John Newton and Partners
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Consulting Engineers

Title:	**Initial Phase 1 Desk Top Study:** **Hoyle Ing Dyeworks** **Hoyle Ing** **Linthwaite** **Huddersfield** **HD7 5QS**
For:	**James Dyson Directors' Pension Scheme**
Prepared by:	**Sarah Tang MEng (Hons)** **Engineer**
Date:	**30th March 2011**
Ref:	**NG7621/HOY/st**

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Date: 30th March 2011

Jim Westhead
Robert Halstead
Branch Road Bowers Mill
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Dear Sirs

Re: Initial Phase 1 Desk Top Study on the PP23 Requirements for: site at Hoyle Ing Dyeworks, Hoyle Ing, Linthwaite, Huddersfield, HD7 5QS

1. INTRODUCTION

The site is an existing vacant dyeworks at Hoyle Ing, Linthwaite. The site is some three miles south west of Huddersfield city centre and is intersected by Manchester Road, the A62. On the south side of Manchester Road is a collection of vacant buildings, including a dyehouse, boilerhouse and offices. The northern side of the site is occupied by a water treatment and effluent balancing tanks associated with the dyehouse, located on the road side. The northern side of the site is bordered by Colne River to the north and Manchester Road to the south. The River Colne runs from south west to north east. Both sides of the site are connected by a service tunnel that runs beneath Manchester Road.

The dyeworks has been operational from the early 1890s up until January 2009 and was used to dye wools and loose fibres.

It is proposed that two of the existing buildings south of Manchester Road are retained and converted for residential use. The remainder of the buildings are to be demolished and new residential structures with associated gardens constructed in their place. On the northern side of Manchester Road, the water treatment and effluent balancing tanks are to be demolished and replaced by residential dwellings.

1.1 Sources of Information

Information on the above site has been obtained from a full Envirocheck Report centred on the site, examination of all the currently available historic maps of the site, examination of the 1:50,000 geological survey map of the area, Mining Report and a walkover survey. A type 3 asbestos report has been carried out on the site as well as a report carried out in 2002, in support of the Integrated Pollution Prevention Control (IPPC) application.

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2. THE SITE

2.1 Present Land Use/Walk Over Survey/Trees

A walkover survey was carried out on the 17th January 2011, on a dry day when temperatures were mild. We were given a tour of the site by the Client. Both sides of the site are accessed off Manchester Road, the A62.

The site can be divided into three areas, shown in figure 1 below.

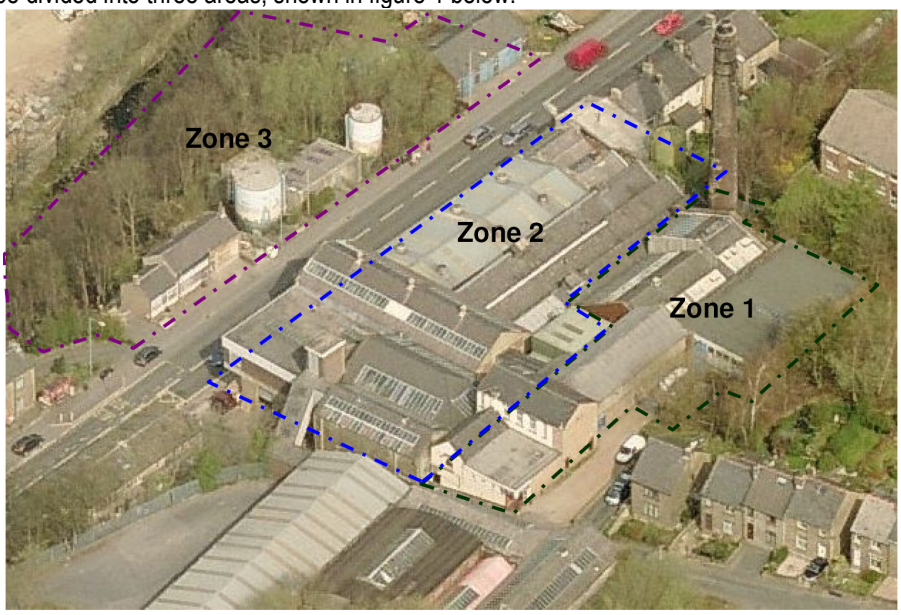

Figure 1: Birds eye view of site showing zones

Southern section of site: The site is fully occupied by the vacant dyeworks buildings, a collection of single and two storey masonry buildings housing redundant machinery. The site slopes significantly from the south eastern boundary of the site down to Manchester Road. Due to the topography of the surrounding area, the south eastern third of the site (zone 1) is elevated from the section of site that borders Manchester Road (zone 2). The south eastern wall of zone 2 is a masonry retaining wall and vegetation was seen growing on the wall Zone 1 was used for drying wool/fibres in dryer machines and an engineers' workshop. Zone 2 was used for the wet processes associated with the colouration and chemical finishing of the loose fibres. A 4"-6" borehole (now capped off) is also located in zone 2, used to extract water from the ground water below and used in the wet processes of dying. A boiler is located in the building in the northern corner of zone 2. Offices are located on the first floor of the two storey buildings in zone 2.

Northern section of site (zone 3): This area contains a dental practice, a vacant brick building and the former water treatment and effluent balancing tanks associated with the dyehouse, fronts onto Manchester Road. The treatment/balancing tanks are above ground structures. The ground slopes significantly from Manchester Road, down to the River Colne. Large trees are located to the rear of the structures, on the embankment.

3. SITE HISTORY

Examination of the published Ordnance Survey maps of the area revealed the following:

Map		Features	
Year	**Scale**	**On Site**	**Off Site**
1854	1:10,560	The southern section of the site is a field. The northern section of the site is a field with what appears to be vegetation along the northern end of the site; which borders the River Colne. The two sections of the site are intersected by Manchester Road.	A mill with associated mill pond lies on the opposite side of the River Colne, some 10m north west of the site. 200m north west lies Low West Wood woollen mill, with associated pond and tenters field. There are sandstone quarries 180m south west, 260m south east and 350m north east of the site. There is a large sandstone quarry 750m east of the site. The London and North Western Railway line runs north east to south west, 300m north west of the site. Running parallel to the railway line is the Huddersfield Canal, some 180m north west of the site.
1892	1:2,500	Southern section: Hoyle Ing Dye Works is situated on the site. A tank is shown centrally on site. Three terrace houses are shown in the western corner of the site. A terrace house, part of three terrace houses is shown in the northern corner of the site. A rectangular shaped building is shown bordering Manchester Road Northern section: Trees are shown to the northern end of the site, on the bank of the River Colne. Three terraced houses border Manchester Road. The remainder of the site is divided into small fields.	Terrace housing lines Manchester Road to the north of the site. Royd house brick works lies 10m south of the site, on the opposite side of Royd House Lane. The mill on the opposite side of the River Colne is noted as 'Beaufort (woollen) Mill' and three small tanks are shown on the bank of the river. The sandstone quarry shown 180m south on the 1854 map has now expanded and is now 70m south of the site. Spring Grove Mill is shown 250m south west of the site.
1894	1:10,560	No change	The sandstone quarries noted on the 1854 map have expanded.
1906	1:2,500	No change	No significant changes

Map		Features	
Year	**Scale**	**On Site**	**Off Site**
1908	1:10,560	Southern section: No change Northern Section: A structure is shown along Manchester Road, to the south of the terraced houses.	No significant changes
1918	1:2,500	Southern section: No change Northern Section: The structure shown along Manchester Road, and is thought to be a pair of semi-detached houses. Along the north eastern boundary is a small quarry feature 10m long x 5m wide, partially on the site.	Beaufort (woollen) Mill, located on the opposite side of the River Colne is now noted as 'Spinning Mill' and two new large buildings are shown on the site. A residential street – Royds Avenue is located parallel with Manchester Road, to the north of the site.
1930	1:10,560	Southern section: There is a rectangular structure in the southern corner of the site, noted as 'Club' Northern Section: There is now a structure shown in the location of the small quarry feature shown on the 1918 map.	The sandstone quarry to the south (shown 70m from the site on the 1982 map) is now partially filled (northern end filled).
1938	1:10,560	No change	No significant changes
1948	1:10,560	No change	No significant changes
1956	1:10,560	No change	No significant changes
1963-1968	1:2,500	Southern section: A rectangular structure is shown between the tank and the main dyeworks building, to the southern end of the site. A tank is shown to the north eastern boundary, next to the chimney. Northern Section: The trees along the bank of the River Colne are now not shown and the area is shown as ground sloping towards the river.	The quarry to the south is now disused and is now noted as 'Royd House Tip' and is on the opposite side of Hoyle Ing/Royd House Lane. A street of residential houses are shown to the southern boundary of the tip. Spinning mill, located on the opposite side of the River Colne is now noted as 'Lowestwood Mills'
1966-1969	1:10,560	Not shown on map	Quarries to the east of the site have been partially filled. Colne Valley High School is 450m south east of the site.

Map		Features	
Year	**Scale**	**On Site**	**Off Site**
1968-1978	1:2,500	Southern section: The three terraced houses in the western corner of the site are now not shown and have been replaced by an extension of the main dyeworks building. The main dye works building has been extended to the south eastern boundary. The tank next to the chimney is now not shown. Northern Section: Extension or an additional house has been added to the semi detached houses	The brickworks first shown on the 1892 map (10m south of the site) has had a long extension to the south of the main building.
1985	1:2,500	No change	No significant changes
1977-1992	1:2,500	Southern section: There is circular feature – possibly a chimney or tank to the north eastern boundary of the site. The end terrace in the northern corner of the site is now not shown and has been replaced by an extension to the dyeworks building. Northern Section: The three terraced houses shown on the 1892 map have now been replaced by two circular tanks with a rectangular structure between – thought to be the dyework's water treatment and effluent plant.	There is a rectangular tank shown on the north eastern border of the site. Royd House Tip (on the opposite side of Hoyle Ing/Royd House Lane – on the 1963-1968 map) is now not noted and the area is covered in trees. The brickworks is now noted as a business park. Lowestwood mill, located on the opposite side of the River Colne is now noted as 'Titanic Mills' Spring Grove Mills 250m south west of the site is now noted as Colne Valley Business Park.
1980-1987	1:10,000	No change	Quarries to the east of the site are now not shown.

Map		Features	
Year	**Scale**	**On Site**	**Off Site**
1993	1:2,500	No change	No significant changes
1994-1996	1:2,500	No change	Residential development on the tip to the south of the site.
1996	1:2,500	No change	No significant changes
2000	1:10,000	No change	Residential expansion of Linthwaite
2006	1:10,000	No change	No significant changes
2010	1:10,000	No change	No significant changes

Table 1: Historic Map Study

From the historic map study, Hoyle Ing dyeworks (with associated tanks and chimney) and terraced houses have been situated on the southern section of the site sometime before 1892, prior to which it had been a field. Sometime before 1930, a club house was located on site and remains today. Some time between 1966 and 1978, the terraced houses were demolished and the dye works were extended. There have been minor additions/alterations to the dye works post 1978.

On the northern section of the site, a row of three terraced houses were constructed, sometime before 1892, prior to which it was a field with trees to the northern end. A pair of semi-detached houses were constructed on the site sometime before 1918 and remain today. A small quarry feature (10m long x 5m wide) was noted on the 1918 map, on the north eastern boundary of the site. In 1930 this quarry had a structure built over it. Due to the size and age of the quarry, this is of insignificant risk to the proposed development, in terms of gas and contamination. Sometime between 1977 and 1992, the row of terraced houses were replaced by two circular tanks with a rectangular structure between – thought to be the dyework's water treatment and effluent plant which remain today.

The site is encompassed by industry, notably woollen mills, stone quarries and a brickworks. Royd House Tip was located to the south of the site between 1963 and 1992.

4. GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

4.1 Geology

Examination of the published British Geological Survey map of the area (Sheet 77, Huddersfield, solid and drift edition) indicated that the site is on to the Midgley Grit, part of the Namurian Rocks (Millstone Grit Series), below the Lower Coal Measures.

There is a geological fault across the southern end of the site, with the downthrow side to the south. It is recommended that the fault is investigated on site by digging a series of trenches, to ascertain its exact location and to determine its affect, if any, on the proposed development. A large scale geological map could also be obtained, which may indicate the location of the fault more accurately.

No drift deposits are shown.

There are three locations on site that the British Geological Survey (BGS) describe as having a moderate potential for landslide ground stability hazards. A ground stability assessment should be carried out on the site.

A BGS borehole is located on site, extracting ground water from the Millstone Grit , for use in the dying process. From the walk over survey, this borehole has now been capped.

4.2 Mining

A Mining Report for the area was obtained and this revealed that there are no previous recorded coal workings under the site in the likely zone of physical influence on the surface.

The report states that coal beneath the site is on reserve, though no workings are currently planned.

The property is **not** situated within the boundary of a former opencast coal mining site, within 200m of a currently operating opencast coal mining site or 800m of the boundary of a future opencast coal mining site.

There is no knowledge of any shafts or adits within 20m of the site and no evidence of coal mining related subsidence claims in relation to the property in the past 10 years.

4.3 Hydrology/Hydrogeology

The Environment Agency ground water vulnerability map records the bedrocks in this area to be a minor aquifer, of variable permeability and high leaching potential.

Minor aquifers can be fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability, including consolidated deposits. Although not producing large quantities of water for abstraction, they are important for local supplies and supplying base flows to rivers.

Soils are of high leaching potential. These are soils where pollutants are likely to penetrate the soil layer because water movement is largely horizontal or they contribute to groundwater recharge elsewhere in the catchment.

The nearest surface water feature is the River Colne, that borders the north western boundary of the site.

The nearest water abstraction licence is on the site, as described in sections 2.1 and 4.1 above and was used to serve the dye works. Two abstractions were authorised in 1973 and 2002.

5. INFORMATION HELD BY STATUTORY AUTHORITIES

This section details any relevant information held in the registers maintained by statutory bodies as identified in the Envirocheck Report.

5.1 Landfill Sites

There are no historic or registered landfill sites with 250m of the site.

There is one historic and two registered (now cancelled/lapsed) landfill sites within 500m of the site.

The historic landfill site is located at Cowersley Lane Quarry, some 312m to the east. The site was operated between 1969 and 1994 and the landfill is described as inert and commercial waste.

There is a registered landfill site 254m east of the site, again at the same quarry as above. The site was licensed to accept 25,000 to 75,000 tonnes of construction, demolition and excavation waste per year and the license was granted in 1983.

491m west of the site is a registered landfill site at Dunnock Quarry. The site was licensed to accept 25,000 to 75,000 tonnes of construction, demolition and excavation waste per year and the license was granted in 1983.

Due to the distances from site and the topography of the surrounding area (all landfill sites are located higher than the site) the landfill sites pose little risk in terms of landfill gas migration. Gas is unlikely to migrate down and across the hillside. However, leaching of contamination from contaminated land within the landfill via the groundwater table under the site is a potential risk. In 2001/ 2002 in support of the IPPC application, water from the borehole on site was tested for pesticides, chromium, copper and cobalt. The results were all below the detection limits. The ground water below the site should be tested for a full suite of contamination to determine the level of contamination, if any.

5.2 Waste Management Facilities

There are two licensed waste management facilities within 250m of the site, both at Bargate Motor Spares (83-130m west of the site) for metal recycling and end of life vehicles. These are on the opposite side of the river to the site and therefore pose little risk in terms of contamination.

A scrap yard is located 45m south west of the site, the license was surrendered in 1992. Due to the time since the scrap yard was in use, this poses little risk to the site.

5.3 Contaminated land Register Entries and Notices

The Envirocheck Report identified one Contaminated Land Register Entries and Notices 797m west of the site. This is a significant distance from the site and is therefore of little concern.

5.4 Local Authority Pollution Prevention and Controls

5m north east of the site is C Potter and Co at 709 Manchester Road with an Air Pollution Control for wood coatings. This is a controlled site and therefore poses little risk to the development.

5.5 Integrated Pollution Control (IPC) Authorisations

There are no integrated pollution control authorisations within 500m of the site.

5.6 Integrated Pollution Prevention and Control Permits (IPPC)
There have been four permits relating to Hoyle Ing Dyeworks, three in 2003 which were all superseded by variation in 2010, relating to the dying of wools and synthetic fibres. These permits are now surrendered.

There are no other permits within 500m of the site.

5.7 Pollution Incidents
There has been one recorded minor pollution incident on site. This was is 1992, polluting the River Colne with detergents/surfactant. This minor incident occurred some 19 years ago and any contaminant from the incident is likely to have dissipated some time ago.

There have been 28 other pollution incidents within 250m of the site, generally relating to the River Colne.

17 incidents were minor, 3 major and 8 significant. All incidents occurred more than 17 years ago and any contaminant from the incidents is likely to have dissipated some time ago. Generally the incidents are to the River Colne and Canal, due to the topography of the surrounding area, the site slopes towards the river, contaminants are unlikely to have migrated up the river into the site.

5.8 Discharge Consents
There are six discharge consents within 250m of the site, all to the River Colne. Due to the topography of the surrounding area, the site slopes towards the river, contaminants from the discharges are unlikely to have migrated up the river into the site.

5.9 Contemporary Trade Directory Entries
There are three active contemporary trade directory entries within 250m of the site, these are all over 100m from the site and one is downstream/downhill of the site and is therefore poses little risk. Due to the topography of the surrounding area, any contaminants from the other two trades are likely to travel down the hill, towards the river and are unlikely to travel sideways to the site.

There are two inactive contemporary trade directory entries on the site, these were for the dyeworks and a catering services.

5.10 Fuel Sites
There are no active fuelling stations within 250m of the site.

5.11 Radon
The site is situated in an area in which the British Geological Survey states that less than 1% of homes are above the action level. **No** Radon protection measures are necessary in the construction of a new dwellings or extensions.

5.12 Environmentally Sensitive Areas

5.12.1 Flooding

The agency and hydrological (flood) map shows that the site is in an area that is affected by flooding from rivers or seas. The flood map shows that the northern end of the northern section of site (the bank of the River Colne) is in flood zone 2/3.

Flood zone 2 is an area that is affected by extreme flooding from Rivers or Sea without defences. Flood zone 3 is an area that is affected by flooding from Rivers or Sea without defences.

A flood risk assessment should be carried out to assess the flooding potential/effects on the proposed development.

5.12.2 Nitrate Vulnerable Zones

The site is within a nitrate vulnerable zone. This would only be applicable to agricultural usage of the site.

6.0 ADDITIONAL INFORMATION

6.1 Services

These have not been examined as part of the Phase 1 report. Enquiries should be made to ensure that the site can be fully serviced. Please refer to the environmental impact assessment for details of easements across the site.

6.2 Site Investigation

No intrusive investigations have been undertaken.

6.3 Asbestos report

A type 3 asbestos report has been carried out on the site. The report revealed a number of the locations where asbestos was present. Any asbestos on site should be removed from site in accordance with the reports recommendations and current regulations.

6.4 Integrated Pollution Prevention Control (IPPC) Report

An IPPC report was carried out in the support of the application in 2002. Extracts from the report detailing the activities carried out on site with associated materials/substances used and a contamination testing schedule can be found in section 7.2. A copy of the report is also appended. Contamination test results are contained within the report and could act as a benchmark for any future contamination testing, to determine if contamination has worsened or migrated in the past 9 years.

Summary

The vacant dye work that remains on site today has been on site since before 1892. On the northern section of the site is the dyework's water treatment and effluent plant. The site is surrounded by industry, notably woollen mills, stone quarries and a brickworks. The closest landfill site is 254m to the east and this, along with the past use of the site and surrounding areas, is a potential source of contamination.

7.0 CONCEPTUAL MODEL

7.1 General

This section provides a conceptual model and qualitative assessment of the potential risks posed to human health and environmental receptors from potential on-site and off-site sources of contamination. The assessment is presented as a 'source-pathway-receptor' model in accordance with Part IIA of the Environmental Protection Act 1990.

Part IIA of the Environmental Protection Act, 1990 was introduced on 1 April 2000. It created a new statutory regime for the identification and remediation of land where contamination poses an unacceptable risk to human health and the environment.

Part IIA provides a statutory definition of contaminated land:

"any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is a significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused".

To determine whether land falls under the Part IIA definition of contaminated land the site should be evaluated in the context of a risk based framework. The assessment of contaminated land is typically a two-phase process which is initially based on a qualitative assessment of the likelihood of complete pollution linkages, with a quantitative element which seeks to determine the degree and the significance of the harm. Land is only defined as 'Contaminated Land' if a 'significant pollutant linkage' is present.

A pollutant linkage must comprise the following:-

Source - a contaminant at a concentration capable of causing adverse health or environmental effects.

Receptor - there must be a human or environmental receptor present, which may be at risk of harm or impact from the source.

Pathway - there must be an exposure pathway through which the receptor comes into contact with the contamination source.

If a pollutant linkage is demonstrated, then the Part IIA legislation provides powers for remedial action to be enforced by the Local Authority in whose area the contaminated land is situated.

7.2 Potential On-site Sources of Contamination

The past use of the site as a dyeworks is a potential source of contamination. As discussed previously (section 2.1 Present Land Use/Walk Over Survey/Trees) **t**he site can be divided into three areas, shown in figure 1. Table 2 details possible materials/substances present, during the activities carried out in the various zones. Table 3 details the possible contaminants present during the activities – i.e. the chemical testing schedule. These tables have been extracted from the IPPC application carried out in 2002.

	Industrial activities carried out	Dates	Materials and substances present or used
ZONE 1	Drying of dyed material Machine shop	Circa 1932 to 2002	Wool and synthetic fibres Machine lubricants
	Events with potential to contaminate the site	**Dates**	**Materials or substances involved**
	There are no records of major spills, fires etc. with potential to contaminate the site	Circa 1932 to 2002	---
	Industrial activities carried out	**Dates**	**Materials and substances present or used**
ZONE 2	Operation of a coal fired boiler	1860 to 1972	Organic and inorganic compounds associated with coal and coal combustion, lubricants and greases
	Operation of a gas/oil boiler - Storage of standby fuel oil	1972 to 2002	Heavy fuel oil, Lubricants and greases Boiler feed conditioning chemicals
	Dyeing of wool and synthetic fibres Mothproofing of wool fibre Bleaching of wool fibre Shrinkproofing of wool fibres	1860 to 2002	Soap and synthetic detergents biocides & preservatives inorganic salts, sulphates, chlorides, chromate's organic salts, acetates, formates organic acids, acetic, formic, citric inorganic acids, sulphuric, hydrochloric bases, ammonia, sodium hydroxide reducing agents, oxidising agents synthetic organic dyestuffs
	Events with potential to contaminate the site	**Dates**	**Materials or substances involved**
	There are no records of major spills, fires etc. with potential to contaminate the site	1860 to 2002	---
	Industrial activities carried out	**Dates**	**Materials and substances present or used**
ZONE 3	Storage of clean process water Screening and balancing of process wastewater	1985 to 2002	Sodium hydroxide solution for effluent pH correction Residual process chemicals used in Zone 2 and present in the effluent piped across Zone 3
	Events with potential to contaminate the site	**Dates**	**Materials or substances involved**
	There are no records of major spills, fires etc. with potential to contaminate the site	1985 to 2002	---

Table 2: Site activities or materials with potential to contaminate the site

Substance or parameter	Source of Potential future contaminant
Isomers of Hexachlorocyclohexane	Contaminant on wool fibre
DDT isomers	Contaminant on wool fibre
Dieldrin	Contaminant on wool fibre
Aldrin	Contaminant on wool fibre
Endrin	Contaminant on wool fibre
Propetamphos	Contaminant on wool fibre
Diazinon	Contaminant on wool fibre
Chlorfenvinphos	Contaminant on wool fibre
Cypermethrin	Contaminant on wool fibre
Permethrin	Mothproofing processes
Chromium (total)	Organic dyestuffs and dyeing processes wastewater
Chromium (hexavalent)	Organic dyestuffs and dyeing processes wastewater
Cobalt	Organic dyestuffs and dyeing processes wastewater
Copper	Organic dyestuffs and dyeing processes wastewater
Cadmium	Contaminant in process chemicals
Mercury	Contaminant in process chemicals
Nickel	Contaminant in process chemicals
Tin	Contaminant in process chemicals
Zinc	Process chemicals
Zirconium	Flame proofing process
Ammonia	Process chemicals
Chloride	Process chemicals
Sulphate	Process chemicals
Sulphide (total)	Process wastewater
Fluoride (total)	Flame proofing process
Aromatic hydrocarbons	Dyestuffs and dyestuff degradation products
Phenols and cresols	Dyestuffs and dyestuff degradation products
Speciated oils	Machine lubricating oils & fuel oil
Acidity/alkalinity (pH)	Mineral and organic acids, bases

Table 3: Chemical testing schedule

Tables 2 and 3 – extracted from IPPC application (2002)

7.3 Potential Off-Site Sources of Contamination

Historic landfill sites and industry including mills, quarries and a brickwork are all potential sources of contamination.

7.4 Receptors

The primary receptors, considered to be potentially at risk from any identified contamination are as follows:

Human Health

- Construction workers during the redevelopment phase.
- Residential end users.

Controlled Waters

- The nearest controlled surface water is the River Colne, that borders the north western boundary of the site.
- Groundwater stored within the Minor Aquifer underlying the site.

7.5 Pathways

Potential contaminant migration pathways considered relevant to the site are:

Human Health

- Ingestion of contamination soils and dust particles
- Direct physical contact with near surface soils and contaminated dust particles.
- Inhalation of wind blown contaminated dust.
- Inhalation of vapours and gases, migrating vertically into the atmosphere.
- Inhalation of vapours and gases, migrating vertically into buildings and accumulating in confined spaces.

Controlled Waters

- Contaminants in Made Ground impacting groundwater underlying the site via vertical leaching mechanisms.
- Contaminants in Made Ground impacting surface water south of the site via lateral leaching mechanisms.

7.6 Pollutant Linkages

A 'pollutant linkage' describes the relationship between a contaminant, a pathway and a receptor, a 'pollutant' being the contaminant in a pollutant linkage. A contaminant, pathway and receptor must all be present for a pollutant linkage to exist, which forms the basis for determination that a piece of land is Contaminated Land.

- There is a pollutant linkage from source, pathway and receptor. Contamination testing of the soils will determine the risk (if any) to receptors.

7.7 Risk

The risk in this case is expected to be low, since any potential contamination could be removed or the pathway cut, to eliminate any pollutant linkages.

8. CONCLUSIONS

- A review of the historic maps highlights that Hoyle Ing dyeworks (with associated tanks and chimney) and terraced houses have been situated on the southern section of the site sometime before 1892; the dyeworks remain (vacant) on site today. On the northern section of the site, a row of three terraced houses were constructed, sometime before 1892 and were replaced by the dyework's water treatment and effluent plant between 1977 and 1992 and remain today. A pair of semi-detached houses were constructed on the site sometime before 1918 and the buildings remain today.

- Potential on sites sources of contamination are from the past use as a dyeworks.

- A type 3 asbestos report has been carried out on the site by Rob Dyson. The report revealed a number of the locations where asbestos was present.

- Potential off site contamination sources are from historic landfill sites, mills, quarries and brickworks

- The nearest landfill site is 254m east of the site

- The site overlies a minor aquifer

- The agency and hydrological (flood) map shows that the site is in an area that is affected by flooding from rivers or seas.

- No radon protection measures are necessary

- Active pollutant linkages at the site are considered to be present

- There is a geological fault across the southern end of the site, with the downthrow side to the south.

- There are three locations on site that the British Geological Survey (BGS) describe as having a moderate potential for landslide ground stability hazards.

9. RECOMMENDATIONS

1. Trial pits will be required to determine the near surface soils and depth to suitable foundation for the proposed structure.

2. Any asbestos on site should be removed from site in accordance with the asbestos report's recommendations and current regulations.

3. Trial pits should be excavated at appropriate locations around the site and samples of soil taken for contamination testing. Testing should be carried out across the site, targeting all three areas and testing for chemicals detailed in table 3 (section 7.2). The previous contamination test results carried out in 2002 are contained within the IPPC report (appended) and could act as a benchmark, to determine if contamination has worsened or migrated in the past 9 years.

4. Soils at proposed foundation level should be tested for sulphates and pH, in order to determine the concrete classes of buried concrete.

5. Water from the existing borehole on site should be extracted and any water encountered within the trial pits and taken for contamination testing.

6. Should clay soils be encountered, then these should be tested for Plasticity Index and Moisture Content.

7. There is a geological fault across the southern end of the site, with the downthrow side to the south. It is recommended that the fault is investigated on site by digging a series of trenches, to ascertain its exact location and to determine its affect, if any, on the proposed development. A large scale geological map could also be obtained, which may indicate the location of the fault more accurately.

8. There are three locations on site that the British Geological Survey (BGS) describe as having a moderate potential for landslide ground stability hazards. A ground stability assessment should be carried out on the site.

9. Foundations to existing structures in close proximity to the proposed structure should be exposed, in order to determine their influence on each other.

10. The agency and hydrological (flood) map shows that the site is in an area that is affected by flooding from rivers or seas. Consideration is to be given to the risk of flooding on site; an assessment is not included in this report.

11. Provision should be made for locating existing services beneath the site before the intrusive investigations. The hand digging of the top metre should be considered.

12. During construction and reduced level dig, careful observation should be made to identify any signs that the soils could be contaminated in terms of appearance or odour. Should this be encountered, then the Engineer must be informed immediately.

13. Should any soils be imported on to site, then these should come from a supplier who can provide necessary testing certificates or the soils should be sampled and tested, to verify that the soils are suitable for their intended use.

14. Construction workers should be protected from exposure to contaminated soils with the provision of all necessary personal protective equipment.

Yours faithfully

Sarah Tang MEng(Hons)
Engineer