and doubled bagged at the point of excavation. As this material has then been removed, the potential to liberate fibre on the second activity (placement) has thus been obviated, or reduced to as low a level as reasonably practicable. As such, in addition to a surface inspection and pick, hand picking of gross ACM is required during excavation and placement activities to ensure that as far as reasonably practicable all visible gross ACM has been removed.

As licensable ACM (AIB and lagging) has been detected during the site investigation, all staff undertaking the hand picking must be suitably qualified to handle licenced ACM. The Contractor is to confirm with Hydrock the qualifications and the suitability of staff prior to commencement. It should be noted that in Hydrock's opinion, Asbestos Awareness is not an appropriate level of competency to pick licenced ACM.

The working Method, including task specific risk assessments and method statements will be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate monitoring, PPE and RPE will be provided and utilised. The working method will be provided to Hydrock for comment two weeks prior to commencement on site.

Visible fragments of suspected asbestos containing materials on the site surface will be handpicked. As hand picking is being undertaken, there may be a requirement to deploy an Environmental Permit. The Contractor is to form their own opinion and either: deploy a permit, or in accordance with the Environment Agencies 'Remediation Position Statements', dated 7/11/2010, notify the Environment Agency of the activity a minimum of five days before start. The EA may then request deployment of a MMP.

All ACM will be placed in a dedicated covered and lockable skip pending off-site disposal at a suitably licensed facility. Such remediation measures will be undertaken by suitably qualified Contractors and in accordance with CAR 2012.

Segregation and stockpiling of soils will be based on classifying materials either for reuse on site or disposal. Appendix B includes Stockpile Template Forms to assist the controlled management of stockpiles.

Air monitoring for asbestos is required during the excavation of Made Ground from Lodge Farm, the Filling Station and any pockets of Made Ground associated with general agricultural use and the results will be compared with acceptable maximum standards set by the HSE. These air monitoring procedures and limits are given in HSG 248 entitled 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures' and CAR 2012. The monitoring will be undertaken by a UKAS accredited laboratory. The limit used is governed by the levels stated in the above guidance documents and the accuracy of the testing used. However, Hydrock recommends using the most stringent limit set by the HSE. Air monitoring results are acceptable only if they fall below this limit and are as low as reasonably practicable. Exposure from work activities involving asbestos must be reduced to as far below the control limit as possible.

5.7 Task E7: Excavation of Made Ground at the Grand Union Canal leak, examination and testing with regards to petroleum hydrocarbons

Additional works are required to finalise. At the current time, it is recommended that in the area of the Grand Union Canal leak, the soils will be excavated, compared to the reuse RTVs and if necessary treated.

Soils excavated from the Grand Union Canal leak area will be inspected, remediated if necessary and validated by chemical testing to comply with the RTVs set out in Table 5.1.

5.8 Task E8: *Ex Situ* Remediation of Contaminated Soils

It is proposed that any soils which fail to meet the RTVs for petroleum hydrocarbons are treated on site by *ex situ* remediation (bioremediation) if proposed for reuse in areas of development (roads, pavements and buildings.

If proposed for reuse in landscape areas, no treatment is required, as long as 'gross' contamination is removed. Alternatively, these soils may also be disposed of to a suitably licensed off site facility.

All materials proposed for treatment will be inspected on behalf of the Contractor by an experienced Geo-environmental Engineer and the Consultant to confirm their suitability for treatment. Any materials deemed unsuitable for treatment will be appropriately controlled and removed from site to a suitably licenced waste facility as soon as possible.

Treatment of the soils will need to be undertaken in accordance with an appropriate Environmental Permit and subject to receipt of any required licences and or permits.

Appropriate mitigation with regards to odours will need to be considered in the design.

Prior to any of the following *ex situ* remediation techniques being undertaken, pre-treatment of soils is required. As a minimum, this will include the removal of larger constituents from the soil matrix by mechanical screening. If appropriate, screened oversize materials will be crushed to manufacture a secondary aggregate.

Samples of treated soils will be taken and tested at a rate of one test per 500m^3 to prove they are suitable for use.

5.8.1 Bioremediation

Biopiles will be designed to reduce the CoPC in excavated soils through the use of biodegradation. Bioremediation will be undertaken on an impermeable surface to prevent leaching of contaminants to the underlying soil and groundwater. Leachate drains will be included in the design to collect any water run-off and the water collected from the leachate drain will be treated in accordance with an Environmental Permit prior to discharge under licence or disposal.

Once the CoPC soil concentrations in the remediated soils have been reduced to below the RTVs set out in Table 5.1, they can be reused on site as part of the development plots.

5.8.2 Solidification and Stabilisation

Solidification and stabilisation are other feasible options to reduce the mobility of the contaminants. However, due to the elevated concentrations of sulphates present in the soils and the risks posed by sulphate heave, this option is not a viable remediation treatment technique.

5.9 Task E9: Cut to fill and Management of Soils

5.9.1 General

The Contractor will strip (and test to confirm suitability of use) the Topsoil from all areas of the site and stockpile at a location to be agreed with the Client. The Contractor will take care to separate material which contains man-made constituents, from Topsoil.

As a minimum the Topsoil stripped from the landfill, the areas of historical development will be stockpiled and tested separately from that stripped from the remainder of the site. Topsoil will be tested in accordance with Section 6.4.7.

Sorting, screening and processing of excavated soils will be required as necessary to comply with the Earthworks Design and Specification.

Placement of any excavated Made Ground from Lodge Farm, the Filling Station and pockets of Made Ground associated with general agricultural activity will be undertaken as part of the cut to fill works, with these soils placed at depth within landscape areas, either as General Fill or Landscape Fill.

Placement of any bio-remediated soils, will be undertaken as part of the cut to fill works, with these soils placed at depth within landscape areas, either as General Fill or Landscape Fill.

During the Enablement Works, the Contractor will undertake all remediation works and placement of soils in accordance with the RMS. All excavations are to be filled with suitable excavated soils following remediation.

Filling will be undertaken by the Enablement Remediation Contractor and will either be undertaken in accordance to the Earthworks Specification or in accordance with the Ground Improvement Specification as required.

The Contractor is referred to the Design and the Earthworks Specification for further details with regards to cut and fill works.

5.9.2 Materials Management

Reuse of soils is allowed following the removal of ACM by handpicking and remediation of any hotspots.

Reuse will need to be undertaken in accordance with the CL:AIRE 'Definition of Waste: Development Industry Code of Practice', i.e. in accordance with a Qualified Person approved Materials Management Plan.

The Enablement Works Contractor is responsible for providing a MMP signed off by a Qualified Person to Hydrock for comment before any excavation works are undertaken.

If reuse of soils in accordance with a MMP is proposed, segregation and stockpiling of soils will be based on the following suitability criteria:

- Soils potentially suitable for reuse on site without treatment (i.e. complying with the requirements of Table 6.2).
- Soils suitable for reuse on site placed at depth as part of the landscaping, e.g. soils containing asbestos which have been hand-picked to removal visible Asbestos Containing Materials (ACM) or soils which pass the RTVs as detailed in Table 5.1, but fail when compared to Table 5.2.
- Soils unsuitable for use (e.g. geotechnically unsuitable soils, the handpicked ACM, untreated contaminated soils, or soils containing significant quantities of ACM following hand picking. These will be disposed of to a suitably licensed off site facility.
- Soils surplus to requirements. These will be disposed of to a suitably licensed off site facility.

Soils that are to be reused on site will be recorded in a MMP/site waste management plan and accompanied by supporting excavation and placement logs.

Site-won soils proposed for reuse (Topsoil and Subsoil) are to be tested as per Section 6.4.7.

For soils to be placed at depth as part of the landscaping, following bulk excavation of the Made ground and / or hotspot removal, treatment and validation. As long as soils to be placed have been: picked to remove ACM; are geotechnically suitable; and are placed in accordance with the MMP, no supplementary testing is required during placement.

If, in the opinion of the Consultant, the material is not suitable for use, the Contractor is to remove and dispose of it in accordance with the RMS, at the Contractor's cost.

5.10 Task E10: Off-Site Disposal of Waste Material

This section is relevant to both the Enablement and the Groundworks phases of works.

Any surplus (i.e. soils which cannot be reused on site due to volumes); unsuitable soils (i.e. soils which fail the RTVs and cannot be reused in an appropriate location); or soils which are not geotechnically suitable, will be disposed of by the Contractor at the Contractor's cost.

All arisings will be regarded as contaminated unless proven otherwise. Any soils to be removed from site will be removed to a licensed waste management facility by a registered waste carrier in accordance with applicable Waste Management Regulations.

All testing to allow disposal of waste will be undertaken by the Contractor at the Contractors cost.

The Contractor will maintain records detailing the approximate location of any material disposed of, including a brief description and records of disposal.

Waste consignment/transfer notices will be required and will be retained by the Contractor. Copies of all waste consignment/transfer notices will be included in the validation file prepared by the Contractor.

5.11 Task E11: Enablement Remediation Contractor's Validation Report

5.11.1 Introduction

The Contactor should note the information presented below which is required to validate their works.

General Requirements are set out in Appendix E, which details the general requirements and responsibilities of the Contractor in relation to health and safety, site set up and operational requirements.

For the sampling and testing requirements, please refer to Section 6.5.

The Contractor will maintain records of the works undertaken and will provide the following reports:

- Materials Management Validation Report;
- Remediation Validation Report; and
- a Geotechnical Feedback report (as per the Earthworks Specification).

All reports provided by the Enablement Contractor will be available in Adobe pdf format which has been digitally bookmarked at each section heading. Four hard copies will be provided and all chemical data is also required in Excel format.

5.11.2 Materials Management Validation Report

The Materials Management Validation Report is required to document the validation of the approved Materials Management Plan and will include the validation of site-won soils and placed soils.

As a minimum the Materials Management Validation Report is to include:

- details of the import mechanisms for each material source;
- details of the testing (chemical and geotechnical) of imported materials to prove each source is suitable for use;
- details of the testing (chemical and geotechnical) of site-won materials to prove each source is suitable for use;
- records of material movement, including:
    1. stockpile inspection records;
    2. stockpile reuse appraisal record;
    3. volumes, origin and placement location of soils referenced to field results and inspections;
    4. details and quantities of excavated, screened, treated, imported and reused soils;
- confirmation that all materials used on the project were suitable for use geotechnically; and
- records of earthworks excavations including: test results, 'as-built' drawings, photographs, quantities of materials and records of progress (may be included as a reference to the separate Geotechnical Feedback Report).

5.11.3 Remediation Validation Report

The Enablement Contractor will maintain records of the works and a Validation Report will be prepared by the Contractor on those aspects of the works it has completed and is responsible for.

The Validation Report will provide a complete record of the remediation activities undertaken at the site and the data collected to support compliance with remediation objectives and criteria. It will also include descriptions of the works with associated 'as built' drawings and details of any unforeseen conditions encountered during the works and how they were dealt with.

The Validation Report will incorporate a summary of and commentary on:

- demolition activities;
- an outline of the remedial action taken to remove asbestos/hazardous materials;
- site stripping and clearance activities;
- approximate quantities for all materials removed from the site;
- remediation works undertaken and validation testing to prove suitability for use;

- details of retained services and obstructions encountered but not removed;
- stockpile plan of all stockpiles generated by the works and remaining on site;
- copies of the certificates for geotechnical testing and chemical testing of the stockpiles;
- topographical survey of the as-excavated voids;
- records of excavations, including:
    - Ordnance Datum survey of extents and depth;
    - Ordnance Datum survey of extents and depth of any residual features;
    - record of decisions for over-excavation;
    - photographic record of each excavation;
    - records of inspection and final extents of validation;
- records of laboratory analytical and *in situ* field test results, including:
    - laboratory results and location plan for each analytical test;
    - field test kit results and particulars of monitoring (e.g. date, location, personnel);
    - laboratory measurements of accuracy and precision;
    - calibration data for field measurement equipment in accord with manufacturers guidance;
    - Chain of Custody forms;
- results of asbestos air monitoring (including reassurance monitoring) and other environmental monitoring (noise/dust);
- treatment records in line with discharge consents/permits for water;
- waste classification and management documentation, including:
    - copies of all consignment notes, in particular those relating to the hazardous waste regulations;
    - details of waste facilities where materials were disposed of;
- final as-built survey of the site (in AutoCAD format); and
- confirmation that site levels are as required.

Information associated with regulatory health and safety, control of noise, nuisance, dust, and waste are to be excluded from the technical verification reporting and will be submitted as separate documentation. This separation is made to differentiate between technical remediation requirements stated herein and operational controls of work.

6.0 GROUNDWORKS REMEDIATION WORKS

6.1 Task G1: Excavation and Reuse of Soils

6.1.1 Excavation

During the construction phase of works, excavation works will be required (foundation excavations, drainage excavations etc.) and the Contractor is referred to the Geotechnical Design and Earthworks Specifications for further information.

The Enablement Works are designed to ensure that asbestos is not present in the soils which form part of the development platforms (roads, pavements and building areas). However, the Groundworks Contractor is to be familiar with the works undertaken during the Enablement Phase of works and recognise that Asbestos Containing Materials maybe found.

The Contractor is referred to Section 8.0 for further information and will undertake the procedures detailed in Section 5.6 if required. This will include as a minimum: a watching brief for any unexpected ACM; appropriate mitigation with regards to dust, PPE and RPE and air monitoring to prove mitigation is successful (if required).

The Contractor should note that groundwater will accumulate in excavations formed on the site during remediation. Treatment of all water encountered during excavation may be required to allow discharge under licence. As a minimum silt will need to be removed prior to discharge. Further details are provided in the CEMP. The Contractor is responsible for obtaining any licences or permits required and if discharge is undertaken, it will need to be in accordance with the relevant licences/permits and only following treatment to appropriate concentrations of the CoPC.

6.1.2 Materials Management (Reuse)

Reuse of all excavated soils will need to be undertaken in accordance with the CL:AIRE 'Definition of Waste: Development Industry Code of Practice', i.e. in accordance with a Qualified Person approved Materials Management Plan.

The Groundworks Contractor is responsible for providing a MMP for their works signed off by a Qualified Person to Hydrock for comment. This is to cover the plot specific cut to fill works, foundation excavation, services excavation, placement of soils and installation of Topsoil.

If reuse of soils in accordance with a MMP is proposed, segregation and stockpiling of soils will be based on the following suitability criteria:

- Soils potentially suitable for reuse on site without treatment (i.e. complying with the requirements of Table 6.2).
- Soils suitable for reuse on site placed at depth as part of the landscaping, e.g. soils containing asbestos which have been hand-picked to removal visible Asbestos Containing Materials (ACM) or soils which pass the RTVs as detailed in Table 5.1, but fail when compared to Table 5.2.

- Soils unsuitable for use (e.g. geotechnically unsuitable soils, the handpicked ACM, untreated contaminated soils, or soils containing significant quantities of ACM following hand picking. These will be disposed of to a suitably licensed off site facility.
- Soils surplus to requirements. These will be disposed of to a suitably licensed off site facility.

Soils that are to be reused on site will be recorded in a MMP/site waste management plan and accompanied by supporting excavation and placement logs.

Site-won soils can be reused. No soils which fail the RTV will be placed on the development parcels during the Enablement Works. However, the Groundworks Contractor should keep a watching brief (Refer to Section 8.0) during excavation.

6.2 Task G2: Over-Excavation of Service Trenches and Installation of Barrier Pipe

Whilst unlikely, if Made ground remains in place below development plots. To protect future maintenance workers from contaminants in the soils, service trenches are to be over excavated, 300mm either side and 300mm below the base of the service being installed. The excavation will be backfilled with soils which are proven to be suitable for use by comparison to the reuse RTVs (Table 6.2).

Protectaline (or equivalent) water supply pipework will be installed.

Please refer to Section 6.4.4 for the validation requirements.

The requirements for Protectaline and over-excavation will be updated during the cut to fill earthworks when confirmation that no CoC are present below development parcels.

6.3 Task G3: Installation of Basic Radon Protection Measures

The site is classified as requiring basic radon protection. This takes the form of a well-installed upgraded damp-proof membrane (DPM) (minimum of 1200 gauge) modified and extended to form a radon barrier across the footprint of the building as part of the reinforced concrete cast in situ floor slab.

Hydrock would recommend that a 2000g membrane is considered as this reduces the chance of damage during installation.

The installed DPM, must also be suitable for use as a radon barrier and the membrane must be installed as a sealed membrane, with additional seals as necessary around upstands and service entry points.

The membrane must be validated by the installer in accordance with CIRIA C735 (Mallet *et al* 2014) and the installation verified by an independent specialist Consultant.

Please refer to Section 7.2.3 for the validation requirements.

6.4 Task G6: Groundworks Contractor's Validation Report.

6.4.1 Introduction

The Groundworks Contractor will maintain records of the works undertaken and will note the information presented below which is required to validate their works.

General Requirements set out in Appendix E, which details the general requirements and responsibilities of the Contractor in relation to health and safety, site set up and operational requirements.

The Contractor will provide the following remediation validation elements:

- Earthworks Validation/Feedback Report;
- Materials Management Validation Report;
- protection of services (if required); and
- gas mitigation.

6.4.2 Earthworks Validation/Feedback Report

The Contractor is referred to the Earthworks Specification with regards to the geotechnical validation/feedback requirements of the bulk earthworks, ground improvement and cut to fill. However, the works will also need to be undertaken in accordance with the requirements of this RMS and the CEMP.

The Groundworks Contractor will maintain records of the works and a Validation Report will be prepared by the Contractor on those aspects of the works it has completed and for which it is responsible.

The Validation Report will provide a complete record of the activities undertaken at the site and the data collected to support compliance with remediation objectives and criteria. It will also include descriptions of the works with associated 'as built' drawings and details of any unforeseen conditions encountered during the works and how they were dealt with.

The Validation Report will incorporate a summary of and commentary on:

- cut to fill works undertaken;
- record of the watching brief for ACM;
- an outline of the remedial action taken to remove asbestos/hazardous materials if encountered;
- topographical survey of the as-excavated voids;
- treatment records in line with discharge consents/permits for water;
- details of any unexpected contamination (if encountered);
- waste classification and management documentation if any waste disposed of off site, including:
    - copies of all consignment notes;

- details of waste facilities where materials were disposed of;

- final as-built survey of the site (in AutoCAD format); and
- confirmation that site levels are as required.

Information associated with regulatory health and safety, control of noise, nuisance, dust, and waste is to be excluded from the technical verification reporting and will be submitted as separate documentation. This separation is made to differentiate between technical remediation requirements stated herein and operational controls of work.

6.4.3 Materials Management Validation Report (Construction Phase)

The Construction Phase Materials Management Validation Report is required to document the validation of the approved Materials Management Plan and will include the validation of site-won soils and placed soils.

As a minimum the Materials Management Validation Report is to include:

- details of the import or reuse mechanisms for each material source;
- details of the testing (chemical and geotechnical) of site-won and imported materials to prove each source is suitable for use;
- records of material movement, including:
  1. stockpile inspection records;
  2. stockpile reuse appraisal record;
  3. volumes, origin and placement location of soils referenced to field results and inspections;
  4. details and quantities of excavated, screened, treated, imported and reused soils;
- confirmation that all materials used on the project were suitable for use geotechnically;
- test results; and
- records of earthworks excavations including 'as-built' drawings, photographs, quantities of materials and records of progress (may be included as a reference to the separate Geotechnical Feedback Report).

6.4.4 Validation with Regards to Protection of Services.

The installation of services are to be validated by the Contractor, who will provide to Hydrock, either:

1. Confirmation that the soils on site, as proven by the Enablement Works Verification report, and a site watching brief report, does not contain any risk to CoPC; or

2. If made ground is present, the following:

   - photographic proof of over-excavation of service trenches;
   - provision of delivery tickets showing Protectaline (or similar) pipework has been delivered to site;

- photographic proof that Protectaline pipework (or similar) has been installed; and
- testing to prove the soils used as backfill are in accordance with the RTVs in Table 6.2; and
- photographic proof of backfilling with 'clean' soils.

6.4.5 Radon Barrier Validation

Validation of any radon barrier installed will be undertaken by the Contractor in accordance with CIRIA 735 as summarised in Table 6.1. Verification of the radon barrier installed will be undertaken by Hydrock in accordance with CIRIA 735 as summarised in Table 6.1.

Table 6.1: Gas Mitigation Validation Measures (assumes cast *insitu*, reinforced slab)

Installer Experience Required	**Verification and integrity testing**	
Qualified and experienced installer (minimum one operative to hold a NVQ Level 2 in gas protection installation)	1.	The Contractor is to check and validate the membrane prior to all concrete pours. All joints, pipe penetrations, corners etc. tested to a recognised standard by the installer. The Contractor is to supply sign-off sheets (validation evidence) including photographs for all concrete pours (see Appendix H for the validation form – other forms can be proposed).
	2.	A thorough visual inspection by an experienced and qualified independent third party inspector (Hydrock) will be undertaken prior to 25 per cent of concrete pours, 25 per cent of joints, pipe penetrations, corners etc. Any defects to be corrected and reinspected.
	3.	During the independent inspection detailed above all membrane laps, pipe penetrations etc. will be independently pick tested or air lanced to ASTM D4437. Any defects to be corrected and reinspected.

6.4.6 Topsoil

6.4.7 Sourcing of Material for Topsoil

Suitable soils are present on site for reuse and will be available following the Enablement Works.

If the source of the material is not natural (including granular material), chemical testing will be undertaken at a rate of one test per 1000m^3.

If the source of the material is natural, chemical testing will be undertaken at a rate of one test per 2500m^3.

A minimum of four chemical suites will be undertaken on any individual source material or import round. Depending on the source or variability of imported material, the Engineer may, at their discretion, request additional testing be undertaken. If constant sources are used for the Topsoil and Subsoil and the results recorded are consistently low, consideration may be given to reducing the number of samples tested.

Testing will be carried out by a UKAS accredited laboratory for the following general suite of contaminants:

- As, B (water soluble), Be, Cd, Cr (total), Cr(VI), Cu, Hg, Ni, Pb, S (elemental), Se, V, Zn, cyanide (total), sulfide, pH, asbestos fibres, speciated polycyclic aromatic hydrocarbons (PAH, by GC-FID), total phenols and fraction of organic carbon;
- BTEX;
- total TPH and speciated TPH (TPHCWG); and
- asbestos quantification.

The results of chemical testing are to be compared with the RTVs presented in Tables 6.2. If any of these thresholds are exceeded, the material will be considered to be unsuitable unless treatment, further testing and risk assessment shows it to be satisfactory.

Table 6.2: Reuse Criteria Topsoil (Commercial End Use)

Contaminant	Proposed RTV mg/kg			Contaminant	Proposed RTV mg/kg		
	(1% SOM)	(2.5% SOM)	(6% SOM)		(1% SOM)	(2.5% SOM)	(6% SOM)
Arsenic	250	250	250	Acenaphthene	84000	97000	100000
Beryllium	390	390	390	Acenaphthylene	83000	97000	100000
Boron	3	3	3	Anthracene	520000	540000	540000
Cadmium	220	220	220	Benz(a)anthracene	86	91	94
Chromium (III)	400	400	400	Benzo(a)pyrene	14	14	14
Chromium (VI)	25	25	25	Benzo(b)fluoranthene	97	98	99
Copper	100	100	100	Benzo(ghi)perylene	630	640	640
Lead	2330	2330	2330	Benzo(k)fluoranthene	140	140	140
Mercury, inorganic	3600	3600	3600	Chrysene	140	140	140
Nickel	600	600	600	Dibenz(a,h)anthracene	12	12	13
Selenium	13000	13000	13000	Fluoranthene	23000	23000	23000
Vanadium	9000	9000	9000	Fluorene	63000	68000	71000
Zinc	300	300	300	Indeno(1,2,3,cd)pyrene	58	59	60
Cyanide (free)	16000	16000	16000	Naphthalene	190	460	1100
Phenol (total)	760	760	760	Phenanthrene	22000	22000	23000
Total PAH	50	50	50	Pyrene	54000	54000	55000
Total TPH	50	50	50	Asbestos	Nil	Nil	Nil
Aliphatics EC5-EC6	300	560	1200	Aromatics EC5-EC7	1200	2300	4700
Aliphatics >EC6-EC8	140	320	740	Aromatics >EC7-EC8	870	1900	4400
Aliphatics >EC8-EC10	78	190	450	Aromatics >EC8-EC10	610	1500	3600
Aliphatics >EC10-EC12	48	120	280	Aromatics >EC10-EC12	360	900	2200
Aliphatics >EC12-EC16	24	59	140	Aromatics >EC12-EC16	36000	37000	38000
Aliphatics >EC16-EC35	1000000	1000000	1000000	Aromatics >EC16-EC21	28000	28000	28000
Aliphatics >EC35-EC44	1000000	1000000	1000000	Aromatics >EC21-EC35	28000	28000	28000

Granular Soils
For granular soils (Type 1/6F5/6F2 etc.), which are to be used as part of pavement or road construction Hydrock propose the following guidelines:

- no visual contamination (oil staining, asphalt, etc.) as confirmed by Hydrock Consultants watching brief;
- limited deleterious material (organics, wood, metal etc.) (in accordance with the SHW);
- no visible asbestos containing material (ACM) as confirmed by Hydrock Consultants watching brief.
- no asbestos fibres as confirmed by testing (at a rate of 1 test per 1000m^3).

6.5 Collection of Samples and Testing

All sampling, logging and testing of soils during all phases of works will be undertaken in accordance with BS 5930:2015 'Code of Practice for Site Investigations' and BS 10175:2011+A1:2013 'Investigation of Potentially Contaminated Sites – Code of Practice'.

Soils for inorganic analysis will be sealed in air-tight polythene tubs.

Soils for organic analysis will be sealed in amber glass jars with the minimal practicable headspace.

Groundwater samples will be collected in suitable containers and with the correct preservatives, as provided by the laboratory.

All samples will be scheduled on Chain of Custody forms prior to being dispatched to the UKAS accredited laboratory for analysis.

The Contractor will undertake all testing at a laboratory which holds UKAS and MCERTS accreditation for the specific tests. Where it is not possible to obtain the testing of a material for a specific property to a UKAS or MCERTS accredited method, the Contractor will obtain permission from the Consultant for the test to be completed at the proposed laboratory, before the test is undertaken.

The results of all testing undertaken (and a copy of the test certificates), will be submitted to the Consultant as soon as they are reported, and no more than one day after issue of the test certificate to the Contractor. It is recognised that different tests may take different time to complete. However, the Contractor will advise the Consultant of any delay that they are aware of regarding the completion of any tests (e.g. a sample is being retested and the report will be delayed). The Consultant will be given sufficient time to review the content of the testing and the associated test results.

Test results (for all phases of works) are to be summarised (by the relevant contractor) in a single master spreadsheet (which contains all data - including geotechnical data) in a format agreed with the Consultant.

Data that does not meet the Specification will be highlighted in the spreadsheet and include details of what works were undertaken to address the non-compliance. The master spreadsheet, results of geotechnical test data, chemical test data and drawings will be maintained and kept up to date and provided to the Consultant by 10:00 a.m. every Monday morning during the Contract.

The Contractor is to make available on site at all times, a file containing all test certificates in addition to the testing summary, for inspection by the Consultant.

7.0 SUPERVISION, VERIFICATION AND REPORTING

Validation will be undertaken by the Contractor(s) and specialists as required.

Verification will be undertaken by Hydrock Consultants and is detailed below.

If required, changes to the agreed Implementation Plan, arising during the course of the works, are to be agreed in writing by Hydrock with the Local Authority and Environment Agency prior to being undertaken on site.

7.1 Site Supervision

The Contractor is to provide appropriate supervision and specialist advice during excavation and validation works. In addition, works are to be undertaken with a site watching brief by Hydrock Consultants.

7.2 Construction/Groundworks Remediation Verification

Upon the provision of a Validation Report from the Groundworks Contractor (see Section 4), to demonstrate that all of the remediation works and Materials Management with regards to the Groundworks have been undertaken in accordance with the Remediation Method Statement, Hydrock Consultants will provide a Verification Report.

This will include:

- earthworks Verification/Feedback Report;
- Materials Management Verification Report;
- protection of services (if required, to be confirmed following the Enablement Works);
- installation of radon barrier; and
- topsoil.

7.2.1 Earthworks Validation/Feedback and Materials Management Verification

On the provision of a Validation Report from the Groundworks Contractor and in accordance with the RMS and the Earthworks Specification, to demonstrate that all of the remediation works and Materials Management with regards to the Construction Works have been undertaken in accordance with the Remediation Method Statement and the Construction Works MMP, Hydrock Consultants will provide a Verification Report.

The report will be prepared by Hydrock Consultants and will provide a summary of the key elements of work and will be referenced to the agreed redevelopment strategy and planning requirements with supporting information presented within appendices.

This will be based upon CLR 11, output 5 and specifically will incorporate a summary and commentary of:

- details of methodology (key documents) and programme;
- decision records covering agreements with regulators;

- records of works undertaken and associated validation and monitoring records obtained from the Contractor (specified above e.g. chemical testing data);
- specialist Contractor's validation reports for particular elements of work;
- supporting data (e.g. 'as-built' drawings);
- final status of remediation and achievement of remedial objectives to satisfy the planning conditions; and
- additional risk assessments/non-scheduled reactive works undertaken.

7.2.2 Verification with Regards to Protection of Services.

During Hydrock's visiting watching brief and in addition to the validation to be provided by the Contractor, if required, Hydrock will inspect service corridor excavations to ensure

- over-excavation of service trenches;
- Protectaline pipework (or similar) has been installed; and
- backfilling is being undertaken with clean soils.

In addition, Hydrock will review the chemical test data provided by the Contractor to confirm the backfill is as per the RMS.

7.2.3 Ground Gas Mitigation Verification

During installation of the membranes, Hydrock will visit site and independently undertake review of the installation methodology and verification. This will include a visual inspection and air lance or pick testing of seams and connections available during the visit.

8.0 CONTINGENCY PLAN AND AREAS OF UNEXPECTED CONTAMINATION

There is potential for areas of unexpected contamination to be present, due to the former use of the site. Any significant quantities of oily or odorous material, significant ashy soils, unusual brightly coloured or asbestos containing materials will be considered as possibly contaminated.

The Discovery Strategy, included in Appendix D, must remain on site at all times during the Enablement Phase of works and demonstrates a clear allocation of responsibility for reporting and dealing with contamination.

A copy of the Discovery Strategy must be placed on the Health & Safety Notice Board and/or displayed in a prominent area where all site staff are able to take note of and consult the document at any time. Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the requirement to follow the Discovery Strategy.

A report will be prepared by Hydrock and submitted to the regulatory parties, the Local Authority and the Environment Agency where groundwater may potentially have been impacted.

If additional materials are identified, these materials will be subject to the procedures stated in this RMS.

9.0 REFERENCES

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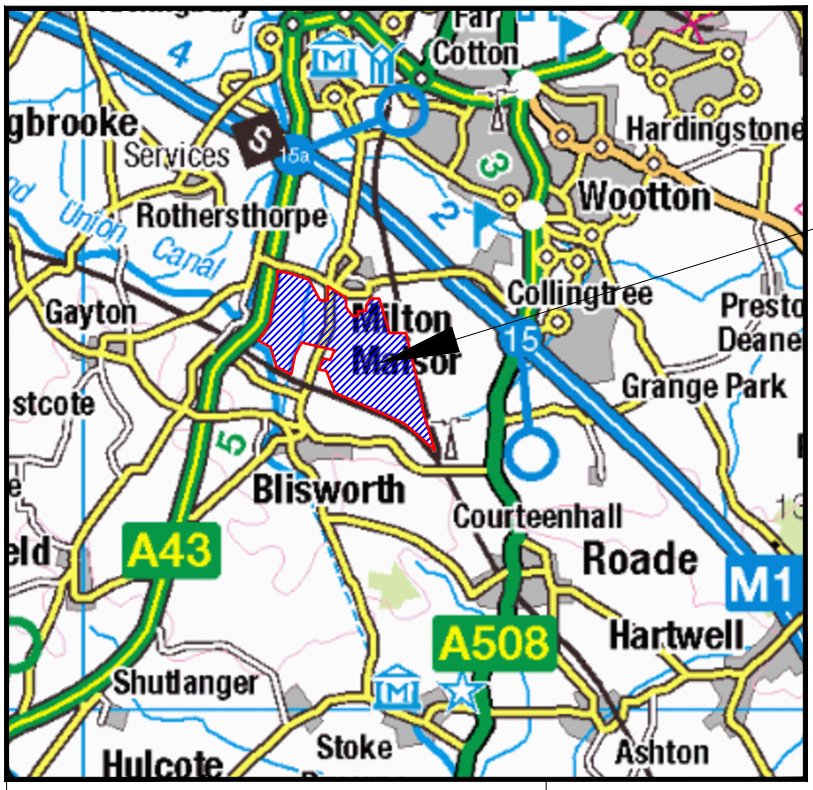
Hydrock Consultants Limited

Appendix A

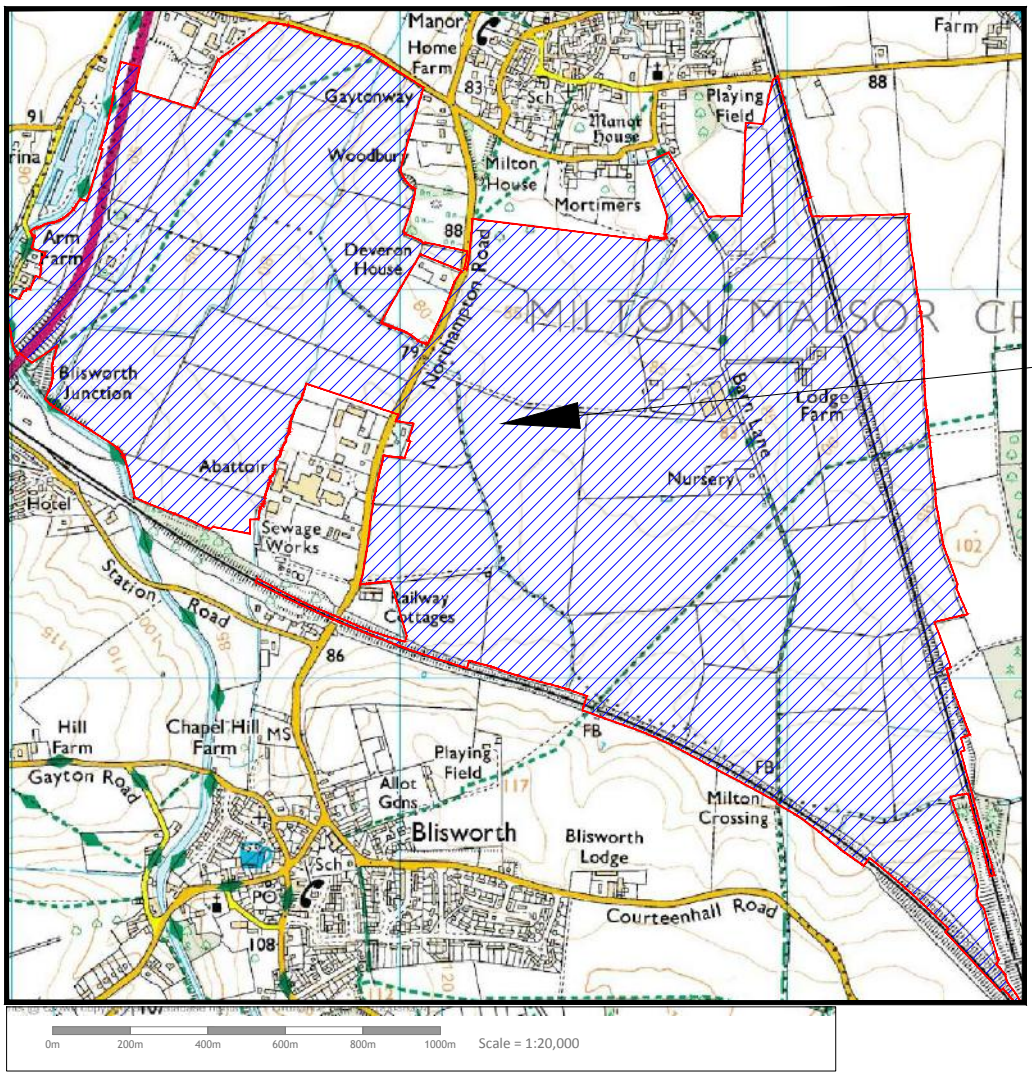
DRAWINGS

Notes:

1. Contains Ordnance Survey data © Crown copyright and database right 2015



THE SITE



THE SITE

Rev	Date	Description	By	Ckd
C	09/02/18	Boundaries revised	NS	AB
B	07/06/17	Boundaries revised	RB	AB
A	14/02/17	Boundaries revised	RB	AB

Architect :

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NN6 8LD
T +44 (0)1604 842888
www.hydrock.com

Client : Ashfield Land

Project Title: Rail Central, Milton Malsor

Drawing Title: Site Location Plan

Drawing Status: FINAL

Hydrock Job No: C151171

Drawn	Checked	Scale @ A4	Date	Issue Date
NS	AB	See Drawing	09/02/18	09/02/18

Drawing Number: C151171/D001 Revision: C

N

A43

MILTON MALSOR

BLISWORTH

UNIT 10

UNIT 9

UNIT 8

UNIT 13

UNIT 12

UNIT 11

UNIT 1

UNIT 3

UNIT 4

TRUCK PARK
149 HGV SPACES

NORTHAMPTON ROAD

WEST COAST MAIN LINE

GRAND UNION CANAL

LEGEND

BASED ON MK SURVEYS', TOPOGRAPHICAL SURVEY DRAWING, REF: 2223. DATED JULY 2016. AND ORDNANCE SURVEY INFORMATION.

- ORDER LIMITS
- ILLUSTRATIVE PROPOSED BUILDINGS
- PROPOSED PUBLIC RIGHT OF WAY
- EXISTING LANDSCAPING RETAINED
- PROPOSED LANDSCAPED OPEN SPACE (INCLUDING SCREENING AND BUNDING)
- FLOOD ATTENUATION
- INTERMODAL AREA
- AREA FOR POTENTIAL P.V. PANELS ON ROOFS
- INDICATIVE EXISTING CATENARY POSITIONS
- INDICATIVE PROPOSED CATENARY POSITIONS

REV	DATE	DETAILS OF ISSUE/REVISION	DRW	REV
0	06-02-18	FIRST ISSUE	PF	MS

ASHFIELD LAND

Rail Central
Northamptonshire

THE RAIL CENTRAL STRATEGIC FREIGHT INTERCHANGE ORDER 2018

DRAWING TITLE

ILLUSTRATIVE COLOUR MASTERPLAN - SHEET 1 OF 2

SCALE	1:2,500	DRAWN	PF
PAGE SIZE	A0	REVIEWED	MS

REGULATION: 5(2)0

DOCUMENT: .

DRAWING STATUS: PLANNING

DRAWING No: MSA-30708-PL-DCO-112

REVISION: 0

SHEET 1

SHEET 2

KEY PLAN
1:20,000

MILTON MALSOR

NORTHAMPTON LOOP

M1 MOTORWAY

UNIT 2

UNIT 1

UNIT 3

UNIT 4

UNIT 5

UNIT 6

UNIT 7

TERMINAL CONTROL BUILDING

TRAIN MAINTENANCE DEPOT

POTENTIAL EXPRESS FREIGHT CROSS-DOCK PLATFORM

WEST COAST MAINLINE

BLISWORTH

SHEET 1

SHEET 2

KEY PLAN
1:20,000

0 25 50 100m

LEGEND

BASED ON MK SURVEYS', TOPOGRAPHICAL SURVEY DRAWING, REF: 2223. DATED JULY 2016. AND ORDNANCE SURVEY INFORMATION.

- ORDER LIMITS
- ILLUSTRATIVE PROPOSED BUILDINGS
- PROPOSED PUBLIC RIGHT OF WAY
- EXISTING LANDSCAPING RETAINED
- PROPOSED LANDSCAPED OPEN SPACE (INCLUDING SCREENING AND BUNDING)
- FLOOD ATTENUATION
- INTERMODAL AREA
- AREA FOR POTENTIAL P.V. PANELS ON ROOFS
- INDICATIVE EXISTING CATENARY POSITIONS
- INDICATIVE PROPOSED CATENARY POSITIONS

REV	DATE	DETAILS OF ISSUE/REVISION	DRW	REV
0	06-02-18	FIRST ISSUE	PF	MS

ASHFIELD LAND

Rail Central Northamptonshire

THE RAIL CENTRAL STRATEGIC FREIGHT INTERCHANGE ORDER 2018

DRAWING TITLE

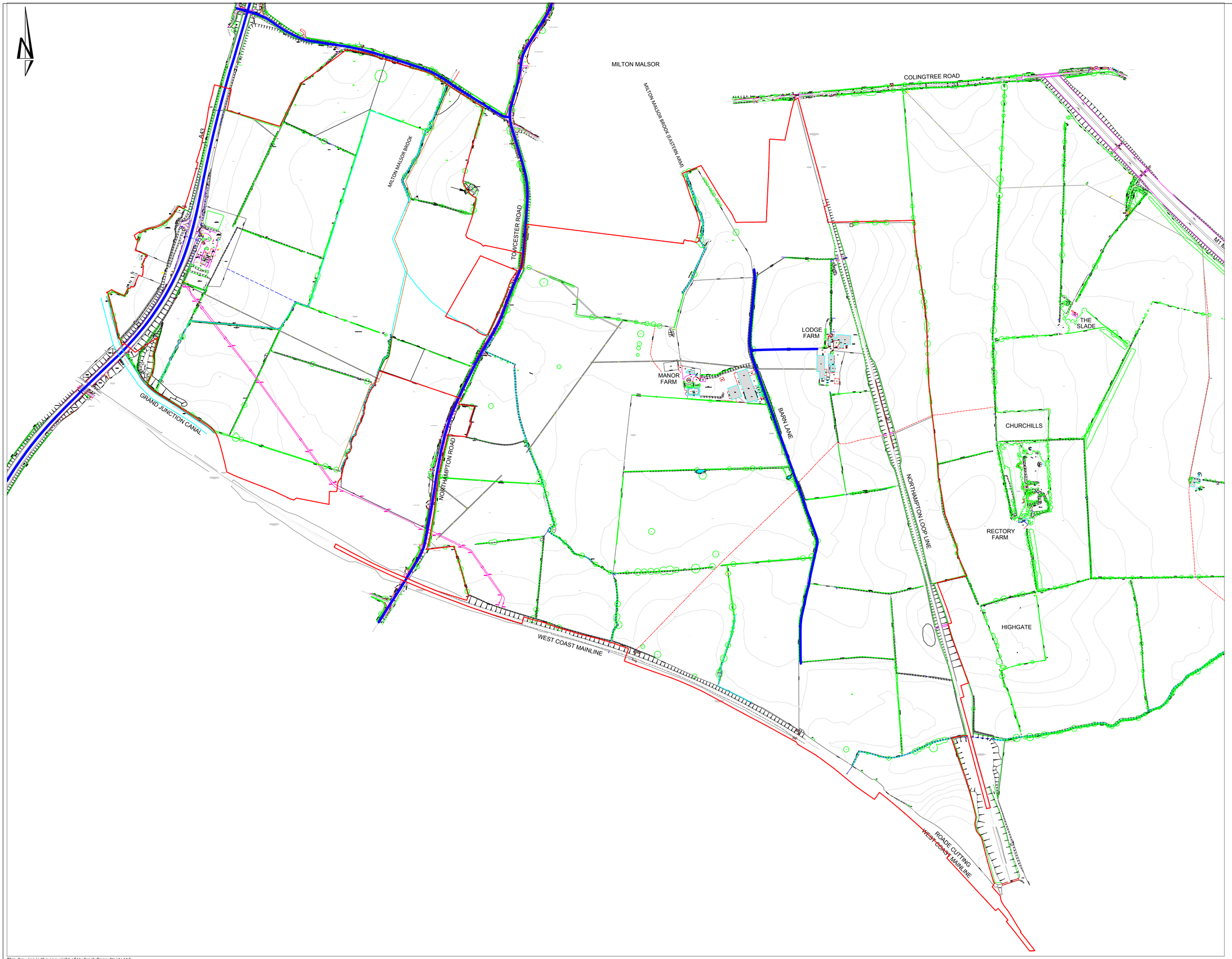
ILLUSTRATIVE COLOUR MASTERPLAN - SHEET 2 OF 2

SCALE	1:2,500	DRAWN	PF
PAGE SIZE	A0	REVIEWED	MS
REGULATION	5(2)0	DOCUMENT	.

DRAWING STATUS

FEASIBILITY

DRAWING No	REVISION
MSA-30708-PL-DCO-112	0



Notes:

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

Key

- Railway line
- Road
- Footpath
- Foul sewer
- BPA Oil Pipeline
- Watercourses
- Trees/Hedges

Rev	Date	Description	By	Ckd
C	09/02/18	Updated Site Boundary	NS	AB
B	06/07/17	Updated	RB	AB
A	14/02/17	Updated	RB	AB

Architect :

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Client :

ASHFIELD LAND

Project Title:

MILTON MALSOR, NORTHAMPTONSHIRE

Drawing Title:

Site Extents Plan

Drawing Status:

FINAL

Hydrock Job No:

C151171

Drawn	Checked	Scale @ A1	Date	Issue Date
NS	AB	1:5000	09/02/18	09/02/18

Drawing Number: 151171/D002

Revision: C

Notes:

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

MILTON MALSOR
COLINGTREE ROAD
A43
TOWCESTER ROAD
GRAND JUNCTION CANAL
NORTHAMPTON ROAD
SOUTHERN EXTENT OF GLACIOFLUVIAL DEPOSITS
MANOR FARM
LODGE FARM
BARN LANE
THE SLADE
CHURCHILLS
RECTORY FARM
HIGHGATE
NORTHAMPTON LOOP LINE
WEST COAST MAINLINE
ROADE CUTTING
M1 MOTO

Legend

- Hydrock Borehole (BHXX)
- Hydrock Trial Pit (TPXX)
- Hydrock Window Sampler Borehole (WSXX)
- Hydrock Hand Dug Trial Pit (HPXX)

ZONING KEY

- Made Ground (landfill)
- Made Ground (Roade Cutting)
- Made Ground (Rathvilly Farm pit)
- Made Ground (other, filling station, farms)
- Alluvium
- Southern extent of Glaciofluvial Deposits
- Development platform areas
- Area of cut
- Area of fill
- Site Boundary

Rev	Date	Description	By	Ckd
B	09/02/18	Site Boundary Updated	NS	AB
A	06/07/17	Updated following additional works	RB	AB

Architect :

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Client :

ASHFIELD LAND

Project Title:

RAIL CENTRAL
MILTON MALSOR
NORTHAMPTONSHIRE

Drawing Title:

Site Zonation Plan

Drawing Status:

INFORMATION

Hydrock Job No:

C/151171

Drawn	Checked	Scale @ A0	Date	Issue Date
NS	AB	1:3500	09/02/18	09/02/18

Drawing Number: 151171/D006

Revision: B

Appendix B

STOCKPILE TEMPLATE FORM

AND

MATERIALS MANAGEMENT FORMS

Rail Central, Milton Malsor

Imported Soil Documentation Form

Stockpile Identification Reference	
Material Type	
Source Site	
Consignment Note Reference Numbers	
Volume of Stockpile (or number of loads)	
Areas Where Material to be used in	
Stockpile Identification Reference	

Sketch Plan of Stockpile Location and Sample Points

Signed _____

Position_____

Date_____

Remediation Diary

Hydrock

Project Information

Project Name:		Contract No:	
Address:		Date/Time:	
Client Name:		Weather	
Report Completed by:			
Signed:		WAMITAB Cert:	

Day		Summary of remediation activities

SOP003 DAILY TREATMENT LOG (SOIL)

Project Information

Project Name:		Contract No:	
Address:		Date/Time:	
Client Name:		Weather	
Report Completed by:			
Signed:		WAMITAB Cert:	

Soil Type & Condition:

Contaminants Treated:

Treatment Type:

Volume Treated (m3):

Daily
Accumulative

Treatment Parameters/ Method:

SOP005 v1 WASTE ACCEPTANCE

Project Information

Project Name:		Contract No:	
Address:		Date/Time:	
Client Name:		Weather	
Report Completed by:			
Signed:		WAMITAB Cert:	

Estimated Soil Volume:

Soil Description:

Upon inspection does the material match the expected properties? Yes: ☐ No: ☐

If answered (Yes) please sign and date.

If answered (No) please indicate 'non-permitted' characteristics

Does the material require further testing?	Does the material need to be stockpiled seperately or quarantined?
Yes: ☐ No: ☐	Yes: ☐ No: ☐

Describe any additional containment measures:

Does the Environment Agency need to be informed?
Yes: ☐
No: ☐

Note: unless otherwise agreed with the Agency, any non-permitted soils will be removed from site within 7-days (subject to additional testing and identification of a suitable landfill).

IN EMERGENCY CONTACT THE ENVIRONMENT AGENCY ON 0800 807060

SOP009	MATERIAL TRACKING SYSTEM (MTS) TREATMENT AND VERIFICATION PHASE (CONTAMINATED) VERIFICATION PHASE (INERT)	Hydrock

Site Location/ Project No.	
Date:	
Unique Identification Code (UIC):	
Total Volume of Material Accepted from Donor Site (single UIC):	

A Contaminated Material Treatment Phase

Record location of material on the Stockpile Location Plan

Commence treatment of material as required to achieve Target Values

Undertake validaiton testing in accordance with the agreed frequency*

Does the treated material meet the Target Values?	
Record date that Target Values achieved	

If material has been successfully validated proceed to place as fill and verify placement:

Record placement on the Fill Location Plan	
Record date of placement as Fill	

If material fails the validation criteria continue treatment until Target Values are met or remove material to a licensed facility**

B Inert Material Verification Phase

Stockpile inert material appropriately***

Record location of material on the Stockpile Location Plan	

Undertake validaiton testing in accordance with the agreed frequency*

Does the material meet the Inert Criteria?	

Record placement on the Fill Location Plan	
Record date as placement as Fill	

If material does not conform to inert criteria transfer material to Treatment Hub and commence treatment in accordance with HYD/MTL/009/A

SOP010 **MATERIAL TRACKING SYSTEM (MTS)**
REJECTED MATERIAL RECORD

Hydrock

Site Location/ Project No:	
Date:	
Unique Identification Code (UIC):	
Total Volume of Material Rejected:	
Reasons for rejection (e.g. targets not achieved):	
Landfill Details:	
Waste Carrier Details:	
EWC:	
SIC (if applicable):	
Duty of Care Ticket No:	
Weighbridge Ticket Confirmation:	
Consignment Note Confirmation (if applicable):	
Sign and Date Completed Form:	

Material Movements (Around Site)

Date	Material UIC	Dumper Loads	Moved From	Moved To	Moved or Excavated	Volume	
DD/MM/YY	BLOCK / STOCKPILE NAME	NUMBER	EXCAVATION / STOCKPILE ID	LOCATION / STOCKPILE ID	M or E	(m^3)	
04/06/2012	HY.SSA.IN	26	P1C	AREA 5	M	254.8	*Example
05/06/2012	HY.SSA.IN	28	P1C	AREA 5	M	274.4	*Example
06/06/2012	HY.SSA.IN	19	P1C	AREA 5	M	186.2	*Example
07/06/2012	HY.SSA.IN	12	P1C	AREA 5	M	117.6	*Example
15/06/2012	HY.SSB.IN	16	EXCAVATION	RS1	E	156.8	*Example
16/06/2012	HY.SSB.IN	18	EXCAVATION	RS1	E	176.4	*Example
17/06/2012	HY.SSB.IN	18	EXCAVATION	RS1	E	176.4	*Example
18/06/2012	HY.SSB.IN	20	EXCAVATION	RS2	E	196	*Example
19/06/2012	HY.SSB.IN	21	EXCAVATION	RS2	E	205.8	*Example
20/06/2012	HY.SSB.IN	10	EXCAVATION	RS2	E	98	*Example
20/06/2012	HY.SSB.IN	23	EXCAVATION	RS3	E	225.4	*Example

Appendix C

DISCOVERY STRATEGY

DISCOVERY STRATEGY- CONSTRUCTION PHASE

CONTAMINATED MATERIALS

MAIN SRFI SITE, MILTON MALSOR

DISPLAY AND AWARENESS

The Discovery Strategy must be placed on the Health & Safety Notice Board and/or displayed in a prominent area where all site staff are able to consult the document at any time.

Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the discovery strategy.

HOW TO IDENTIFY POTENTIAL CONTAMINATED MATERIAL

- Looks oily and has an oily odour.
- Solvent type of odour.
- Man-made materials in fill such as paint cans, car parts, glass fragments.
- Contains fragments of white asbestos sheeting, coal/coke clinker.
- Sand bags, and or/subsurface concrete structures.
- Asbestos cement/lagging.

(Examples only – This list is not exhaustive. If in any doubt ask the Site Manager)

PROCEDURE

If unexpected evidence of contamination is found the following procedures will be adhered, including:

1. All site works at the position of the suspected contamination should stop.
2. Site Personnel to inform the Site Manager/Agent.
3. Visual and olfactory observations of the condition of the ground and the extent of contamination should be made and notification will be given to Hydrock Consultants, who will inform the Local Authority within circa 24 hours after discovery. Should the contamination be likely to affect controlled waters the Environment Agency will also be informed.
4. In the presence of a suitably qualified geo-environmental engineer on behalf of the Consultant, investigation works will commence to recover samples for testing and, using visual and olfactory observations of the condition of the ground, delineate the area over which contaminated materials are present.
5. Should Hydrock deem it appropriate, the affected material may be excavated and placed in a stockpile on a suitable impermeable surface. This should be suitably quarantined with no addition to, or removal of, the stockpile while chemical analysis is being undertaken. Alternatively, the material should remain *in situ* until laboratory test results have been obtained.
6. A photographic recorded should also be made of relevant observations.

7. Hydrock will determine the testing suite based on visual and olfactory observations.
8. Test results will be compared against current assessment criteria suitable for the future use of the area of the site affected.
9. If after testing the ground is found to be contaminated, the Local Authority and NHBC will be informed. After consultation with the Local Authority, NHBC and if necessary the Environment Agency, materials should either be removed for disposal to a licensed waste management facility or remediated to agreed clean-up criteria.

UNEXPECTED TANKS

It is possible (but unlikely) that underground tanks, which have not been identified by the investigations to date, may be present. The following procedures are to be adhered to if tanks are identified:

1. All site works at the position of the tanks should stop.
2. A description of the tank should be made by Hydrock including; condition and surround, along with visual and olfactory observations should any contents in the tank be apparent. A photographic recorded should also be made of relevant observations.
3. The tank's position and depth should be determined and marked on a plan of the site.
4. Notification will be given to Hydrock Consultants who will inform the Local Authority within 24 hours.
5. During the presence of a suitably qualified geo-environmental engineer on behalf of the Consultant, investigation works should be undertaken to obtain samples of any liquid or sludge contents and to establish dimensions of the tank.
6. Testing will be determined based on visual and olfactory observations by Hydrock Consultants.
7. Test results will be compared against current assessment criteria and proposals for disposal of any contents determined in agreement with the appropriate Regulatory Parties.
8. Emptying the tank and disposal of contents to a suitable licenced disposal facility.
9. Once the tank has been emptied in accordance with the above proposals, it is to be removed for disposal to a licensed waste management facility. Copies of the relevant waste consignment notes are to be forwarded to Hydrock Consultants.
10. Excavation and remediation of any contaminated soils in accordance with Section 6.1.
11. Samples of the base and sides of the resultant hole will be sampled as per the Consultant's instructions and an assessment as to whether this may have been a source for groundwater contamination made.

A report will be prepared by Hydrock and submitted to the regulatory parties, the Local Authority and the Environment Agency where groundwater may potentially have been impacted.

Appendix D

GENERAL REQUIREMENTS

D.1 Compliance with Legislation and Standards

The works are to be undertaken in compliance with all relevant British Standards, codes of practice, regulations, guidance and legislation.

Whilst not an exhaustive list, works will be in compliance with the latest revision of all relevant legislation, HSE Guidelines and good working practice including, but not be limited to, the following:

- The Health and Safety at Work etc. Act 1974;
- Construction Health Safety and Welfare Regulations 1996;
- Health and Safety Executive 'Protection of Workers and the General Public during Redevelopment of Contaminated Land' HS (G) 66, HMSO 1991;
- The Construction, Design and Management Regulations 2015;
- The Control of Substances Hazardous to Health Regulations 2002 (COSHH Regulations);
- The Control of Asbestos Regulations, 2012; and
- BS6187:2011 'Code of Practice for Full and Partial Demolition'.

The Contractor is responsible for obtaining all necessary approvals, licences, consents and permits from regulatory bodies and third parties prior to commencement.

D.2 Licences, Permits and Consents

Before commencement of site activities, detailed planning of the project will be undertaken including liaison with the regulatory authority and will include issue of this report along with copies of previous environmental reports regarding the Site to the Local Authority for comment. Any conditions associated with planning permission will be addressed prior to carrying out the works. This includes conditions which are the responsibility of the Contractor.

It will be a requirement of the Contractor (to be appointed) to obtain any of the necessary permits and undertake the appropriate notifications and assessments. The Contractor should only expect approvals have been sought by others where explicitly provided to the Contractor or advised in writing.

If treatment of the soils is to be undertaken (e.g. bioremediation of unexpected contamination), it will need to be undertaken in accordance with an appropriate Environmental Permit.

Any reuse of soils will need to be undertaken in accordance with the 'Definition of Waste: Development Industry Code of Practice', Version 2, 2011 i.e. in accordance with an approved Materials Management Plan and Qualified Person Declaration.

D.3 Health and Safety Requirements

The Principal Contractor for each phase of the works must manage the risks in accordance with their legal requirements and all works are to be undertaken in compliance with all relevant regulations, guidance and legislation.

It will be necessary to submit a Construction Phase Plan (CPP) will be required to be submitted to the Principal Designer, the Client and the LPA in advance of mobilisation to site.

The CPP will be passed to the Site Manager who will implement all Health and Safety measures on site. The Site Manager will fully induct the Site Operatives prior to commencement of any works. The CPP will be kept as an open document and will be adapted as required to during the project. This will (as a minimum) include:

- welfare arrangements, storage and security;
- air monitoring requirements (and action levels);
- traffic management plan;
- segregation of working areas and site welfare (and decontamination units if required);
- site inductions, daily safety briefings and toolbox talks;
- activity specific risk assessments;
- method statement briefings;
- daily inspection records; and
- permits to work.

It will be necessary to excavate soils to allow development. As a matter of good practice, construction workers and services personnel will follow guidance stated in 'HSG 66 Protection of Workers and the General Public during Redevelopment of Contaminated Land' during development works where Made Ground soils are known or anticipated. Adequate standard personal protective equipment and the implementation of basic hygiene measures will be necessary.

In addition, safe working procedures will be implemented in accordance with CIRIA132, good standards of personal hygiene will be observed, and appropriate levels of PPE, and if necessary RPE, provided and utilised.

It should be noted that Asbestos Containing Materials and asbestos fibres have been encountered in the Made Ground during the investigation and appropriate control (in accordance with CAR2012) will be required in order to mitigate risks. Ground workers and sub-surface maintenance workers will be made aware of the possibility of encountering contaminants (including low concentrations of asbestos) within soils or groundwater at the site through ‘toolbox’ talks.

In summary, the following measures are suggested to provide a minimum level of protection:

- all ground workers will be issued with protective clothing (including high visibility clothing), hard hats, footwear and gloves, personnel instructed as to how it should be used;
- all personnel will wear hard hats, high visibility clothing and protective footwear at all times;
- it will be assumed that everyone on site complies with the health and safety plan;
- take reasonable steps to ensure that only authorised persons are allowed on site (or part thereof as the case may be);
- display, where they can be easily read, any notification that has been sent to the Health and Safety Executive;
- provide hand washing and boot cleaning facilities;
- no smoking except in designated areas;
- adopt good practices relating to personal hygiene;
- prepare method statements for construction operations as required;
- adopt appropriate mitigation to reduce the risks due to asbestos to as low as reasonably practical; and
- provide the Principal Designer with any other relevant information.

Before site operations are commenced, the necessary COSHH Assessments, Method Statements and Health and Safety Plans will be completed, approved to the Principal Designer's satisfaction and issued in accordance with the CDM Regulations.

The Health and Safety Plan will pay particular attention to the following hazards which may be encountered:

- potentially hazardous or contaminated materials used or encountered on site;
- deep excavations;
- the presence of elevated concentrations of ground gases and the potential risk of asphyxiation within confined spaces/excavations;
- contaminated groundwater (TPH and VOCs) in excavations and potential for vapour;
- working in the vicinity of existing underground or overhead services;
- working in confined spaces;
- working on, or in the vicinity of highways;
- working with materials which have the potential to contain asbestos and the risk of inhalation of asbestos fibres;
- manual handling;
- the potential for fire;

- working with electrical apparatus in the vicinity of mobile plant and the potential presence of water;
- poor lighting;
- the potential for falling/slipping/tripping and sustaining injury;
- the possibility for biological agents to be present, including, but not limited to: psittacosis, leptospirosis (Weill's disease), tetanus, legionella, human waste; and
- working in the vicinity of voids and openings.

The Contractor will take all necessary safety precautions throughout the ground treatment operations and will comply with the Health and Safety at Work Act 1974 or any subsequent re-enactment thereof.

The Contractor will submit for approval all necessary method statements to the Client prior to commencing the works.

The Contractor will provide details of emergency procedures. Emergency services will be informed of the site operations prior to commencement.

All statutory records to be kept in the site manager's office and these may include (not an exhaustive list and note not all may be required):

- ASB NNLW1 – Notification of non-licensed asbestos work if the work is deemed not be requiring a licence;
- appropriate licence with regards to CAR 1012 if the work is deemed to require a licence;
- HSE Notification F10;
- Pre-construction Information Pack;
- Construction Phase Health and Safety Plan;
- Method Statements and Risk Assessments;
- Environmental Permit deployment form and associated paperwork;
- Discharge Consents for disposal of groundwater (and allowance for treatment if required to meet the discharge consent);
- competence records (including asbestos awareness training and face-fit test records
- service records;
- plant and machinery maintenance records;
- Duty of Care paperwork.

In addition it is recommended that:

- the generation of dust is reduced as much as practical by the use of water;
- Asbestos Awareness training/briefing be given to all staff;
- background and ongoing air dust monitoring (to include asbestos) be undertaken to check for presence of asbestos fibres during the works;
- reassurance monitoring is undertaken to confirm that the mitigation measures with regards to asbestos are effective; and
- if licensed ACM is encountered, licensed asbestos contractors are employed to manage the licensed asbestos controlled areas, all other operatives involved in the operations must have appropriate training to satisfy the requirements of the Control of Asbestos Regulations 2012.

D.4 Site Establishment and Security

Prior to the commencement of any works, the contractor, in conjunction with the Client and the Consultant, will establish the boundaries of the site and working areas.

The Contractor will make adequate provision to secure the site boundary and prevent unauthorised access onto the site during the course of the works.

Prior to the commencement of any works, the contractor, will undertake a dilapidation survey of all adjacent features/construction including but not limited to boundary walls/ fences, adjacent footpath and road constructions etc. The survey will be agreed with the Client or their representative prior to commencing any work on site.

The Contractor will be responsible for all costs associated with rectification of damage to adjacent features/construction including but not limited to boundary walls/ fences, adjacent footpath and road constructions etc. resulting from the demolition works.

The Contractor is to provide surveying capability as set out in this document facilitate the above.

Prior to the completion of the works the Contractor is to discuss the continuation of the site security, including the fences, with the client and acceptable arrangements for continued security are to be agreed prior to the removal of the Contractor's security provision.

D.5 Traffic Safety and Management

The Contractor will comply in all respects with Chapter 8 of the Traffic Signs Manual for works on or affected the public highway and/or private roads forming the highway access to/from the site. The Enabling Works Contractor will obtain all necessary consents from the Local Highway Authority for works on the public highway.

On-site access and haul routes will be provided and maintained by the Enabling Works Contractor in such a manner so as not to endanger either the user, those working in the vicinity of such accesses/haul routes and or the Works.

Access to the site will be agreed with the Client prior to commencement.

Suitable precautions will be taken to prevent the spread of mud and debris on the public highways. Regular inspections of the public highway adjacent to the site will be carried out. If deemed necessary by the Contractor, the Client or the Consultant, the highway will be swept regularly to remove any mud, slurry or dust deposited by vehicles entering or departing the site. If the Consultant considers that significant amounts of any detritus have been deposited on the public highway then operations will be temporarily suspended until appropriate cleaning operations have been undertaken.

The Contractor is to co-operate with other Contractors if they are present during the works.

The proposed works will generate a number of vehicle movements associated with the removal of soils and delivery to site of materials. Consideration will be given to the route and the timing of these vehicle movements, to minimise risk and disturbance to sensitive locations (such as schools, residential areas).

Risks associated with the transport of soils that are potentially containing contaminated, such as dust emission, will be appropriately managed.

D.6 Welfare Facilities

Site cabins and welfare facilities will be established at a location to be agreed with the Client.

The Contractor is deemed to have made provision and arrangements for all temporary services associated with the welfare facilities.

The Contractor is to provide a separate office for the Consultants use.

D.7 Working Hours

Noisy operations i.e. the use of hydraulic breakers will be restricted to operating times as specified by the Client and by the planning permission. It is understood that these will be 8:30am to 5:30pm, or other hours agreed with the Local Authority, Monday to Friday and 9.00am to 1.0pm on Saturday. No working will take place on Sunday or Bank Holidays.

Prior to commencement the Contractor is to review the Planning Conditions and if necessary, make contact with the Local Authority to establish if any further restrictions apply.

D.8 Mobile Plant

Mobile plant will be operated by suitably trained and qualified operators experienced for each item of plant. When not in use all plant will be locked to prevent unauthorised operation.

All traffic entering or working on site v obey the site speed limit.

Fuelling of any plant will be undertaken in a designated area and all above ground fuel storage tanks will comply with the requirements of the Pollution Prevention Guidelines PPG2. Specifically, any storage tanks used will:

- be sited within an oil-tight secondary containment system such as an impermeable bund;
- the secondary containment must provide storage for at least 110% of the tanks' maximum capacity;
- be located within a secure area; and
- all taps and valves fitted with a lock and kept locked shut when not in use.

Maintenance of mobile plant will be undertaken in a designated area, unless absolutely necessary.

Waste oil, hydraulic fluid etc. will not be tipped directly or discharged on to site. Such materials will be stored separately, in a secure bunded area, for off-site disposal. Waste oil may be a special waste and disposal will be undertaken by a registered carrier in accordance with the Duty of Care Regulations.

A spill kit will be kept on site in an accessible place adjacent to the designated refuelling area.

D.9 Unexploded Ordnance

In general accordance with CIRIA report C681 (Stone *et al* 2009) a non-specialist UXO screening exercise indicates the site to be in an area where the available records of aerial bombing are interpreted as a low bomb risk.

The Contractor is to undertaken their own searches or investigations to satisfy themselves.

D.10 Surveying

The Contractor will provide full time surveying personnel and equipment to undertake the following activities and any other requirement for topographical information relating to the project that arises through the duration of the enabling works contract. The survey personnel and equipment will be capable of providing accurate levels and co-ordinates in relation to the national grid and topographical survey provided within one day of request.

The following key activities are covered by the requirements for surveying:

- confirmation of topographical survey on possession of the site, and setting out of the site boundary;
- confirmation of positions of existing services and site features;
- surveying the base and extent of all excavations and remaining obstructions (to be undertaken prior to backfilling);
- all setting out and levelling relating to delivery of the enabling works;
- the location of sub-structures removed;

- interim surveys to be undertaken during the infilling works to provide information on issues such as depth of excavation, progress of earthwork, quantities of materials etc.;
- the location and elevation of test samples and locations; and
- as built survey information.

A topographical survey of the site is provided in the Site Information. The Contractor is required to undertake all necessary topographical survey works to verify these levels before the commencement of the contract. Should the Contractor find any discrepancies on the drawings they are to refer the matter to the Client for verification before proceeding with the part of the works affected.

The Contractor will undertake a topographical survey following completion of the enablement works.

All topographical surveys will include levels at maximum 10m spacing and details of any features, changes in slope, structures, services and any other features of interest.

All of the above features will be surveyed for line and level at the site boundary and marked on a plan. Levels will be to Ordnance Datum and locations to National Grid. The survey will be calibrated against existing site surveys and benchmarks in the vicinity of the site.

D.11 Testing

The Contractor will be responsible for undertaking all testing necessary to satisfy the Consultant that the works have been carried out in accordance with, and comply with the specification.

All soils and chemical testing will be carried out by a UKAS and MCERTS accredited laboratory, with accreditation for the specific analysis, to the approval of the Consultant. The lowest level of detection will be used for all testing. The Contractor is to submit to the Consultant the proposed levels of detection for all proposed testing.

The Contractor is to make available on site at all times a file containing all test data (geo-environmental and geotechnical) received for inspection by the Client or Consultant or Named Representative (NR). The Contractor is to prepare a summary table for presentation with the contractors report detailing test results and associated status.

This summary table of the geo-environmental and geotechnical testing will be in Excel format and be updated and sent to the Consultant by 10:00am every Monday. This summary will include an up to date location plan, all samples taken, tests scheduled, laboratory results received and outstanding testing.

D.12 Offsite Disposal

Materials for offsite disposal will be sampled and analysed, by the Contractor, at rates sufficient to allow the material to be adequately categorised.

Material exported from site to landfill, or other appropriately licensed facility, will be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations, 1991 and where appropriate the Special Waste Regulations, 1996.

A transfer note will be completed, signed and retained by all parties involved. The transfer note will state the volume of waste, the nature of the material and statement to the chemical composition.

The waste transfer notes will be kept by the Contractor for a period of at least 2 years.

D.13 Contamination

Contractors will be made aware of the possibility of encountering contaminants within soils or groundwater at the site (including asbestos fibres) through 'toolbox' talks (also see Section E.15).

Safe working procedures will be implemented in accordance with CAR2012, CIRIA132 and good standards of personal hygiene will be observed and appropriate levels of PPE provided and utilised.

Eating, drinking and smoking will be strictly prohibited in the development site other than in designated mess areas.

D.14 The Control of Noise, Vibration and Dust Nuisance

The Contractor will comply with the recommendations for practical measures to reduce noise and vibration set out in BS5228-1:2009 and BS5228-2:2009 and with any specific Principal Contractor requirements.

The Contractor will take all reasonable measures to prevent dust nuisance from being generated by construction traffic, etc.

If necessary working methods will be altered in order to ensure that the level of noise generated from the works is within published tolerable limits.

The requirements of the LPA are to be sought and undertaken.

General

No fires will be permitted on site.

Dust Mitigation

Appropriate measures will be implemented at all times to minimise any dust emissions.

Any main temporary haul roads will, where practical to do so, be constructed of crushed hardcore products. The haul roads will be maintained for the duration of their use to minimise any build-up of loose spoil etc.

Traffic both entering and working on site will obey a maximum speed limit of 10 mph (unless otherwise agreed).

Mobile water bowsers and sprayers will be available on site at all times to water unpaved haul roads and working areas. The water spray may include chemical dust suppressants or wetting agents to improve dust control.

Wagons that are to be used for the haulage of any contaminated material from site will be appropriately sealed or sheeted to prevent the release of fugitive dust.

An adequate supply of water will be maintained on site at all times to allow for dust suppression activities to be carried out at short notice.

Where mobile water bowsers are no effective in suppressing dust then vapour masts will be used. Such vapour masts will be deployed at 20m centres on the downwind side of haul roads or excavations giving rise to significant dust or emissions of odour.

Air quality and dust monitoring stations will be set up and monitored by the Contractor to record the dust concentrations during the works.

With regards to stockpiles:

- stockpiles will be placed on a suitable polythene membrane to prevent any cross contamination and care will be taken not to pierce the sheeting when placing the bulky elements of the material;
- stockpiles will be dampened down or covered to prevent dust, whilst the final choice will be made by the Contractor based on site constraints, but the options include covering with plastic/polythene membrane, or by a layer of clean soil material;
- plant will be appropriately loaded to prevent spillages;
- stockpiles will be kept to a minimum to reduce ‘wind whip’ causing potentially hazardous material to be blown from the pile;
- the drop distance from excavator bucket to stockpile/process plant will be kept as short as reasonably practicable to reduce dust;
- appropriate signage will be displayed so that site workers/visitors are alerted to the potential hazards associated with the material to be stored on site, and
- roadways within the site will be kept moist by spraying from a water bowser.

Odour

Excavation works may give rise to significant odour problems (VOCs and TPH contamination) and the Contractor is to have made appropriate allowances for suitable odour control. Any odorous

materials will be covered at the end of each working day and any stockpiles will be located away from any sensitive areas.

Plant and machinery will be serviced regularly to ensure that exhaust fumes are compliant with best practice and relevant regulations.

Noise

The requirements of the Local Planning Authority and BS 5228: 1997 'Noise and vibration control on construction sites' will be adhered to at all times.

All machinery will be fitted with effective silencers and will be serviced at regular intervals. No items of plant will be operated with engine covers raised.

The location of any crushing plant will take into consideration the location of neighbouring properties and other noise sensitive receptors and will be located away from these areas and located adjacent to proposed stockpile locations where possible.

D.15 Asbestos in Soils

Asbestos, including loose fibres, fibres in bitumen and in insulation are present with in the Made Ground.

The Principal Contractor must manage the risks in accordance with their legal requirements and will need to prepare appropriate health and safety documentation and obtain appropriate approvals, licences, consents and permits prior to commencement.

The works are to be undertaken by the Principal Contractor who will co-operate with Hydrock with regards to Materials Management at the site.

The remediation works are designed to break the source-pathway-receptor linkage with regards to contaminants within the soil. Whilst appropriate measures are required for all contaminants present, the Contractor will note the additional details provided below with regards to asbestos in the soils:

- Asbestos is a hazard to Human Health when airborne fibres are inhaled. Asbestos containing material (ACM) that is in a bound form (such as asbestos cement tiles) is not hazardous where the asbestos fibres cannot become airborne. However, if lagging is present or the ACM is broken or crumbled in a dry condition the asbestos fibres could become airborne and could then be inhaled. When soil with asbestos is covered by hardstanding, buildings or a cover of clean soil or when the soil is kept damp, the asbestos fibres are less likely to become airborne and the risk is greatly reduced.
- The Health and Safety at Work Act 1974 forms the basis of health and safety legislation in in the UK. In addition, the Control of Asbestos Regulations 2012 (CAR 2012) applies throughout the UK. CAR 2012 applies if land has significant asbestos content and is relevant to any work conducted on asbestos contaminated land.

- CAR 2012 defines a 'control limit' of 0.1 fibres per cubic centimetre of air averaged over a continuous period of 4 hours. This limit is not risk based and may be much higher than the levels for control of environmental pollution.
- CAR 2012 applies even where exposure to asbestos of employees is sporadic and of low intensity and where exposure to asbestos of any employee will not exceed the control limit. In addition, the work must be of short non-continuous activities where non-friable materials are handled, or removal without deterioration of non-degraded materials in which asbestos fibres are firmly linked in a matrix.
- Lagging, broken fragments of asbestos and loose fibres have the potential to release airborne fibres in dry conditions. In addition, as the ACM and asbestos fibres have been contained in the soil for many years, the likelihood is that they would be degraded to some extent. However, the asbestos fibres detected at the site are within a soil matrix and if this is kept damp, this should assist in minimising the risk of the release of airborne fibres.
- Given the above factors, it is possible that the works being undertaken would not be exempt from CAR 2012 licensing requirements. Therefore, until proven otherwise, Hydrock considers that the Contractor will treat the work involving handling of the soils as licensed work as defined in CAR 2012.
- It should be noted that information presented in this document is provided to assist in managing the soil at the site which contains asbestos. Hydrock cannot be held responsible for how the control measures associated with these risks are implemented and recommend that an appropriate asbestos specialist assist with both the preparation of documents and licences and site supervision.

Task specific risk assessments and method statements will be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and if required RPE will be provided and utilised.

Visible fragments of suspected asbestos containing materials on the site surface will be handpicked. If hand picking is being undertaken, ACM will be placed in a dedicated covered and lockable skip pending off-site disposal to a suitably licensed facility. Such remediation measures will be undertaken by suitably qualified contractors and in accordance with CAR 2012.

As hand picking is being undertaken, in addition to the controls required under CAR 2012, there may be a requirement to deploy an Environmental Permit. The Contractor is to form their own opinion and either: deploy a permit; or in accordance with the Environment Agencies 'Remediation Position Statements', dated 7/11/2010, notify the Environment Agency of the activity a minimum of 5 days before start. The EA may then request deployment of a MPP.

ACM will be placed in a dedicated covered and lockable skip pending off-site disposal to a suitably licensed facility. Such remediation measures will be undertaken by suitably qualified contractors and in accordance with CAR 2012.

D.16 Water Quality Controls

The Contractor will provide for such measures as may be necessary to ensure that water, whether groundwater, from precipitation or any other source, does not accumulate in excavations or on sub-grades.

Adequate drainage sumps will be installed during works and cut off trenches/dewatering measures will be used as required to manage surface water run-off, to prevent any water from entering watercourses, either directly as surface water run-off, or indirectly via the surface water drainage systems.

The contractor will obtain all licences or consents required to discharge water from the site and operate under the terms of those licences or consents.

Any free phase hydrocarbons encountered during excavations will be removed from the surface of the groundwater and treated or disposed of according to current legislation;

Treatment of all water encountered during excavation to a suitable concentration to allow discharge under licence. The Contractor is to assume a suitable discharge point is available on site. Whilst no specific groundwater remediation is proposed, any water encountered within excavations (during all phases of the works) will need to be pumped and treated prior to discharge under licence.

Any water pumped from excavations is likely to need to be passed via settlement tanks before being discharged to the sewer or surface drainage.

If materials escape, appropriate the Contractor is to undertake (at their cost) appropriate remedial action as soon as possible.

D.17 Services

Service records are to be provided by the Client for information purposes within the enabling works documentation. However, the Contractor will be responsible for liaison with the statutory service providers to ensure all service records are current and correct. The Contractor is also responsible for the safe disconnection of existing services entering the site, except those which are to remain operational.

Prior to site work commencing, the position of all services indicated as on site or off site but close to the site boundary will be determined and clearly identified where on site. The locations will be confirmed on site by appropriate investigation, observations and survey. Any discrepancies between the anticipated positions and confirmed locations are to be reported to the Client.

All retained manholes will be located and clearly identified on site to prevent damage. The location, depth, diameter and invert level of each manhole and the size and depth of all stream connections will be recorded. Where drains or sewers are to be grubbed up the downstream ends will be plugged prior to commencement to prevent offsite systems becoming blocked or contaminated.

Where existing drains or sewers are to remain, CCTV surveys are to be provided by the Contractor. These surveys must be undertaken on commencement prior to any physical work and on completion to demonstrate no damage has occurred.

Where damage has occurred, any remedial work must be agreed with the Client and relevant authority/owner prior to repairs commencing. The repair costs will be borne by the Contractor.

All services on site that are to be retained through the works are to be positively located on site, reliance will not be placed on existing records. Services are to be visibly marked and protected for the duration of the works. Appropriate methods are to be put in place to ensure all site staff working in the vicinity of retained services are fully briefed.

The Contractor is responsible for ensuring that all hydrant covers, stop tap boxes, manhole covers and the like, are raised or lowered to suit the finished levels associated with the proposed enabling works plateau and future construction thicknesses.

Following the completion of the works, a survey plan of the location of terminated services will be provided.

D.18 Damage to Property

All works are to be undertaken in accordance with the Party Wall etc. Act 1996.

The Contractor will ensure that all precautions are taken in order to avoid any damage to existing property arising from the Works and will be responsible for same in the event that any damage should arise from his failure to exercise due care.

Any adjacent structures, services and the like will be inspected prior to commencement of the Works for evidence of existing defects and, if necessary, a dilapidation survey will be carried out by the contractor, with the agreement of the Client, prior to works commencing on site. A re-inspection will take place on completion of the Contract to verify that no damage or deterioration of the said structure, service or apparatus has occurred as a result of the Works. A schedule of the findings of this re-inspection will be circulated to all parties concerned for their records.

The Contractor will execute the works with care so as to avoid damage to existing structures and drains or other services to be retained.

All fences, trees, paths, shrubs, grassed areas and other surfaces required to be retained will be protected by the Contractor from spillage and damage caused by site operations and upon completion of the works they will be handed over in an undamaged and proper state to the satisfaction of the Client.

Refer to landscape architect drawings and specifications that define the areas that require protection. The Contractor will not raise or lower the ground level beneath the spread of the branches of any tree to be retained without the approval of the Client.

D.19 Drawings and Supplied Information

Whilst efforts has been made to ensure that the information provided to the Contractor is correct and current, the Contractor is responsible for corroborating the existing information with the benefit of their site presence and to report any discrepancies encountered or anticipated to the Client immediately.

Where cutting and filling operations are to be carried out the Contractor is to undertake comparative assessments with the benefit of existing information, additional survey and their anticipated sequence of work to ensure sufficient and suitable material is available to undertake the works as proposed. Any anticipated shortfall or surplus will be report immediately.

D.20 Photographs

A detailed dilapidation survey will be undertaken of the site and adjacent properties including joint site boundaries, in conjunction with adjacent land owners. Such survey will include roads, footpaths, street lighting and road signs. A copy of the survey, including record photographs will be provided to the Client within seven days of commencement of site works.

The Contractor is to provide on-site a digital camera and e-mail facilities to enable electronic transfer of site photographs and other information for the full duration of the contract.

Progress photographs are to be taken at least weekly across all parts of the site for inclusion within the Contractor's report. Photographs are to be made available to the Consultant and the Client in electronic format should they be requested during the contract. Record photographs will be provided as part of the validation information.

Appendix F

REMEDIATION OPTIONS APPRAISAL

F.1 Introduction

This Options Appraisal has been undertaken in general accordance with Chapter 3 (Options Appraisal) of CLR11 (Model Procedures for Management of Land Contamination), DEFRA, 2004. There are four main stages to this appraisal:

1. Identifying Key Risk Drivers.
2. Identifying feasible remediation options for each relevant pollutant linkage.
3. Carrying out a detailed evaluation of feasible remediation options to identify the most appropriate option for any particular linkage.
4. Producing a remediation strategy that addresses all relevant pollutant linkages, where appropriate by combining remediation options.

F.2 Key Risk Drivers for Remedial Action

Hydrock Reports R/151171/001/Issue 8 and R/151171/002/Issue 4 have identified that the key risk drivers with regards to the requirement for remediation are:

- the presence of asbestos in Made Ground soils;
- the presence of petroleum hydrocarbons in soils;
- the presence of asbestos, PAH and petroleum hydrocarbons with regards to services; and
- the presence of radon.

The following sections of this report are intended to identify remedial techniques which can be applied in order to achieve a site which is suitable for the proposed residential development.

It should be noted that with regards to potable water pipelines and ground gas risks, these are not discussed in the Remediation Options Assessment as they are mitigated by prescriptive measures identified by British Standards and good practice.

F.3 Remediation Options and Evaluation of Feasibility

F.3.1 Preliminary Assessment of Remediation Options

Investigation and risk assessment have concluded that the site will require remediation in order to mitigate the risk to the identified receptors. The objectives of the remediation are to sever the link(s) between one or more elements of each of the *source-pathway-receptor* linkages.

The initial screening process considers the available remedial techniques based on the following key criteria:

- Effectiveness. The strategy must work within the context of the site and be effective in the removal of contamination linkages.
- Practicality. The strategy has to have been successfully used in similar situations on other sites and readily available within the UK market. Novel solutions or those still in the research stage are not considered here.

- Durability. The strategy needs to be durable and not reliant on ongoing maintenance to continue being effective.
- Relative Cost. The strategy must not be excessively costly.
- Relative Operational Time: The strategy should work in a feasible and realistic time scale.
- Sustainability. More sustainable options are preferred.

Table F.1 below summarises all of the accepted remedial techniques readily available in the UK and assess each against the six key parameters listed above.

In the first instance, the feasibility of each of the listed remedial option is assessed in terms of effectiveness at treating the contamination, which is broken down into; effective (Y), partially effective (P) or ineffective (N).

The listed techniques are then assessed in terms of relative cost ranging from negligible cost (£) through moderately expensive (££) to prohibitively expensive (£££+).

Timescale over which the remediation technique is operational has been broadly assessed in units of weeks, months, years and decades. If for example a given technique is only effective over a period in the order of years to decades then its overall feasibility is diminished.

Table F.1: Applicability of Remediation Options and Initial Assessment – Soils

Remedial Activity	Effective on			Relative Cost	Relative Operational Time	Comments (Practicality/Sustainability/Durability)	Feasibility (Y- Yes, N – No)
	Asbestos	PAH	TPH				
Cover System	Y	Y	N	£	Weeks	Will prevent contact between future site users and deeper soils and break the S-P-R linkage.	Whilst a possibility if the Made ground soils were to remain *in-situ*. It is proposed to excavate and manage Made ground. As such, a cover system is not proposed.
Excavation and Disposal (may also involve pre-treatment by screening and sorting).	Y	Y	Y	£££+	Weeks	May remove the source of the contamination, but asbestos fibres in soils would be likely to be released. Excavation and disposal is not considered sustainable. However, dependent upon other factors may be unavoidable. Disposal to be minimised as much as possible by reuse of appropriate soils.	Y – But disposal is not considered necessary for the majority of soils. It may be a requirement to dispose of small amounts of ACM.
Excavation, Processing and Materials management at Depth	Y	Y	N	££	Weeks	Processing alone will not remove asbestos, but it will reduce the asbestos concentrations and remove the majority of ACM. It may reduce CoPC concentrations (via aeration during movement), but not completely. Excavation and processing may be required from a geotechnical perspective. Would need to be undertaken in association with MMP.	Y – Carried forward.
Bio-piles	N	N	Y	££	Months	Will effectively reduce CoPC concentrations. However, will not remove asbestos.	Y – Likely to be required in conjunction with other technologies.
Windrow Turning with addition of additives to stimulating aerobic microbial activity	N	N	Y	££	Weeks to Months		
Soil Washing	N	Y	Y	£££+	Months	Treat process streams (water, sediment) and route to appropriate off-site disposal, as required. Will potentially result in a significant proportion of soils which are geotechnically unsuitable without extensive treatment.	N – Due to the creation of geotechnically unsuitable soils, which would require disposal.
Hydraulic Binders	N	Y	Y	££	Weeks to Months	Mixing of additives into soils to bind contamination thereby minimising migration from soil to vapour and dissolved phases. Additives may include binding agents for organics and cementitious materials.	N – discounted due to the risk of heave.

Previous site experience, technical literature and Hydrock's in house knowledge have been used to reject unsuitable remediation options. The primary reasons for rejection of an option were generally the ongoing operational constraints, the cost and the inability to treat all the required contaminants present. In some instances there may be a number of treatment options identified with the best practicable option unable to be determined at this stage. In these instances all potential remedial options are carried forward.

F.3.2 Viable Remedial Options

As described above, certain technologies were rejected on the basis of ineffectiveness, excessive cost, sustainability, or those which are required to operate in timescales of years or greater. The short-list of options presented below represents those technologies which were not rejected at the pre-screening process and as such, are taken forward to the options appraisal process:

- Materials management (excavation, screening out of the fines, reprocessing and reuse of suitable materials).
- Processing of asbestos contaminated soils for reuse (hand picking visible ACM if encountered).
- Excavation of any petroleum hydrocarbon impacted soils and bio-remediation.
- Reuse of excavated material which are proven suitable for use.
- Disposal of handpicked ACM.

Materials Management (Excavation, Processing and Reuse of Suitable Materials)

As the exercise is predominantly an earthworks exercise, the timescales are relatively quick allowing for rapid completion of the remediation objectives and this remediation solution could be designed and implemented within a matter of months.

If ACM is encountered hand picking of ACM may be undertaken, a Mobile Treatment Licence (MTL) may be required.

Hydrock believes that soils containing asbestos fibres do not need to be disposed of off site, and can remain on site at depth provided that:

- all visible ACM is handpicked, if encountered and disposed of off site;
- they are handled in accordance with a MMP signed off by an appropriate Qualified Person;
- they are geotechnically suitable for use;
- a cover system is placed over them;
- all service trenches are over-excavated and backfilled with clean fill;
- soils containing asbestos fibres are handled using appropriate task specific risk assessments and method statements with appropriate PPE and if required RPE provided and utilised;
- all works are undertaken in accordance with an Environmental Permit by suitably qualified Contractors and in accordance with CAR 2012; and

- appropriate monitoring is in place to verify the works do not create a risk to site workers or neighbours.

Pre-treatment

Prior to any of the above *ex situ* remediation techniques being undertaken, pre-treatment of soils will be required. As a minimum, this will include the removal of larger constituents from the soil matrix by mechanical screening.

If appropriate, screened oversize materials will be crushed to manufacture a secondary aggregate. Subject to meeting acceptability criteria this will be used on site as fill material.

Excavation and Ex Situ Treatment of CoPC Impacted Soils

Any CoPC impacted soils failing the RTVs will be excavated and either treated to make them suitable for use (bioremediation, stabilisation or oxidation), or disposed of off-site.

Bioremediation

Bioremediation is typically utilised for soil and groundwater remediation primarily impacted with VOCs and petroleum hydrocarbons. Whilst it is accepted that in some instances less degradable species are not suitable for bioremediation, given the presence of VOCs and low end carbon chain petroleum hydrocarbons, bioremediation should be very effective for these site conditions. The benefits of this option are:

- parameters can be monitored during the works, to ensure maximum efficiency of the bio pile;
- bioremediation and then reuse of suitable materials on site could be undertaken within the programme;
- it is consistent with the principles of the Landfill Directive i.e. a reduction in the quantity of materials sent for landfill disposal;
- it will reduce haulage wagon movements to a minimum; and
- soil stabilisation/solidification and bioremediation are tried and tested techniques.

Whilst an Environmental Permit will be required, Hydrock do not see any significant disadvantages with regards to the use of *ex situ* treatment to treat hotspot contamination at the site.

Disposal

Disposal involves the removal of contaminant material from site and disposal at an appropriately licensed waste management facility.

The advantages with regards to excavation and disposal are:

- it represents a relatively rapid remediation strategy; and
- provides a high degree of certainty in the suitability of the site for its intended end use.

The main disadvantages with full Excavation and Disposal are:

- cost of disposal, especially as the majority of the soils would be suitable for use as general fill below the cover system; and
- does not represent a sustainable remediation strategy as significant vehicle movement will be required to and from the site and the contamination is not destroyed but simply relocated to a waste management facility, thus taking up valuable landfill space.

Hydrock does not believe that full disposal of all impacted soils is applicable at the site. However, partial disposal may be required and this option is considered viable if used in conjunction with other techniques.

Appendix G

GAS MEMBRANE VALIDATION

Appendix H

ROLES AND RESPONSIBILITIES

WORK ACTIVITY	RESPONSIBILITY
Pre- Contract	
Remediation Method Statement	Hydrock Consultants
Regulatory discussion and agreement	Hydrock Consultants
Geotechnical Design/Earthworks Specification	Hydrock Consultants
Demolition Specification	Project Manager
Agreement and discussion with the Contractor as to remediation works and measures proposed.	Hydrock Consultants
Pre- Commencement	
H&S Risk assessments and working methods regards soils containing asbestos. Asbestos is present in the soils and all appropriate measures will need to be undertaken by the Contractors with regards to CAR 2012. Working Methods and proposed monitoring to be provided to Hydrock for comment.	Enablement Contractor Groundworks Contractor
H&S Risk assessments and working methods regards soils and groundwater containing elevated petroleum hydrocarbons and VOCs. Proposed methods to be provided to Hydrock for comment.	Enablement Contractor Groundworks Contractor
Materials Management Plan and Qualified Person sign off. MMP to be provided to Hydrock for comment.	Enablement Contractor Groundworks Contractor
Groundwater disposal licence/permit for water pumped from the site for Remediation Works.	Enablement Contractor Groundworks Contractor
Design of the radon barrier.	Structural Engineer as part of the structural design.
Demolition to Slab Level	
Demolition of the current buildings in accordance with a suitable specification, including all licences/permits/monitoring etc.	Enablement Contractor
Crushing and screening of demolition arisings in accordance with the Specification.	Enablement Contractor
Testing of stockpiles in accordance with the Specification	Enablement Contractor
Disposal of unsuitable material	Enablement Contractor
Demolition – Watching Brief:	Hydrock Consultants
Slab removal and Enablement Remediation	
Topsoil strip, testing and stockpiling.	Enablement Contractor
Additional visual investigation as the slab is lifted, with any additional plausible source-pathway receptor linkages identified (hotspots/tanks/drainage runs etc) to be added to the remedial requirements.	Enablement Contractor With watching brief by Hydrock Consultants.
Testing of liquids in tanks etc and disposal of liquids to a suitable waste management facility.	Enablement Contractor
Crushing and screening of slab removal and below ground obstruction arisings in accordance with the Specification.	Enablement Contractor

WORK ACTIVITY	RESPONSIBILITY
Controlled excavation of obstructions tanks, drainage runs etc;	Enablement Contractor
Hotspot excavation to remove any suspected soils under supervision of environmental engineer.	Enablement Contractor
Watching brief during hotspot excavation	Hydrock Consultants
Sampling and testing of hotspot excavations to prove no contaminated soils remain.	Remediation Enablement Contractor
*R*emediation to allow reuse on site (including all testing).	Enablement Contractor
Backfilling of remediation excavations (as agreed with the Groundworks Contractor and Principal Contractor)	Enablement Contractor
Testing of stockpiles in accordance with the RMS and the Specification	Enablement Contractor
Disposal of unsuitable material	Enablement Contractor
Provision of an Enablement Remediation Validation report.	Enablement Contractor
Verification Report for the Enablement Remediation works.	Hydrock Consultants
Bulk Excavation/Improvement	
Ground improvement (as required), excavation, segregation, screening and processing of soils as required in accordance with the Specification and the RMS.	Enablement Contractor
Pumping of groundwater via suitable temporary treatment system and silt settlement system and discharge under permit of licence (including all testing).	Groundworks Contractor
Watching brief during bulk excavation	Hydrock Consultants (part time)
Testing of earthworks to prove placement in accordance with the Specification and provision of a Geotechnical Validation Report	Enablement Contractor
Provision of a Validation Report detailing the remediation works undertaken during slab removal and Enablement Remediation and bulk excavation/improvement.	Enablement Contractor
Verification Report and Geotechnical Feedback Report detailing the ground improvement, earthworks and remediation works undertaken during bulk excavation/improvement.	Hydrock
Construction works	
Pumping of groundwater via suitable temporary treatment system and silt settlement system and discharge under permit or licence (including all testing).	Groundworks Contractor
Installation of Protectaline and over-excavation of service runs and replacement with clean stone, with provision of photographic proof of delivery and installation (If required).	Groundworks Contractor
Installation of radon barrier (NVQ Qualified(	Groundworks Contractor
Verification of the gas protection measures	Hydrock Consultants
Placement of a 450mm in areas of landscaping;	Groundworks Contractor
Provision of all validation data / requirements as per the RMS	Groundworks Contractor