Soil Environment Services Ltd

CONTAMINATED LAND RISK ASSESSMENT

PHASE 1 DESK TOP STUDY AND SITE WALKOVER SURVEY

ASD Metal Services

ASD Metal Services
Biddulph

Soil Environment Services Ltd
October 2014

Our Ref: SES/ASD/TR/1#1 **Date: 21st October 2014**

Client:

ASD Metal Services
Tunstall Road
Knypersley
Biddulph
Stoke-on-Trent
ST8 7AQ

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CONTENTS

1. INTRODUCTION AND OBJECTIVES

The purpose of this assessment is to examine specifically the current and potential risks to human, ecological and ground and surface water receptors associated with possible contamination of the ground at the site located at:

Tunstall Road
Knypersley
Biddulph
Stoke-on-Trent
ST8 7AQ

Ref: 387940,356020

The proposal is for re-development of the site, including the demolition of redundant/peripheral buildings, upgrading the site drainage, upgrading the external roadways and new storage areas and replacement of roof cladding and rainwater pipework.

The site was visited on the 21st October 2014 to undertake a site walkover survey in order to assess current site conditions, particularly with respect to potential sources, pathways and receptors.

Evaluation of the risks is given and subsequently, if needed, recommendations made with regard to further (Phase 2) investigation and/or remediation.

General guidance used:

BS 10175:2011 Investigation of potentially contaminated sites. British Standards Institution, London.

CLR 11: Model procedures for the management of land contamination. Environment Agency.

Environment Agency Guiding Principals for Land Contamination (GPLC).
(2010) Environment Agency.

DoE Industry Profiles – Environment Agency

2. SITE CHARACTERISATION AND FORMER INVESTIGATIONS

Current setting and condition (Drawing 1)

The site assessed for this investigation currently comprises 2.854 ha of land located off Tunstall Road, Biddulph. Residential properties bound the site to the north, with a road to the east, an industrial estate to the south and trees to the west. A metal services company occupies the site (Photographs 1-11). The site and surrounding land slopes down to the north and east.

Photo 1 Aerial view

Walkover findings

A redundant diesel fuel tank is located to the north-west of the site (Photo 2). A smaller new diesel and AdBlue tank are located east of the redundant tank (Photo 3).

PHOTO 2 View NW to NE

PHOTO 3 View NE to NW

A disused electricity transformer is situated on the south-west of the site (Photo 4).

PHOTO 4 View to the SW

PHOTO 5 View SE to NE of old rail lines

A new substation is located in the south-west corner of the building (Photo 7).

PHOTO 6 View of the north-west of the site

PHOTO 7 New substation

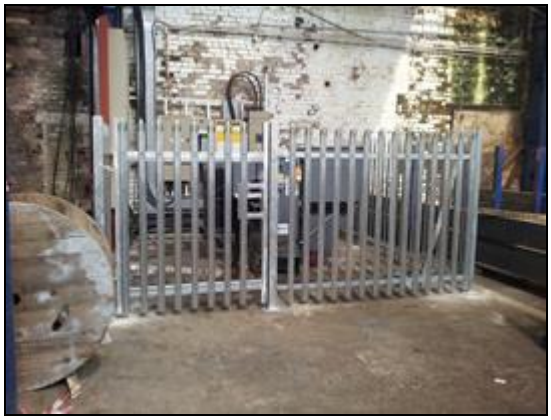


PHOTO 8 Concrete asbestos removal

PHOTO 9 View inside the building

No significant leaks or spillages of cutting fluid/oil was noted within the building as drip trays are fitted within the machines (Photo 10).

PHOTO 10 View inside the building

PHOTO 11 View inside the building

Flora and fauna

The trees surrounding the site had good foliage and no chlorosis. There was no evidence of vegetation dieback.

The site walk-over revealed:

- the site surface of the building was concrete. No surface cracks or holes were evident.
- no significant staining of the ground or spillages were noted outside of the building or around the former sub-station
- concrete asbestos was being removed from the rook by a licenced contractor during the time of the walkover survey.

Site history (see Historical maps – Appendix A)

Land use	Direction	Distance (m)	Notes
On-site			
Undeveloped land (pre 1875)	On-site	0	
Building developed c.1925	On-site	0	
Reservoir maked on the north 1925	On-site	0	Infilled by 1981
Rail lines 1925-c.1993	On-site	0	
Marked as an engineering works 1937	On-site	0	Extended c. 1970, 1981
Tanks marked 1970	On-site	0	
Electricity substation 1976-current	On-site	0	south-west of the site
Off site			
Railway (pre 1878-1982)	W	18	
Fish pond/reservoir/pond (pre 1878-current)	NE	198	
Chimney (1925-1992)	S	1	
Allotment gardens (1925-1960)	NW	87	
Works (1954-current)	S	1	Britclean cleaning supplies
Industrial estate marked (1988-current)	S	1	

Current soils, geology and hydrology

BGS maps indicate that the site is located on:

1:50 000 scale superficial deposits description: Till, Devensian - Diamicton. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions.

1:50 000 scale bedrock geology description: Pennine Middle Coal Measures Formation - Mudstone, Siltstone and Sandstone. Sedimentary Bedrock formed approximately 309 to 312 million years ago in the Carboniferous Period. Local environment previously dominated by swamps, estuaries and deltas.

Flow to groundwater may be restricted due to the impermeable nature of the superficial geology mapped on the site.

Surface water flow could find a possible route via surface water drains and channels to the north and east leading to the drain 106 m north-east of the site.

The site is on variably permeable Unproductive Superficial and Secondary A Bedrock aquifer and is not in a groundwater source protection zone.

Former investigations

No former investigations with relation to ground contamination have been undertaken.

Current environmental data search

Environmental data (Appendix B) indicates the following:

The site is on a variably permeable Unproductive Superficial and Secondary A Bedrock aquifer
The site is not in a groundwater source protection zone.
No active landfill sites within 500 m
No historical landfill sites within 500 m
No waste treatment or disposal sites within 500 m

Less than 1% of homes are above the action level for radon. No protective measures are considered necessary in the construction of new dwellings
No fuel stations within 250 m

The Urban Soil Chemistry maps (Appendix B) indicate no significant elevated soil metal concentrations.

One pollution incident within 250 m

1. 218 m north-east. 1998. Pollutant: pesticides. Classed as a Category 3 incident (minor risk).

3. CONCEPTUAL SITE MODEL

The conceptual site model detailed here is by a written and diagrammatical (Drawing 1) description of the sources, pathways and receptors. A cross section is included if this will aid interpretation.

3.1 Sources

Source location	Direction	Distance (m)	Potential Contaminants
On-site			
Reservoir (1925-pre 1981)	On-site	0	Methane, carbon dioxide
Rail lines (1925-c.1993)	On-site	0	Metals, hydrocarbons
Engineering works (1937-current)	On-site	0	Metals, hydrocarbons, organic compounds, solvents, acids, asbestos
Tanks marked (1970-current	On-site	0	Hydrocarbons
Electricity substation (1976-current)	On-site	0	PCB's, mineral oils
Off site			
Railway (pre 1878-1982)	W	18	Metals, hydrocarbons
Chimney (1925-1992)	S	1	Metals, hydrocarbons
Allotment gardens (1925-1960)	NW	87	Hydrocarbons, pesticides, herbicides
Works (1954-current)	S	1	Metals, hydrocarbons, solvents, detergents
Industrial estate marked (current)	S	1	Metals, hydrocarbons

3.2 Receptors

Humans

- Workers in the proposed properties
- Workers and residents in adjacent properties
- Development workers

Controlled waters

- The site is on a variably permeable Unproductive Superficial and Secondary A Bedrock aquifer
- The site is not in a groundwater source protection zone.
- Underlying aquifer
- Drain 106 m north-east

Ecology

- Animals and plants are considered to be possible receptors.

Buildings and services

- Underground utility pipes and foundations

3.3 Pathways and plausible pollutant linkages (See Table 1)

Pathways to and from the site could exist via service channels.

Human health

The main pathways considered possible are:

1. Ingestion of soil
2. Ingestion of dust
3. Ingestion of contaminated vegetables
4. Ingestion of soil attached to vegetables
5. Dermal contact with skin
6. Dermal contact with dust
7. Inhalation of fugitive soil dust
8. Inhalation of fugitive dust
9. Inhalation of vapours outside
10. Inhalation of vapours inside
11. Ingress to water supplies is also considered
12. Accumulation and explosion of methane

Controlled waters

Flow to groundwater may be restricted due to the impermeable nature of the superficial geology mapped on the site.

Surface water flow could find a possible route via surface water drains and channels to the north and east leading to the drain 106 m north-east of the site.

The site is on variably permeable Unproductive Superficial and Secondary A Bedrock aquifer and is not in a groundwater source protection zone.

TABLE 1. Plausible pollutant linkage/pathway matrix Y = yes, N = no, Blank = not possible																			CSM	Ref	No.	1	Version	a
SOURCE	**Chemicals**		**RECEPTORS**																					
		Possible present on site	**On site**								**Off site**													
	Type		**Current workers**	**Future workers**	**Dev,ment workers**	**Current residents**	**Future residents**	**Ground water**	**Surface water**	**Ecology**	**Current workers**	**Future workers**	**Dev,ment workers**	**Current residents**	**Future residents**	**Ground water**	**Surface water**	**Ecology**
ON SITE																		
Former reservoir	Methane	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Carbon dioxide	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Engineering works/rail/tanks	Metals	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
	Hydrocarbons	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
	Organic compounds	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
	Solvents	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
	Acids	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
	Asbestos	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
Electricity substation	PCB's	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
	Mineral oils	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
OFF SITE																		
Former railway	Metals	N	N	N	N	N	N	N	N	N	N/A							
	Hydrocarbons	N	N	N	N	N	N	N	N	N								
Chimney	Metals	N	N	N	N	N	N	N	N	N								
	Hydrocarbons	N	N	N	N	N	N	N	N	N								
Former allotment gardens	Hydrocarbons	N	N	N	N	N	N	N	N	N								
	Pesticides	N	N	N	N	N	N	N	N	N								
	Herbicides	N	N	N	N	N	N	N	N	N								
Works/industrial estate	Metals	N	N	N	N	N	N	N	N	N								
	Hydrocarbons	N	N	N	N	N	N	N	N	N								
	Solvents	N	N	N	N	N	N	N	N	N								
	Detergents	N	N	N	N	N	N	N	N	N								
Notes	**For sources and contaminants see Section 3.1 of the report.**																	
	For receptors and plausible linkages see Sections 3.2 and 3.3 of the report.																	
	For risks from sources on-site and sources off-site see Section 4 of the report.																	

4. RISK ASSESSMENT

4.1 Human health

A potential but low risk exists from possible contamination in relation to the former and current activities on site (Table 2). The major risk could be from ingestion and dermal contact with heavy metals and hydrocarbons during development works and risks from hydrocarbon vapour inhalation within indoor air-space.

Table 2. Risks from possible sources

Source location	Direction	Distance (m)	Potential Contaminants	Risk	Reason
On-site					
Reservoir (1925-pre 1981)	On-site	0	Methane, carbon dioxide	No	Natural attenuation of ground gases*
Rail lines (1925-c.1993)	On-site	0	Metals, hydrocarbons	Yes	Residual contamination may remain
Engineering works (1937-current)	On-site	0	Metals, hydrocarbons, organic compounds, solvents, acids, asbestos	Yes	Leaks and spillages may have occurred
Tanks marked (1970-current	On-site	0	Hydrocarbons	Yes	Leaks and spillages may have occurred
Electricity substation (1976-current)	On-site	0	PCB's, mineral oils	Yes	Leaks and spillages may have occurred
Off site					
Railway (pre 1878-1982)	W	18	Metals, hydrocarbons	No	Geology restricting pathways
Chimney (1925-1992)	S	1	Metals, hydrocarbons	No	Geology restricting pathways
Allotment gardens (1925-1960)	NW	87	Hydrocarbons, pesticides, herbicides	No	Distance and geology restricting pathways
Works (1954-current)	S	1	Metals, hydrocarbons, solvents, detergents	No	Geology restricting pathways
Industrial estate marked (current)	S	1	Metals, hydrocarbons	No	Geology restricting pathways

Notes: * Given the length of time since in-fill, any potential gas generated during decomposition is likely to have peaked and be in decline. This information is based on the document prepared by CIRIA titled 'CIRIA C665 -Assessing risks posed by hazardous gases to buildings'. Section 7.2.5 (Figure 7.1), details that the landfill gas generation rate significantly reduces with the age of the waste. By 30 years, the rate of gas generation is insignificant, and by 50 years, the rate is minimal.

Risk is regarded as being a combination of the likelihood of an 'event' occurring and its severity. Both elements must be considered when assessing risk. As defined in CIRIA C552:2001, the magnitude of the potential severity of risk occurring may be assessed against:

Consequence of Risk Being Realised (based on C552 CIRIA, 2001)

Consequence of risk being realised			
Classification	**Category**	**Definition**	**Examples**
Severe short-term (acute) risks only	Humans	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part 2A.	High concentrations of cyanide on the surface of an informal recreation area.
	Controlled Waters	Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource.	Major spillage of contaminants from site into controlled water.
	Property	Catastrophic damage to buildings/property.	Explosion causing building collapse (can also equate to a short-term human health risk if buildings are occupied.
	Ecological System	A short-term risk to a particular ecosystem, or organism forming part of such ecosystem.	
Medium chronic (long-term) risks; "significant harm"	Humans	Chronic damage to Human Health ("significant harm" as defined in Defra 2006).	Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria
	Controlled Waters	Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution).	Leaching of contaminants from a site into a major or minor aquifer.
	Ecological System	A significant change in a particular ecosystem	Death of a species within a designated nature reserve.
Mild chronic (long-term) risks; less sensitive receptors	Controlled Waters	Pollution of non-sensitive water resources.	Pollution of non-classified groundwater.
	Property	Significant damage to buildings, structures and services ("significant harm" as defined in Circular on Contaminated Land, Defra, 2006). Damage to sensitive buildings/structures/services	Damage to building rendering it unsafe to occupy (e.g., foundation damage resulting in instability)
	Ecological System	Significant damage to crops. Damage to the environment.	
Minor chronic (long-term) risks; mild	Financial / project	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.	
	Humans	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc).	The presence of contaminants at such concentrations that protective equipment is required during site works.
	Property	Easily repairable effects of damage to buildings, structures and services	The loss of plants in a landscaping scheme. Discolouration of concrete.

Similarly, the classification of the magnitude of the probability of the risk occurring may be assessed against:

Probability of Risk Being Realised (C552 CIRIA, 2001)

Probability of risk being realised	
Classification	**Definition**
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

The risk categories are summarised in the following table:

Risk Classification Matrix (C552 CIRIA, 2001)

Risk classification matrix					
(CIRIA C552, 2001, page 82)		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High	High	Moderate	Moderate/ Low
	Likely	High	Moderate	Moderate/ Low	Low
	Low Likelihood	Moderate	Moderate/ Low	Low	Very Low
	Unlikely	Moderate/ Low	Low	Very Low	Very Low

Risk Classification Definitions (C552 CIRIA, 2001)

Risk classification definitions	
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Moderate / Low	
Low	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

The identified potential contaminants and receptors have been considered in relation to pathways that may link them (Table 3):

Table 3 – Risk assessment

Potential source	Potential receptor	Plausible pathway	Probability	Severity	Risk
Any elevated concentrations of metals, PAH's, TPH in the made ground or perched water	Human health	Direct ingestion, dermal contact, dust and/or vapour inhallation	Likely	Severe	High
		Direct ingestion and or dermal contact with liquid contaminants	Low likelihood (natural attenuation, leaching)	Severe	Moderate
	Construction	Direct contact	Likely	Mild	Moderate/ Low
	Underlying natural strata/controlled waters	Leaching via vertical or lateral migration	Low likelihood	Severe	Moderate
Ground gases (Made Ground)	Site end users	Ingress and accumulation	Unlikley	Severe	Moderate/ Low
Asbestos fibres and asbestos containing materials	Human health Site end users	Direct ingestion and/or inhalation of fibres	Low likelihood	Severe	Moderate

4.2 Controlled waters

The site is considered to pose no significant risk to controlled waters due to the impermeable nature of the superficial geology restricting pathways.

4.3 Ecology

No significant risk is considered to exist as no significant receptors are considered to exist on or within a significant distance of the site. Hence no plausible pollutant linkages are present.

4.4 Buildings and services

A possible risk is considered to exist as aggressive substances (PAH's) which may affect plastic water supply pipes are potentially considered to exist on the site.

5. UNCERTAINTIES AND PHASE 2 PROPOSALS

Some uncertainties are considered to exist with regards to the concentration of potential contaminants from the former substation transformer and current works activities on the site. Metals, hydrocarbons and other potential contaminants could be present in the soil at concentrations above guideline values.

It is recommended that a watching brief is undertaken by contractors on the site during ground works development. Should any significant made ground be encountered during development works or should any areas of odorous, abnormally coloured or suspected contaminated ground be encountered, an amended risk assessment of the development should be undertaken to determine whether remedial works are necessary.

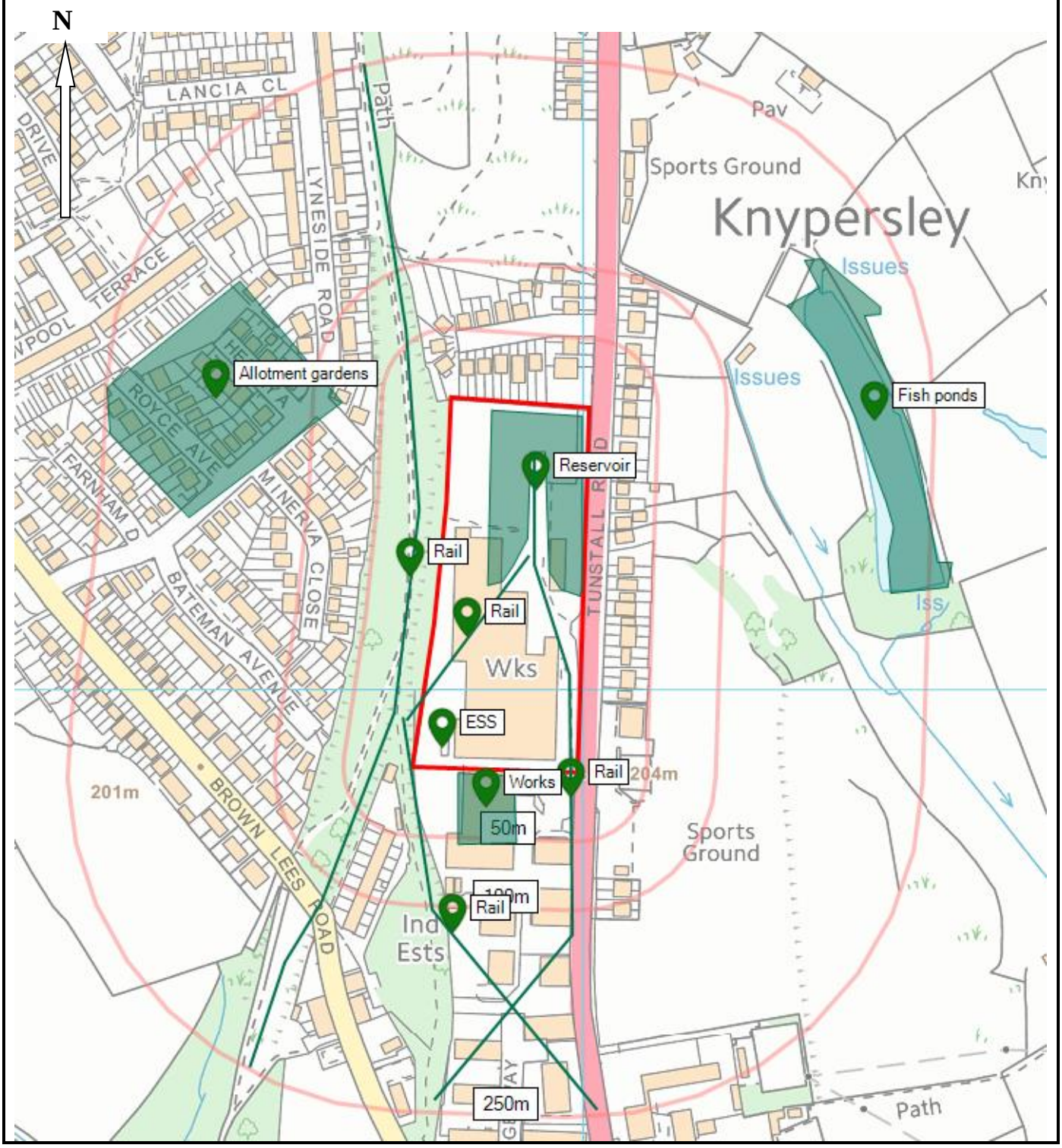
DRAWING 1 & DRAWING 2

Current site location & existing site layout

NOTES:

Site boundary

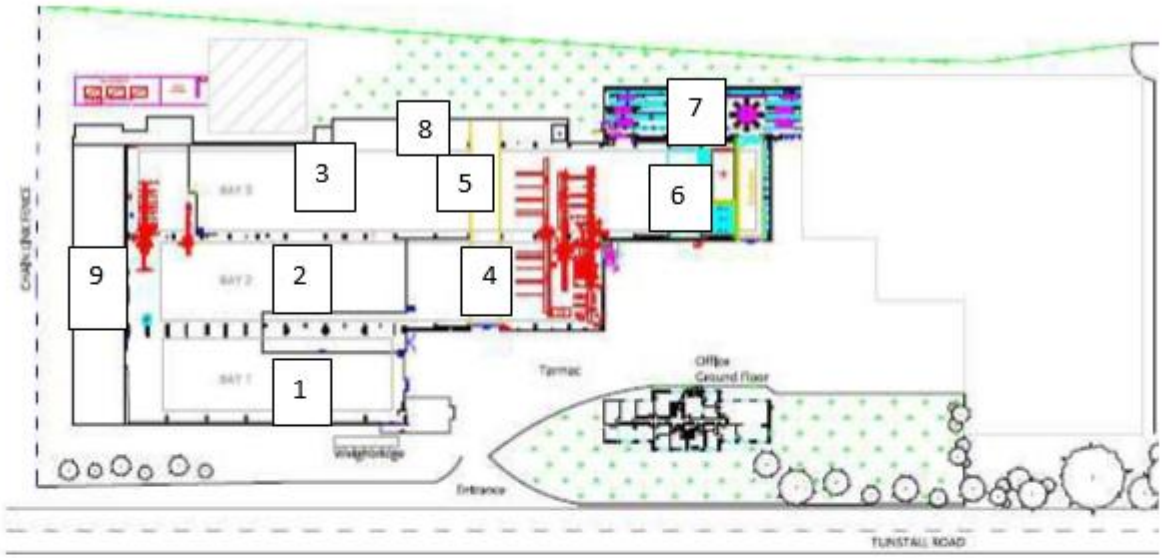
Soil Environment Services Ltd	
Drawing number	1
Drawing title	Site location plan
Scale	1:2500
Date	21/10/2014



NOTES: Site boundary	Soil Environment Services Ltd	
	Drawing number	2
	Drawing title	Existing site layout
	Scale	1:500
	Date	21/10/2014

N

Existing Warehouse Layout



The existing warehouse consists of 7 bays and two non-craned "lean to" extensions.

1. Bay 1 – Plate and Trailer Flats
2. Bay 2 – Re-rolled, Floor Plate and part Witter
3. Bay 3 – Hollows / Re-rolled and part Witter
4. Bay 4 – Back-to-Back and processed (sawn) materials. Processing (sawing) bay.
5. Bay 5 – Saw in-feed. Processing (sawing) bay.
6. Bay 6 – Grange Steels stock
7. Bay 7 – Grange Steels stock (Hubtex racking)
8. Rear extension
9. South ("Lucky Bags")

DRAWING 3

Proposed site layout

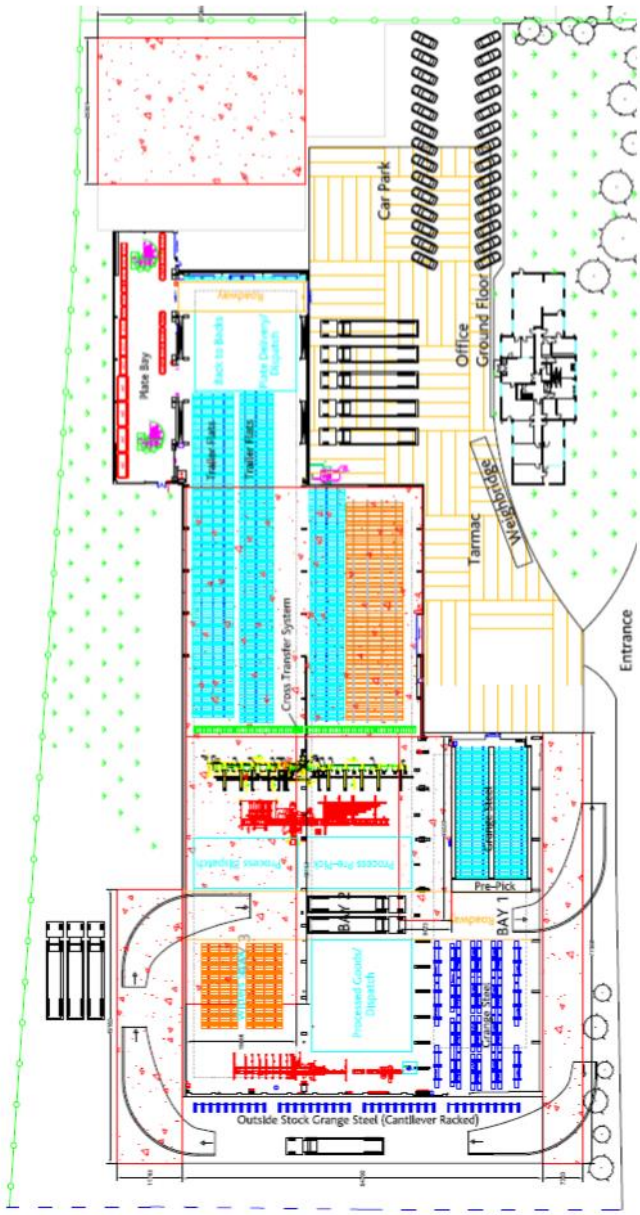
NOTES:

Site boundary

Soil Environment Services Ltd

Drawing number	3
Drawing title	Proposed site layout
Scale	1:500
Date	21/10/2014

N



APPENDIX A

Historical maps

APPENDIX B

Environmental data