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# Rother Valley Railway Reinstatement

## Robertsbridge to Bodiam

## Preliminary Land Quality Risk Assessment

SLR Ref: 402.00985.00007

November 2013

## EXECUTIVE SUMMARY

In July 2013, SLR Consulting Ltd was commissioned by Temple Group Limited on behalf of Rother Valley Railway Limited to provide consultancy services to support a planning application for the proposed reinstatement of the Rother Valley Railway between Robertsbridge and Bodiam. Whilst an Environmental Statement prepared by Temple Group will mention land quality, it is intended that this report will best serve to support the planning application with respect to those matters.

This document, a Preliminary Land Quality Risk Assessment, presents information with respect to the site's environmental setting, land use history and the potential for contamination. The information has been used to identify the likely contaminant sources, receptors and pathways; to form a preliminary conceptual site model; and to identify potential pollutant linkages taking account of the fact that:

- soil will be removed from the railway (embankment) footprint prior to the commencement of bulk earthworks and stored on site awaiting placement post-construction;
- bridge abutments will be formed in concrete and culverts will comprise pre-cast concrete;
- pedestrian and bridleway crossings will consist of a granular "Type 1" fill material laid across the track formation to form a surface;
- the developer will, at some point (most likely following receipt of planning approval), have full site access and will have the opportunity prior to commencement of construction works to carry out visual inspections and ground investigations – with land quality assessments designed to identify necessary protective / remedial measures if needed;
- the site in question is a railway line and in operation employees and visitors will not have routine exposure to the ground, save perhaps at the halt which may have managed / landscaped gardens.

Given the proposed commercial use as a rail line with halt the most significant PPL appear to be:

- **PPL1a** - Potential Harm to Human Health Outdoors from Exposure to PCBs in the Ground Adjacent to / under Previous Transformer Locations;
- **PPL 1b & 1c** - Potential Pollution of Surface Water and Groundwater by Various Contaminants in Made Ground;
- **PPL2a** - Potential Harm to Human Health Outdoors from Exposure to Various Contaminants held in Historic Wastes within Embankments / Ballast;
- **PPL 2b** - Potential Damage to Future Structures from Exposure to Aggressive Ground;
- **PPL3** - Potential Harm to Human Health Outdoors from Exposure to Various Contaminants held in Contaminated Ballast;
- **PPL4** - Potential Harm to Human Health from Contaminants in Landscaping Soils;
- **PPL5** - Potential for Harm to Health and Building Damage from Hazardous Gases; and
- **PPL 6** - Potential Risks to Health or the Environment from Unidentified Sources

Our recommendations for further investigation and assessment of PPL 1, 2, 3 & 5 are presented in **Section 5**, whilst **Section 6** recommends voluntary preventative and remedial actions concerning PPL4 and PPL6 and discusses the validation of those works.

We trust that Rother District Council will be satisfied with the content of this report and agree that further works identified, including inspection actions to deal with (theoretical) contamination as outlined in this document, can be secured via planning condition(s). Discharge of any formal planning condition(s) would, of course, be subject to the satisfactory completion of the works.

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## APPENDICES

**Appendix A** GroundSure EnviroInsight Report including Historical Ordnance Survey Map Extracts, September 2013

**Appendix B** GroundSure GeoInsight Report, September 2013

# 1.0 INTRODUCTION

## 1.1 Background

SLR Consulting Ltd (SLR) was commissioned by Temple Group Limited on behalf of Rother Valley Railway (RVR) Limited in July 2013 to undertake a Preliminary Land Quality Risk Assessment (PLQRA) for the proposed reinstatement of the Rother Valley Railway between Robertsbridge and Bodiam. Whilst an Environmental Statement prepared by Temple Group will mention land quality, it is intended that this report will best serve to support the planning application with respect to those matters. The new line will bisect the land edged in red on **Figures 1-1** and **1-2** which are Ordnance Survey map extracts dated 2002 (from Groundsure).

**Figure 1-1**
**Overall View of Site - West**

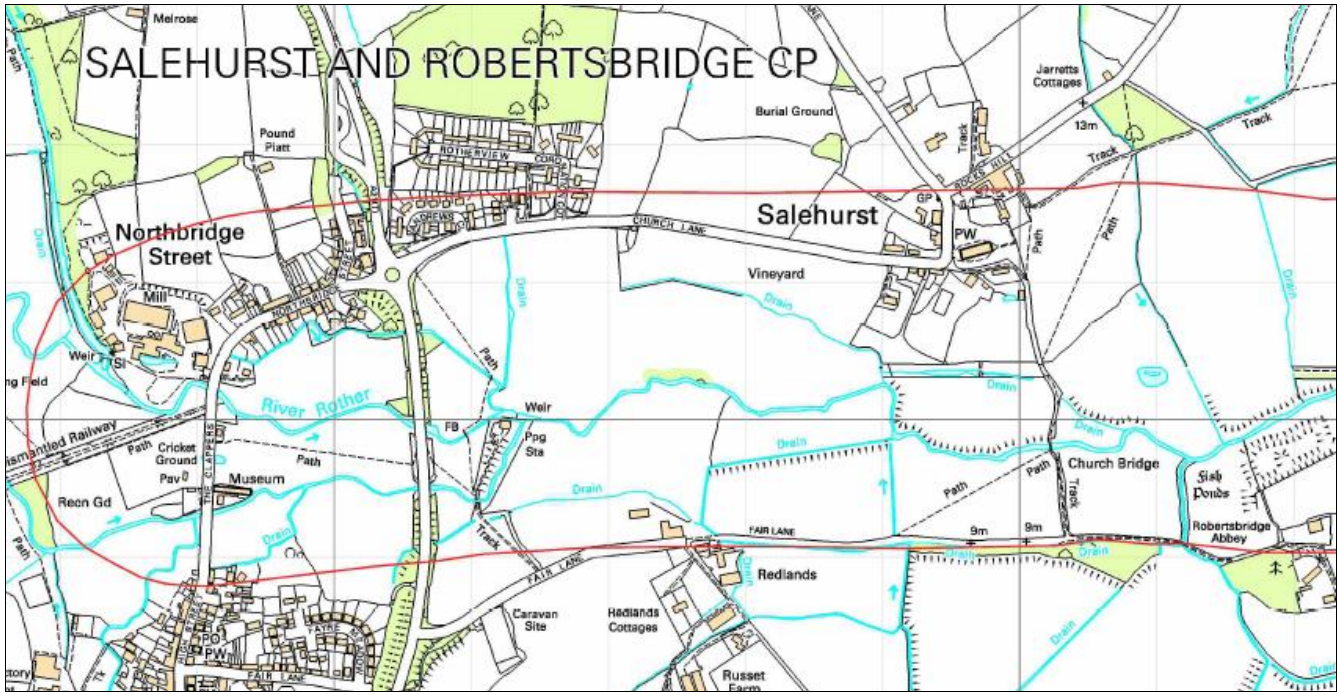
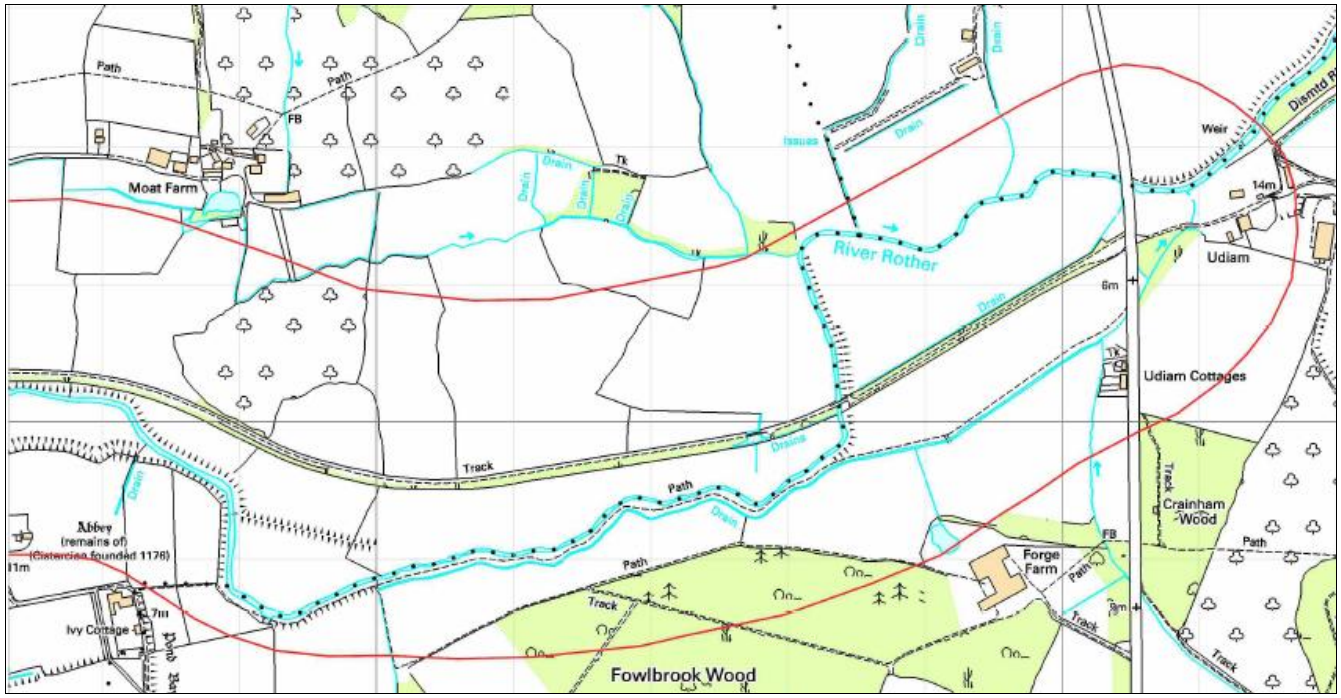


**Figure 1-2**
**Overall View of Site - East**



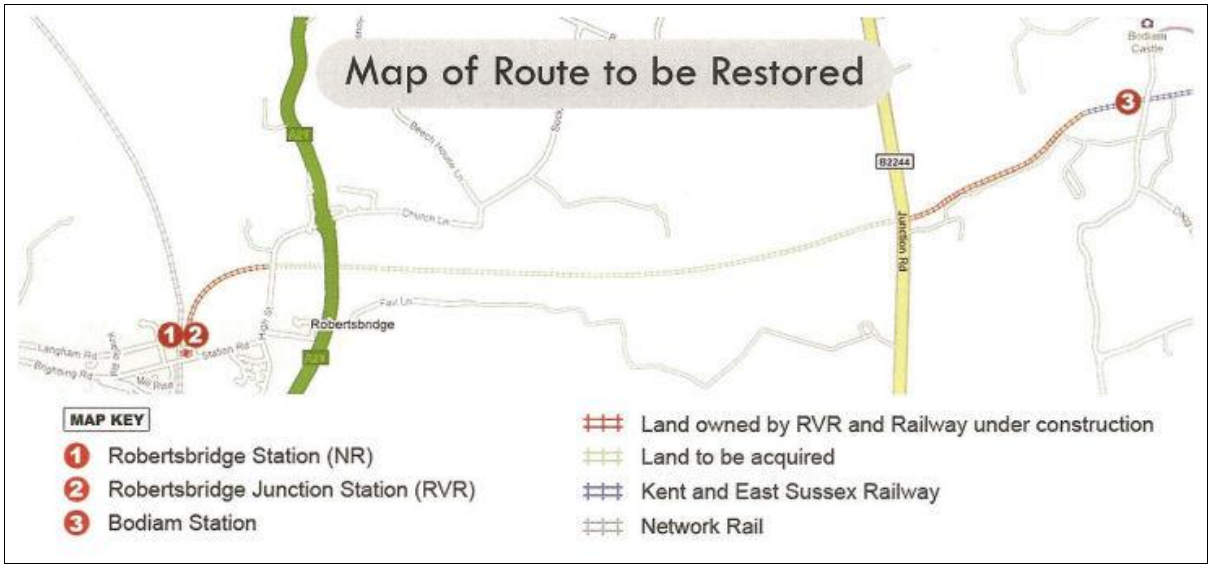

This report has been prepared by SLR's Land Quality Group based at the Bradford on Avon office of SLR, Treenwood House, Rowden Lane, Bradford on Avon, Wiltshire, BA15 2AU, Tel: 01225 309 400.

## 1.2 Proposed Development

Based in Robertsbridge, RVR has been active since its establishment in 1991 buts maintains its original corporate goal of reconstructing the Rother Valley Railway; a line which operated between 1900 and 1961.

The section of rail line to be reinstated, see **Figure 1-3**, runs from Northbridge Street (Robertsbridge) to Junction Road (west of Bodiam), a distance of approx. 3.5 kilometres, and rebuilding of the halt at Salehurst - something which would bring tourists to the village and off-site farm shop. The line at either end of that being proposed has already been constructed, stopping adjacent to the roads. In fact, at Robertsbridge, new bridges and rail have been laid from Northbridge Street to the mouth of the RVR station, which is currently under construction. Those activities are covered by a previous planning consent.

**Figure 1-3**
**Map of Route to be Restored (from http://www.rvr.org.uk/maps.html )**




In common with the original, the reinstated line will follow the courses of the River Rother and its tributary, the Newmill Channel. The original line, much of which was carried on a low embankment, required 24 bridges and culverts and numerous level crossings. The reinstatement project is not simple, and involves construction works spanning between 18 and 24 months. Broadly speaking, these are the construction activities:

- enabling works – creation of site compound and formation of temporary access roads;
- flood defence enhancements;
- earthworks - embankment construction;
- placement of track sub-base (which will then be used as the haul road);
- construction of bridges, culverts and level-crossings;
- placement of ballast; and finally
- installation of signalling and rails.

Activities which involve interaction with the ground are:

- **Topsoil Stripping and Excavation** - topsoil will be removed from the railway embankment footprint immediately prior to the commencement of bulk earthworks. Topsoil would be stored on site in uncompacted mounds, prior to reinstatement post-construction.

- **Track Bed** – a geotextile membrane will be laid prior to placement of sub-base.
- **Underbridges 6 and 12** - sheet piles approximately 15m in length would be vibro-piled into the ground either side of the channel and 3m deep concrete bridge abutments would be formed behind the piles. The bridge structures would be lifted onto the abutments using mobile cranes.
- **Culverts** - culverts would be constructed utilising pre-cast concrete units.
- **Pedestrian and Bridleway Level Crossings** - these crossings would consist of a granular "Type 1" fill material laid across the track formation to form a surface for users walk on.

Ultimately the reinstated line will carry both coal fired steam engines and diesel powered engines.

### 1.3 Objectives

This redevelopment project falls under the remit of the Town and Country Planning Regulations and requires an Environmental Impact Assessment.

Sussex County Council (SCC) and Rother District Council (RDC) will be aware of the potential for historic contamination. Their technical specialists will expect RVR to satisfy local and national planning policies and show that the site is suitable for its new use taking account of:

- ground conditions - considering both natural hazards and pollution arising from previous uses;
- the development proposals - including any proposals for mitigation / land remediation; and
- impacts on the natural environment arising from the development / remediation proposals.

The Council will also want the developer's land quality advisor to consider whether the land, once developed, would be capable of being determined as Contaminated Land under Part 2A of the Environmental Protection Act 1990.

Given the above, SLR recommended a standalone PLQRA to inform the client's development team and support the planning application. We also advised that the PLQRA may be the first in a series of risk assessments, all of which should follow guidance provided by Defra and the Environment Agency in CLR11 Model Procedures for the Management of Land Contamination.

The secondary objective of this PLQRA is to establish if there is any evidence of significant subsurface contamination from past or present activities on or adjacent to the site which could give rise to abnormal development costs i.e. expenditure on remedial works to deal with unacceptable risks to the environment or RVR employees / visitors / contractors along the proposed reinstatement.

### 1.4 Scope of Work

SLR's PLQRA report briefly considers the risks to controlled waters, human health and the proposed infrastructure.

SLR's scope is outlined below:

- review of historic OS mapping;
- purchase and review of environmental data pack;

- review of borehole logs from the British Geological Survey (BGS) database;
- review of geological map;
- preparation of a report presenting:
    - the desk study data;
    - a site conceptual model with preliminary risk assessment; and
    - recommendations for further assessment steps.

### 1.5 Data Sources

This report has been produced following consultation with the sources of information summarised in **Table 1-1**.

**Table 1-1:**
**Information Sources**

| Information Type | Source |
|---|---|
| General topography and Site setting | Google Earth<br>Bing Maps<br>www.streetmap.com |
| Site and background information | GroundSure EnviroInsight including Historical Ordnance Survey Map Extracts purchased 17 September 2013 (**Appendix A**).<br>GroundSure GeoInsight purchased 17 September 2013 (**Appendix B**) |
| Hydrogeology and Geology | Environment Agency (EA) website.<br>British Geological Survey (BGS) Sheet 304, Tenderden, Solid & Drift Edition, 1:50,000 scale. |
| Historic Background | www.rvr.org.uk |

## 2.0 SITE DETAILS, SETTING AND HISTORY

### 2.1 Site Vicinity Description

**Figure 2-1** provides an aerial image, and **Table 2-1** summarises the property details. Information within the table has been derived from Ordnance Survey (OS) mapping. Plans showing the site's location, surrounds and layout are provided in **Appendix A**.

**Figure 2-1**
**Aerial View of Site**

**Table 2-1:**
**Site Details**

| | |
|---|---|
| Address | The linear site has no address as such, the National Grid Reference for the site is 575050,124173. |
| Site Location | The section of rail line to be reinstated runs from Northbridge Street (Robertsbridge) to Junction Road (west of Bodiam), a distance of approx. 3.4 kilometres. |
| Recent Site Activities[1] and Site Description | In 1973 an organisation now know as the Kent & East Sussex Railway (KESR) was successful in purchasing the disused line between Tenterden and Bodiam, but the preservationists failed to gain permission to take over the section between Bodiam and Robertsbridge. Subsequently that stretch of line was lifted and the track abandoned – falling into various ownerships.<br>A separate company, now RVR, was formed in 1991 with the view of reconstructing the railway between Bodiam and Robertsbridge. Since that date, the railway has been acquiring parts of the track bed as and when possible. Negotiations continue with the remaining landowners to secure the remainder of the route.<br>The eastern half of the old line is apparently walkable albeit now heavily overgrown. Due to access constraints, SLR has not been able to visually inspect the land, but it is clear from aerial imagery that the route has become vegetated with emergent trees / scrub. The image below shows the eastern extremity of the proposed line (with the rail line across the road to the east) and the vegetation / woodland shown between the two agricultural fields is typical / representative of that found along the entire eastern half of the proposed route. |

[1] Some text taken from http://www.rvr.org.uk/history.html and edited.

One or two relatively short sections of the western half of the proposed route have become vegetated with emergent trees too, but for the most part evidence of the former railway is absent – the land having been returned to agriculture. Aerial imagery shows that the proposed route is arable farmland broken at points by field boundaries / hedges. The image below shows the eastern extremity of the proposed line (with the rail line across the road to the west) and the planted / ploughed agricultural fields and hedge boundaries are typical / representative of that found along the majority of the western half of the proposed route.

| | | |
|---|---|---|
| Fuel Storage Tanks | There is no evidence of modern or historic fuel / oil storage tanks along the proposed route. | |
| Surrounding Land Use | North | Agricultural land and woodland with numerous drainage ditches and a tributary of the River Rother. In the east of the site, the River Rother is located to the north. The settlements of Salehurst and Northbridge Street are present. |
| | East | Railway, surrounded by agricultural land and woodland. |
| | South | Agricultural land and woodland with numerous drainage ditches. In the west of the site, the River Rother is located to the south |
| | West | The Clappers (road), beyond which is a railway surrounded by a cricket ground and agricultural land. |

## 2.2 Physical Site Setting

A summary of the main physical features of the Site are given in **Table 2-2**. Information has been derived from the GroundSure Report and other sources.

**Table 2-2:**
**Summary of Physical Site Features**

| | | |
|---|---|---|
| **Geography and Geology** | Gradient | The site is generally flat, although sections where the embankment remains is generally elevated. |
| | Elevation | The site is at an elevation of approximately 8 metres above Ordnance Datum. |
| | Made Ground | A series of former railway embankments exist in the eastern portion of the site. The origin and chemical composition or the material used to construct these embankments is not known. |
| | Superficial Drift Geology | The site is underlain by alluvium comprising silt, peat sand and clay. |
| | Solid Geology | The alluvium is recorded as being directly underlain by the Ashdown Formation, which comprises interbedded sandstone and siltstone. |
| | Radon Gas | The proposed development does not include the development of dwellings, but in any case no radon protective measures are necessary. |
| | Mining, and Ground Stability Hazards | GroundSure suggests the site is not within a coal mining affected area and that there are negligible to moderate ground stability hazards from shrinking / swelling clay, landslides, compressible ground and running sands. The risk of landslide is very low to low.<br>Non-coal mining – There may be some gypsum extraction in the vicinity and some rare iron ore extraction although this would have been minor in scale and restricted in extent. |
| Hydrology | Surface Water and River Network | The proposed line of the railway follows the valley of the primary River Rother and crosses it and some of its smaller tributaries, of which there are many, at certain points. The main River meanders roughly east south east toward Rye Harbour where it discharges to the sea. |
| | Flood Risk | The site, at around 8m AOD lies inside the Environment Agency Flood Zone 3 (annual probability of flooding as 1:100) based on fluvial and tidal models. |
| | Surface Water Abstractions | The nearest surface water abstractions are from the River Rother, with the water used for spray irrigation. |
| Hydrogeology | Aquifer | The Environment Agency aquifer records clasify the alluvium as a Secondary (undifferentaited) Aquifer.<br>Ashdown Formation is classified as a Secondary A Aquifer. |
| | Groundwater Abstractions | There are no potable groundwater abstractions within 500m of the Site, there is<br>There are two groundwater abstractions within 480-500m |

| | | |
|---|---|---|
| | | of the site, one for farming and one for irrigation. |
| | Source Protection Zones | There are no groundwater source protection zones within 500m of the site. |

## 2.3 Environmental Search Data

The EnviroInsight report, presented in **Appendix B**, was reviewed to gain commercially available environmental data for the site and its immediate vicinity. A summary of the search information is provided below:

- Sites Determined as Contaminated Land – there are no sites within 500m determined as Contaminated Land under Part 2A EPA 1990.
- There are two Part B Permitted premises, off site in Northbridge Street, but within 500m - these are Favor Parker who compost animal feed, and Scatts agricultural merchants
- Discharge consents – there is one off-site consent within 500m, for sewer storm overflow.
- EA recorded pollution incidents – there are 10 records within 500m of the site, all of relatively minor nature and occurring in 2002 and 2003 – 7 of the instances had no impact on land with the remainder having minor impact.
- Landfill sites – there are no operational or historic landfill sites within 250m of the site – the nearest is at approximately 290-300m off site and is an historic landfill noted to have taken inert waste.
- Other Waste Sites (Operational and Historic) – none listed within 500m.
- Oil and Gas Pipelines - There are no records of high pressure oil and gas pipelines within 500m.
- The potentially contaminative current industrial land uses within 500m are relatively low risk – substations and a vineyard. There are no fuel stations.
- Environmentally Sensitive Sites – the site is within the High Weald Area of Outstanding Natural Beauty and there are Ancient Replanted Woodlands nearby..

Groundwater and surface water abstraction data was discussed in **Section 2.2.**

## 2.4 Site History

This section presents a summary of the site's history from a review of OS map extracts and a small amount of web based research. Whilst the age and general type of activity and land use can often be determined from the type and layout of structures depicted on OS maps, specific elements of site operations cannot normally be determined. Large scale (1:2,500 and 1:10,560) historical map extracts were reviewed for selected years between 1872 and 2012.

A summary of the findings is given in **Table 2-3** and the OS maps are provided in **Appendix A**. Given the length of the site and for ease of interpretation, **Table 2-3** presents the data for the west of the site (Section A1) separately to the east of the site (Section B1), as per **Figure 2-2**, below.

**Figure 2-2:**
**West Section (A1) and East Section (B1) of the Site[2]**

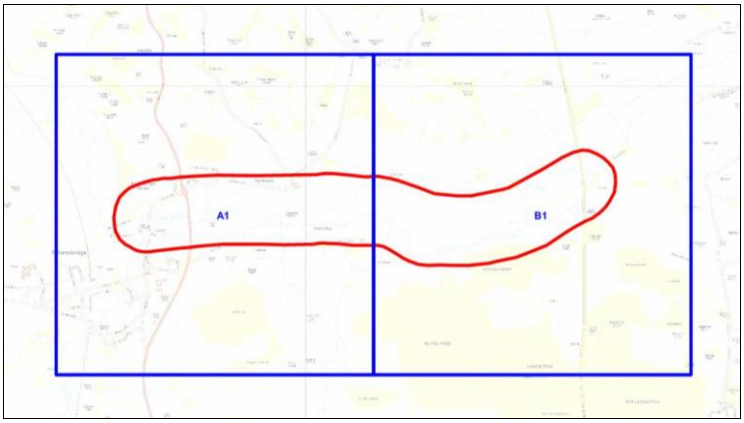



**Table 2-3:**
**Site History Summary**

| Map Dates | Description |
|---|---|
| 1872 - 74 | **West**: The site is undeveloped and crosses a number of fields, along with a mill race (a tributary of the River Rother) and a road.<br>**East**: The site is undeveloped and crosses a number of fields, the River Rother and a road.<br>**Off-site**: The surrounding land use is predominantly agricultural and woodland with the River Rother generally located to the south. Dykes are present along the majority of the northern and southern banks of the River Rother and field ditches are located around the boundaries of most the fields. Northbridge Street, with a corn mill, and Robertsbridge are located approximately (c.) 100m northwest and c.250m southwest of the site, respectively. Salehurst is located c.100m to the north of the western section and Udian is located c.150m east of the site. A spring is located 150m south of the eastern extent of the site. A railway line, which runs north-south, is present c.500m west of the site, with a station located c.600m southwest. A brick works and associated kiln, and a gas works are present adjacent to the station. The remains of a Cistercian Abbey (c.1176) and associated grounds, fish ponds and chapel are present c.250m to south of the centre of the site. |
| 1897 | **West**: No significant changes in the west of the site.<br>**East**: No significant changes in the east of the site.<br>**Off-site**: The area to the immediate north and south of the site is marked 'liable to floods'. The gas works is no longer present. The railway line is to the west is marked as Tunbridge Wells and Hasting Branch of the S.E.R. The brick works has expanded and is marked as a brick and tile works. A saw pits are located c.760m southwest of the west of the site and c.400m north of the centre of the site. |
| 1908 | **West**: The site comprises a single gauge railway line, marked as the Kent and East Sussex Railway, which is on an embankment and crosses the mill race and roads. Tanks, presumably water tanks, are present in the western extent of the site and extend off site. A wetland / reed bed type area is present on site directly south of Salehurst. Much of the land to the south of the railway line is marked as marsh land.<br>**East**: The site comprises a single gauge railway line, marked as the Kent and East Sussex Railway, which is on an embankment and crosses the River Rother and a road. Much of the land to the south of the railway line is marked as marsh land. The far east of the site is marked as Junction Road Halt.<br>**Off-site**: The Kent and East Sussex Railway line extends off site to the east and to |

[2] Image from GroundSure

| Map Dates | Description |
|---|---|
| | the west. In the west it joins the Tunbridge Wells and Hastings Branch and also has a branch to the corn mill. Sewage filters are present adjacent to the brick and tile works. |
| 1928 - 29 | **West**: No significant changes on site.<br>**East**: No significant changes on site.<br>**Off-site**: The tile and brick works are no longer marked; allotment gardens are present. The saw pit is marked as a saw mill. The railway to the west is marked Southern Railway. A gravel pit is present c. 400m south of the western section of the site. |
| 1946 - 48 | **West**: No significant changes on site.<br>**East**: No significant changes on site.<br>**Off-site**: No significant changes. |
| 1957 | **West**: No significant changes on site.<br>**East**: No significant changes on site.<br>**Off-site**: No significant changes. |
| 1975 – 77 | **West**: The site is marked as dismantled railway / track; however the embankment remains in situ. The reed bed to the south of Salehurst is marked as a pond.<br>**East**: The site is marked as dismantled railway / track; however the embankment remains in situ. A pond is present in the east.<br>**Off-site**: The railway line, which extends from site, remains present to the west and is marked as disused to the east. The branch line to the mill is no longer present and the mill is an animal foodstuff mill. The tanks in to the west of the site are marked as a pumping station. A works is present in the location of the former brick works. The saw mill to the southwest has been extended. A depot is present in the location of the gravel pit to the south of the site, which appears to have been filled in. |
| 1991 – 93 | **West**: A new road (the A21T) crosses the site north-south on an embankment.<br>**East**: No significant changes.<br>**Off-site**: The railway, which extended off site, is no longer present, with the exception of the construction of the A21T. The depot to the south of the site is marked as a caravan site. |
| 2002 - 12 | **West**: No significant changes.<br>**East**: No significant changes.<br>**Off-site**: No significant changes. |

In summary, the site comprised agricultural land and was crossed by river and road systems, until the construction of the Kent and East Sussex Railway and its associated embankments and infrastructure - which became operational n 1900. The site operated as a railway until 1961 and was dismantled in the mid-1970's, leaving some embankments and water features. No significant changes have been evident on site since the mid-1970s, save for the construction of the A21(T) in the early 1990s, which crosses the west of the site north-south .

Potentially contaminative historic off site land-uses have included, extension of the railway line on site, a gas works (600m off site), a corn mill, a brick and tile works (c.600m), a gravel pit, a railway station, saw mills and a depot. However, all of these activities are considered to be too distant to have had a significant impact on the site.

# 3.0 OUTLINE CONCEPTUAL MODEL AND PRELIMINARY LAND QUALITY RISK ASSESSMENT

## 3.1 Regulatory Context

### *3.1.1 The Contaminated Land Regime – Overhauled for 2012*

Spring 2012 saw substantial changes in the UK's Contaminated Land Regime with a complete overhaul of the legal guidance[3] and deletion of long-standing pollution control policies[4] in favour of the National Planning Policy Framework[5].

The new Contaminated Land Statutory Guidance is very different from the 2006 issue and consultation draft. Whilst the regime continues to advocate a precautionary approach to dealing with contaminated land, there is clear direction to avoid the *"excessive cost burdens"* of *"wastefully expensive remediation".*

In their Impact Assessment Defra estimate that:

> *"20%-40% of current remediation work is "unnecessary" and that these costs can be avoided through clearer Guidance and new technical tools to describe the new Category 1-4 system"*

For clarity:

- Category 1: describes land which is clearly problematic;
- Categories 2 and 3: cover the less straightforward land where detailed consideration is needed before deciding whether it is Category 2 (contaminated land requiring remedial action) or Category 3 (not contaminated land) - wider socio-economic factors come into play if health risks assessment fails to produce a decision; and
- Category 4: describes land that is clearly not contaminated land.

The new Category 4 test is particularly important in defining when land is clearly not contaminated land in the legal sense; it introduces the idea that it would be exceptional for land: exhibiting normal background levels of contamination; or contaminant levels below published assessment criteria (which are due to be augmented by new screening levels) to be considered as contaminated land.

Importantly, the new guidance makes it clear that regulators can only require remediation to a point where land is no longer contaminated land in the legal sense (i.e. the boundary between Categories 2 and 3) and not require *"unnecessary"* clean up to attain Category 4 standards. This means some landowners / developers will choose a remedial end-point in Category 3 whilst others will still volunteer to clean-up to Category 4 (to deal with perception issues or to please funders, etc).

From this point on, exceedance of a Soil Guideline Value should simply trigger further risk assessment.

[3] Environmental Protection Act 1990 Part 2A Contaminated Land Statutory Guidance, Defra, April 2012.

[4] Planning Policy Statement 23: Planning and Pollution Control, ODPM, November 2004.

[5] National Planning Policy Framework, DCLG, March 2012.

With the introduction of clearer legal guidance, the introduction of the concept of "normal" background levels of contaminants and an emphasis on the use of science and risk assessment to make better and more reasonable decisions about when land does (and does not) need to be remediated and to what degree, the government predicts financial savings to:

- businesses and other owners of land with a significant legacy of historical land contamination;
- the construction sector and new home-buyers via a substantial reduction in deadweight remediation costs; and
- the taxpayer from reduced costs for publicly-funded remediation projects.

*National Planning Policy Framework*

This redevelopment project falls under the remit of the Planning Act and is subject to both local and national planning policies.

Annex 2 of PPS23[6] entitled Planning and Pollution Control advised on the circumstances when it might have been be appropriate for local planning authorities to grant planning permission for developments on land affected by contamination. Its replacement, the National Planning Policy Framework (NPPF) of March 2012 has a core aim to:

- encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.

Slightly modifying the messages of Annex 2, the new NPPF says the planning system should contribute to and enhance the natural and local environment by:

- preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and
- remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

Furthermore NPPF says that planning policies and decisions should also ensure that:

- a site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation; and that
- after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990 (meaning Category 3 or 4).

In essence, these simple messages replace all 42 pages of Annex 2 including the example planning conditions in Appendix 2B, <u>and</u> the Model Planning Conditions for development on land affected by contamination set out in a letter to Chief Planning Officers by DCLG in May 2008.

It is clear that the national planning policy directs those involved in development to ensure sites are suitable for use and not be capable of being determined as contaminated land

[6] Planning Policy Statement 23: Planning and Pollution Control, Annex 2: Development on Land Affected by Contamination, ODPM, 2004.

under Part 2A – which means that the category of land, post remediation (if required) should be considered.

### 3.2 Physical Conceptual Site Model

The physical Conceptual Site Model (CSM) is anticipated to be relatively simple, with either:

- the natural alluvium surcharged by an historic embankment made of unknown materials (predominantly in eastern half of site); or
- (predominantly in western areas) land currently used for arable crop production: agricultural soils over natural alluvium with the possibility of some historic embankment/track-bed material entrained in the soil.

We would expect groundwater to be present at approximately the elevation of the River Rother, so around 6-7m above Ordnance Datum (AOD) – not more than a few metres below ground level.

### 3.3 Chemical Conceptual Site Model

Due to access constraints, SLR has not been able to visually inspect the land, but it is clear from aerial imagery that the route has become vegetated with emergent trees / scrub or is in use for crop production.

Historic mapping and modern aerial imagery have not lead to the establishment of specific areas of chemical concern by SLR (i.e. there are no mapped tanks or coal heaps, etc and no clear images of land devoid of vegetation, etc) but with no close-up visual evidence and no intrusive ground investigation (targeted or otherwise), SLR is reliant on published guidance to establish which *potential* contaminants may have entered the ground during the relatively short operational period of the railway; 61 years from 1900 to 1961. The most relevant source of guidance is the Industry Profile for Railway Land produced by the Department of the Environment in 1995. Table 1 from that document, reproduced below, in **Figure 3-1**.

**Figure 3-1:**
**Extract from Industry Profile**

**Table 1 Main groups of contaminants and their probable locations**

**Railway land**

| Location or process / Chemical group | Running lines | Stations | Sidings and freights yards | Freight depots | Signal box lamprooms | Infrastructure engineering workshops | Electrical substations | Engineering landfill sites | Roofing |
|---|---|---|---|---|---|---|---|---|---|
| Fuel oils | | ■ | ■ | | | | | ■ | |
| Lubricating oil | | ■ | ■ | ■ | | | | ■ | |
| Paraffin | | | | | ■ | | | | |
| PCBs | ■ | | | | | | ■ | | |
| PAHs | ■ | ■ | ■ | ■ | | ■ | | | |
| Solvents | | | | | | ■ | | | |
| Ethylene glycol | ■ | | ■ | ■ | | | | | |
| Creosote | ■ | | | | | ■ | | | |
| Herbicides | ■ | | | ■ | | | | | |
| Ferrous residues | ■ | | | | | | | ■ | |
| Metal fines | ■ | | | | | | | ■ | |
| Asbestos | | | | | | | | ■ | ■ |
| Ash | ■ | | | ■ | | | | ■ | |
| Sulphate | ■ | | | ■ | | | | ■ | |

Shaded boxes indicate areas where contamination is most likely to occur

The relevant column of the table is that for Running Lines. The potential sources of contaminants are:

- **Source 1: Land beneath Electrical Transformer(s)** – it is not known whether the site once had transformers, but it is the case that some historic oil-filled transformers in the UK did contain PCBs.
- **Source 2: Waste within Embankments / Ballast** - the embankments in the east of the site may well have been constructed with natural excavated materials but if there had been a shortfall it is possible that waste materials such as clinker and ash were also used. Similarly track ballast in the UK is normally crushed rock (granite, limestone or sandstone) but sometime crushed slag or steam locomotive ash was used. Potential contaminants are: metals, phenols, sulphates and polycyclic aromatic hydrocarbons (PAH) compounds.
- **Source 3: Contaminated Ballast** – **(1)** fuel oils, lubricating oils and greases may cause localised contamination of ballast in location where locomotives have stood – the only candidate site is the halt at Salehurst. There is also the possibility for ethylene glycol. **(2)** herbicides may have been used to prevent the growth of weeds on the tracks or along the lineside. **(3)** creosote used to preserve wooden sleepers may have entered the ground along the line.

Obviously those pollutants, *if* present in 1961, may be present at reduced concentrations or may not be present at all when the proposed railway opens - given the decommissioning process in the 1970's and 55 years environmental degradation.

Other, perhaps more minor, sources of contamination are:

- **Source 4: Soils** (majority of which are now in agricultural use) along the previous route which may contain contaminants by virtue of having been under or adjacent to the old railway – and hence may contain traces of coal ash, metal fines, etc (Note – in particular this source refers to soils which will be will be removed from the railway footprint and placed elsewhere as landscaping soils post-construction; and
- **Source 5:Hazardous Gases** - naturally occurring methane, carbon dioxide and perhaps others hazardous gases from within the alluvium associated with the river valley which may contain organic matter and peat.

And, of course there may be:

- **Source 6: Unexpected / Unidentified Contamination** – which may be revealed by the earthworks.

The normal procedure for assessing land dictates that potential contaminants, pathways and receptors should be considered within the context of contaminant or pollutant linkages. An evaluation of the risks associated with each linkage should drive decisions regarding the status of the land as contaminated and requiring remediation, uncontaminated or requiring further investigation.

The information summarised in the previous sections has been used to identify the likely contaminant sources, receptors and pathways present at the Site. The elements of the conceptual model built into **Table 3-1**, overleaf, have been used to consider the potential pollutant linkages (PPL), their significance and acceptability.

It must be remembered that:

- soil will be removed from the railway (embankment) footprint immediately prior to the commencement of bulk earthworks and stored on site awaiting placement post-construction;
- bridge abutments for two underbridges will be formed in concrete, partly in the ground, and culverts will be constructed in pre-cast concrete;
- pedestrian and bridleway crossings will consist of a granular “Type 1” fill material laid across the track formation to form a surface;
- the developer will, at some point (most likely following receipt of planning approval), have full site access and will have the opportunity prior to commencement of construction works to carry out visual inspections and ground investigations – with land quality assessments designed to identify necessary protective / remedial measures if needed;
- the site in question is a railway line and in operation employees and visitors will not have routine exposure to the ground, save perhaps at the halt which may have managed / landscaped gardens

Given the proposed use as a commercial rail line with halt the most significant PPL appear to be:

- **PPL1a** - Potential Harm to Human Health Outdoors from Exposure to PCBs in the Ground Adjacent to / under Previous Transformer Locations;
- **PPL 1b & 1c** - Potential Pollution of Surface Water and Groundwater by Various Contaminants in Made Ground;
- **PPL2a** - Potential Harm to Human Health Outdoors from Exposure to Various Contaminants held in Historic Wastes within Embankments / Ballast;
- **PPL 2b** - Potential Damage to Future Structures from Exposure to Aggressive Ground;
- **PPL3** - Potential Harm to Human Health Outdoors from Exposure to Various Contaminants held in Contaminated Ballast;

- **PPL4** - Potential Harm to Human Health from Potential Contaminants in Landscaping Soils;
- **PPL5** - Potential for Harm to Health and Building Damage from Hazardous Gases; and
- **PPL 6** - Potential Risks to Health or the Environment from Unidentified Sources

NB PPL1 concerns Source 1, PPL2 concerns Source 2, etc.

In addition, soil quality should be assessed to facilitate appropriate waste disposal options in the event of excavation and removal during construction, piling, etc.

**Table 3-1**:
**Outline Conceptual Site Model**

| Source / Area of Concern | Contaminant(s) | Receptors | Likelihood of PPL Forming & Comment on Consequence | Next Step in Procedure |
|---|---|---|---|---|
| **Source 1: Land beneath Electrical Transformer(s)** – it is not known whether the site once had transformers, but it is the case that some historic oil-filled transformers in the UK did contain PCBs. | PCBs | Humans – Inside the train: Future workers & visitors | Unlikely – humans in the train should have insignificant exposure. | - |
| | | Humans – Outdoors: Future workers & visitors | **PPL 1a:** Unlikely that visitors would be exposed, but workers may and there is some potential harm to health from exposure to contaminants via dermal contact (primarily) and ingestion/inhalation. | **PPL 1a:** Further Investigation & Assessment – see **Section 4.1** |
| | | Humans – Neighbours | Unlikely | - |
| | | Property – Built Environment: Future structures | Unlikely that that exposure to PCB would result in significant deterioration of buried concrete/piles | - |
| | | Property - Flora / Fauna: Crops | Unlikely – crops will not be grown | - |
| | | Surface Water: River Rother | **PPL 1b&c:** Possible that soluble contaminants migrate laterally via groundwater to the surface water. However, given a 55 year interval it seems extremely unlikely that significant pollution continues. | **PPL 1b&c:** Further Investigation & Assessment – see **Section 4.2** |
| | | Groundwater: Secondary Aquifer, flow towards River Rother)<br>No potable groundwater abstractions between site and river. | | |
| | | Ecosystems | Unlikely – none present within a reasonable distance from the site | - |

| Source / Area of Concern | Contaminant(s) | Receptors | Likelihood of PPL Forming & Comment on Consequence | Next Step in Procedure |
|---|---|---|---|---|
| **Source 2: Waste within Embankments / Ballast -** the embankments in the east of the site may well have been constructed with natural excavated materials but if there had been a shortfall it is possible that waste materials such as clinker and ash were also used. Similarly track ballast in the UK is normally crushed rock (granite, limestone or sandstone) but sometime crushed slag or steam locomotive ash was used. | Potential contaminants are: metals, phenols, sulphates and polycyclic aromatic hydrocarbons (PAH) compounds. | Humans – Inside the train: Future workers & visitors | Unlikely – humans in the train should have insignificant exposure. | - |
| | | Humans – Outdoors: Future workers & visitors | **PPL 2a** Unlikely that visitors would be exposed, but workers may and there is some potential harm to health from exposure to contaminants via dermal contact (primarily) and ingestion/inhalation. | **PPL 2a:** Further Investigation & Assessment – see **Section 4.1** |
| | | Humans – Neighbours | Unlikely | - |
| | | Property – Built Environment: Future structures | **PPL 2b** Possible that exposure to aggressive ground would result in significant deterioration of buried concrete abutments/culverts. | **PPL 2b:** Further Investigation & Assessment – see **Section 4.3** |
| | | Property - Flora / Fauna: Crops | Unlikely – crops will not be grown | - |
| | | Surface Water: River Rother | **See PPL 1b&c** | **See PPL 1b&c** |
| | | Groundwater: Secondary Aquifer, flow towards River Rother)<br>No potable groundwater abstractions between site and river. | | |
| | | Ecosystems | Unlikely – none present within a reasonable distance from the site | - |

| Source / Area of Concern | Contaminant(s) | Receptors | Likelihood of PPL Forming & Comment on Consequence | Next Step in Procedure |
|---|---|---|---|---|
| **Source 3: Contaminated Ballast** – (1) fuel oils, lubricating oils and greases may cause localised contamination of ballast in location where locomotives have stood – the only candidate site is the halt at Salehurst. There is also the possibility for ethylene glycol. (2) herbicides may have been used to prevent the growth of weeds on the tracks or along the lineside. (3) creosote used to preserve wooden sleepers may have entered the ground along the line. | Fuel oils, lubricating oils and greases plus ethylene glycol – at Salehurst<br><br>Herbicides and creosote along the line. | Humans – Inside the train: Future workers & visitors | Unlikely – humans in the train should have insignificant exposure. | - |
| | | Humans – Outdoors: Future workers & visitors | **PPL 3:** Unlikely that visitors would be exposed, but workers (at Salehurst and along the line) may and there is some potential harm to health from exposure to contaminants via dermal contact (primarily) and ingestion/inhalation. | **PPL 3:** Further Investigation & Assessment – see **Section 4.1** |
| | | Humans – Neighbours | Unlikely | - |
| | | Property – Built Environment: Future structures | Unlikely that that exposure to contaminants listed would result in significant deterioration of buried concrete/piles | - |
| | | Property - Flora / Fauna: Crops | Unlikely – crops will not be grown | - |
| | | Surface Water: River Rother | **See PPL 1b&c** | **See PPL 1b&c** |
| | | Groundwater: Secondary Aquifer, flow towards River Rother)<br>No potable groundwater abstractions between site and river. | | |
| | | Ecosystems | Unlikely – none present within a reasonable distance from the site | - |

| Source / Area of Concern | Contaminant(s) | Receptors | Likelihood of PPL Forming & Comment on Consequence | Next Step in Procedure |
|---|---|---|---|---|
| **Source 4: Soils** (majority of which are now in agricultural use) along the previous route which may contain contaminants by virtue of having been under or adjacent to the old railway – and hence may contain traces of coal ash, metal fines, etc (Note – in particular this source refers to soils which will be will be removed from the railway footprint and placed elsewhere as landscaping soils post-construction). | Various contaminants – possibly metals, hydrocarbons & PAH compounds | Humans – Inside the train: Future workers & visitors | Unlikely – humans in the train should have insignificant exposure. | - |
| | | Humans – Outdoors: Future workers & visitors | **PPL 4**: Potential harm to human health from exposure to contaminants within imported landscaping soils via ingestion, dermal contact and inhalation outdoors (from outdoor soil) | **PPL 4:** Voluntary Preventative Action – in order to prevent the risks the developer will control the quality of landscaping soils – see **Section 5.1** |
| | | Humans – Neighbours | Unlikely | - |
| | | Property – Built Environment: Future structures | Unlikely that that exposure to contaminants listed would result in significant deterioration of buried concrete/piles | - |
| | | Property - Flora / Fauna: Crops | Unlikely – crops will not be grown | - |
| | | Surface Water: River Rother | **See PPL 1b&c** | **See PPL 1b&c** |
| | | Groundwater: Secondary Aquifer, flow towards River Rother)<br>No potable groundwater abstractions between site and river. | | |
| | | Ecosystems | Unlikely – none present within a reasonable distance from the site | - |

| Source / Area of Concern | Contaminant(s) | Receptors | Likelihood of PPL Forming & Comment on Consequence | Next Step in Procedure |
|---|---|---|---|---|
| **Source 5:Hazardous Gases** - naturally occurring methane, carbon dioxide and perhaps others hazardous gases from within the alluvium associated with the river valley which may contain organic matter and peat. | Hazardous gases (e.g. methane) | Humans – Inside the train: Future workers & visitors | Unlikely – humans in the train should have insignificant exposure. | |
| | | Humans – Outdoors: Future workers & visitors | Unlikely given diffusion to atmosphere | - |
| | | Humans – Neighbours | Unlikely to be significantly impacted by on Site sources | - |
| | | Property – Built Environment: Future structures | **PPL 5:** Potential explosion risk from build-up of gases / vapours under / within any structures (especially electrical cupboards / rooms) | **PPL 5:** Further Investigation & Assessment – see **Section 4.3** |
| | | Property - Flora / Fauna: Crops | Unlikely – crops will not be grown on site | - |
| | | Surface Water: River Rother | **See PPL 1b&c** | **See PPL 1b&c** |
| | | Groundwater: Secondary Aquifer, flow towards River Rother)<br>No potable groundwater abstractions between site and river. | | |
| | | Ecosystems | Unlikely – none present within a reasonable distance from the site | - |

| Source / Area of Concern | Contaminant(s) | Receptors | Likelihood of PPL Forming & Comment on Consequence | Next Step in Procedure |
|---|---|---|---|---|
| **Source 6** - Unidentified Contaminant Sources | Unknown | All Receptors | **PPL 6**: Potential Harm to Health or the Environment from Unidentified Contaminant Sources – Exposure Mechanism Unknown. | **PPL 6**: If Needed - Voluntary Remedial Action – see **Section 5.2** |

## 4.0 FURTHER INVESTIGATION AND ASSESSMENT

This PLQRA has allowed the development of an outline conceptual model. Normally SLR would recommend investigation of PPLs without further desk based / preliminary research, but in this case it is our opinion that intrusive work should be preceded by a second stage of data gathering with the subsequent review of information being used to improve the conceptual model.

We have come to this conclusion as there is likely much to be gained by visually inspecting the proposed route, researching the old line (to establish the locations of transformers and alike if possible) and gaining a detailed understanding of the construction plans.

The second stage should enable an assessor to produce a more detailed conceptual model of ground conditions, and seems to be the most sensible approach as it should allow RVR's application to proceed with minimal land quality fieldwork.

From the list of PPL identified in Section 3, PPL1, PPL2, PPL3 and PPL5 will require further investigation if the enhancement of the conceptual model does not rule them out or allow the developer to volunteer protective measures.

PPL 4 and PPL5 are discussed in **Section 5**.

### 4.1 Health - PPL 1a, PPL2a & PPL3

*Potential Harm to Human Health Outdoors from Exposure to PCBs in the Ground Adjacent to / under Previous Transformer Locations*

*Potential Harm to Human Health Outdoors from Exposure to Various Contaminants held in Historic Wastes within Embankments / Ballast*

*Potential Harm to Human Health Outdoors from Exposure to Various Contaminants held in Contaminated Ballast*

These PPL concern potentially harmful ground conditions at the site of historic transformer locations, across embankments (if waste was used as a construction material), and across areas of historically contaminated ballast (if present). There is no certainty with respect to the presence or location of such features within the land to be developed and further visual inspection and desk based investigation is recommended.

If old transformer sites, evidence of the use of waste or historic contamination is identified, SLR recommends an intrusive investigation to allow the developer to take account of the chemistry of soils, so that they may make an informed decision about the need for remedial works.

If no old transformer sites, etc are identified, SLR recommends modification of the conceptual model with deletion of associated PPL.

### 4.2 Controlled Waters - PPL 1b&c

*Potential Pollution of Surface Water and Groundwater by Various Contaminants in Made Ground*

These PPL concern ground conditions across the site and the possibility of soluble contaminants migrating laterally via groundwater to the surface water within the River Rother.

SLR recommends regulatory liaison with RDC and the Environment Agency and acquisition of surface water quality monitoring records, not least as given a 55 year interval it seems extremely unlikely that significant pollution continues. Subject to the findings of the extended research an intrusive investigation and / or environmental monitoring is recommended to provide the scheme's environmental consultant with information regarding soil and groundwater chemistry.

The results of any investigation should be used to inform generic risk assessments, detailed quantitative risk assessment may follow if required.

### 4.3 Property - PPL 2b and PPL5

*Potential Damage to Future Structures from Exposure to Aggressive Ground*

*Potential for Harm to Health and Building Damage from Hazardous Gases*

These PPL concern ground conditions across the area of all proposed ground bearing foundations.

Subject to the findings of the extended research, SLR recommends an intrusive investigation and environmental monitoring to provide the scheme's environmental consultant and (foundation) designers with information regarding aggressive ground conditions and hazardous gases / vapours. The information should take regard of guidance provided by the BRE in Special Digest 1 Concrete in Aggressive Ground, and the various guidance documents available with respect to hazardous gases / vapours and potential mitigation measures.

# 5.0 VOLUNTARY PREVENTATIVE AND REMEDIAL ACTIONS AND VALIDATION OF THOSE WORKS

## 5.1 Voluntary Preventative Action to Avoid PPL 4

*Potential Harm to Human Health from Potential Contaminants in Landscaping Soils*

SLR recommends that the developer offer to ensure that landscaping soils (especially those placed in public access areas) meet a soft landscape specification. Example specification wording:

> *"Do not use fill materials which would, either in themselves or in combination with other materials or groundwater, give rise to a health hazard, damage to building structures or instability in the filling, including material that is:*
>
> - *frozen or containing ice;*
> - *organic;*
> - *contaminated or noxious;*
> - *susceptible to spontaneous combustion;*
> - *likely to erode or decay and cause voids;*
> - *with excessive moisture content, slurry, mud or from marshes or bogs;*
> - *clay of liquid limit exceeding 80 and/or plasticity index exceeding 55; or*
> - *unacceptable, class U2 as defined in the Highways Agency 'Specification for Highway works', clause 601".*

The specification should also sets out how the sub-soil should be prepared and placed to a level allowing the later addition of:

- 150mm of topsoil – grassed areas; and
- 450mm of topsoil – shrub planting areas.

In terms of quality, site-won (or imported) topsoil should be tested for compliance with BS 3882:2007[7], and compost tested against BSI PAS100.

Tree pits should be a minimum of 1,200mm diameter and 1,000 mm deep or allow 300mm clearance between the rootball and the edge of the pit.

The regulator may require some documentary evidence that the landscaping specification is followed, and beyond that may require evidence that the chemical composition of any growing media / soil is suitable for use. It is for RVR or their representative to liaise with LBTH on this matter.

In advance of that liaison, it is thought likely the developer or their representative will need to:

- obtain chemical test certificates of proposed landscaping materials and compare the results of the analyses to soil guideline values or (generic) health risk assessment criteria applicable to a the proposed land use(s)
- arrange for a UKAS and MCERTS accredited laboratory to test samples of the materials:
    - at a rate to be agreed with RDC; and for

[7] Specification for topsoil and requirements for use

    - an analysis suite agreed by RDC (most likely comprising CLEA metals, speciated total petroleum hydrocarbons, speciated polycyclic aromatic hydrocarbons, pH and soil organic matter);
- arrange for additional samples (beyond those pre-agreed with RDC) to be collected and tested should any uncertainty arise as to the quality and / or origin of material brought onto site; and
- prepare and submit to RDC a Land Quality Validation Report to demonstrate that suitable materials were placed - see **Section 5.3**.

## 5.2 If Needed - Voluntary Remedial Action to Break PPL 6

*Potential Risks to Health or the Environment from Unidentified Sources*

SLR has advised RVR that RDC may use a planning condition whereby the developer must set forward voluntary additional measures to deal with any contamination (beyond that contamination previously identified) encountered as part of the redevelopment.

In practise, should the developer encounter potentially hazardous materials work should cease and the matter be referred to an appropriate environmental consultant.

Any remedial actions should be agreed with RDC and recorded in the Land Quality Validation Report - see **Section 5.3**.

## 5.3 Land Quality / Remedial Works Validation Report

Any remedial works will follow a period of liaison with RDC in which final details of the remedial scheme will be agreed. RDC may or may not want to be informed of progress during the remedial works, but the regulator will require a report shortly after the remedial works are complete. The Land Quality Validation Report, which should be submitted to RDC with an application to discharge the relevant condition, should:

- set out which organisations have been responsible for implementing and supervising the remedial works (any environmental consultant used should be suitably experienced and operate under an externally accredited quality assurance scheme e.g. ISO9001).
- provide the results of any inspection for contaminants and the remedial scheme;
- provide details for the suppliers of imported soils (if any);
- present chemical test certificates (from the supplier);
- make reference to the health risk assessment carried out prior to soil placement (or import) and the scope of quality assurance works agreed with RDC (criteria & frequencies);
- present the results of laboratory tests on imported materials showing that:
    - the rate agreed with RDC was observed; and that
    - the analysis suite agreed by RDC was carried out;
- present the results of any additional testing (beyond that agreed with RDC);
- demonstrate that quality assurance procedures relevant to soil sampling, storage and testing were complied with (including the use of accredited laboratories and, where possible, the use of MCERTS testing methods);
- form a record of the remedial activities (and any changes to the remedial design) using as-built drawings, progress photographs, etc; and
- set out any additional remedial measures volunteered to deal with contamination (beyond that previously identified) encountered as part of the redevelopment.

## 6.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client.

Information reported herein is based on the interpretation of data collected from various sources which has been accepted in good faith as being accurate and valid.

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

SLR

global environmental solutions


**ABERDEEN**
214 Union Street,
Aberdeen AB10 1TL
**T: +44 (0)1224 517405**

**AYLESBURY**
7 Wornal Park, Menmarsh Road,
Worminghall, Aylesbury,
Buckinghamshire HP18 9PH
**T: +44 (0)1844 337380**

**BELFAST**
24 Ballynahinch Street, Hillsborough,
Co. Down, BT26 6AW Northern Ireland
**T: +44 (0)28 9268 9036**

**BRADFORD ON AVON**
Treenwood House, Rowden Lane,
Bradford on Avon, Wiltshire BA15 2AU
**T: +44 (0)1225 309400**

**BRISTOL**
Langford Lodge, 109 Pembroke Road,
Clifton, Bristol BS8 3EU
**T: +44 (0)117 9064280**

**CAMBRIDGE**
8 Stow Court, Stow-cum-Quy,
Cambridge CB25 9AS
**T: + 44 (0)1223 813805**

**CARDIFF**
Fulmar House, Beignon Close,
Ocean Way, Cardiff CF24 5PB
**T: +44 (0)29 20491010**

**CHELMSFORD**
Unit 77, Waterhouse Business Centre,
2 Cromar Way, Chelmsford, Essex
CM1 2QE
**T: +44 (0)1245 392170**

**DUBLIN**
7 Dundrum Business Park,
Windy Arbour, Dublin 14 Ireland
**T: + 353 (0)1 2964667**

**EDINBURGH**
No. 4 The Roundal, Roddinglaw
Business Park, Gogar, Edinburgh
EH12 9DB
**T: +44 (0)131 3356830**

**EXETER**
69 Polsloe Road, Exeter EX1 2NF
**T: + 44 (0)1392 490152**

**FARNBOROUGH**
The Pavilion, 2 Sherborne Road, South
Farnborough, Hampshire GU14 6JT
**T: +44 (0)1252 515682**

**GLASGOW**
4 Woodside Place, Charing Cross,
Glasgow G3 7QF
**T: +44 (0)141 3535037**

**HUDDERSFIELD**
Westleigh House, Wakefield Road,
Denby Dale, Huddersfield HD8 8QJ
**T: +44 (0)1484 860521**

**LEEDS**
Suite 1, Jason House, Kerry Hill,
Horsforth, Leeds LS18 4JR
**T: +44 (0)113 2580650**

**LONDON**
83 Victoria Street,
London, SW1H 0HW
**T: +44 (0)203 691 5810**

**MAIDSTONE**
19 Hollingworth Court, Turkey Mill,
Maidstone, Kent ME14 5PP
**T: +44 (0)1622 609242**

**NEWCASTLE UPON TYNE**
Sailors Bethel, Horatio Street,
Newcastle upon Tyne NE1 2PE
**T: +44 (0)191 2611966**

**NOTTINGHAM**
Aspect House, Aspect Business Park,
Bennerley Road, Nottingham NG6 8WR
**T: +44 (0)115 9647280**

**SHEFFIELD**
STEP Business Centre, Wortley Road,
Deepcar, Sheffield S36 2UH
**T: +44 (0)114 2903628**

**SHREWSBURY**
Mytton Mill, Forton Heath, Montford
Bridge, Shrewsbury SY4 1HA
**T: +44 (0)1743 850170**

**STAFFORD**
8 Parker Court, Staffordshire Technology
Park, Beaconside, Stafford ST18 0WP
**T: +44 (0)1785 241755**

**WARRINGTON**
Suite 9 Beech House, Padgate Business
Park, Green Lane, Warrington WA1 4JN
**T: +44 (0)1925 827218**

**WORCESTER**
Suite 5, Brindley Court, Gresley Road,
Shire Business Park, Worcester
WR4 9FD
**T: +44 (0)1905 751310**

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