# 13. SOILS, GEOLOGY AND LAND CONTAMINIATION

## 13.1 Introduction

This chapter of the ES discusses the historical and current use of the Site, with respect to contaminated land and the underlying geology and hydrogeology. It details the objectives, methodology and findings of a Phase I desk-based environmental review and considers the potential impacts of disturbance of the soils on the Site associated with the Proposed Development.

## 13.2 Scope of Assessment

The Proposed Development has made only very minor changes to the design of the Consented Development in so far as it influences soils, geology and land contamination. The only design changes that have specific implications for soils, geology and land contamination include:

- the footprint of the facility, which has been reduced compared to the Consented Development as a result of the change in technology; and
- the foundations of the building, which may need to be marginally deeper to support the taller structures.

The assessment from the 2016 ES has been reviewed and updated in this context and only minor, non-material amendments have been made. Some minor updates have also been made to the baseline conditions, but these are not substantive. The conclusions of the assessment of the Proposed Development are consistent with the findings of the 2016 ES with respect to soils, geology and land contamination.

## 13.3 Assessment Methodology and Significance Criteria

The assessment of contaminated soils in the UK follows a risk-based approach and is structured in a tiered manner. As well as having a systematic approach to collecting the data, it is also necessary to adopt recognised techniques and standards in assessing them and particularly with regard to environmental risk assessment.

An assessment of baseline conditions has been undertaken based on the findings of a Phase 1 desk-based study. The methodology employed in completing the desk-based review of the site and surroundings involved the following:

- a site walkover by an experienced environmental consultant to provide an assessment of current site activities and the site's environmental setting;
- a review of historical maps of the Site and surrounding area to determine any historical potential for contamination at or within the vicinity of the Site;
- a review of a third-party environmental database;
- examination of published geological maps produced by the British Geological Survey (BGS) and inspection of the internet-based BGS Geology of Britain and Borehole Viewer;
- examination of the Environment Agency's (Environment Agency's) internet-based aquifer classification scheme;
- review of the internet-based MAGIC environmental mapping service, a web-based interactive service which maps governmental environmental information;
- consultation of the Indicative Atlas of Radon in England and Wales (HPA-RPD-011), published by Public Health England (November 2007) (Ref. 13.1) and Radon;
- guidance on protective measures for new dwellings, published by the BRE & Department of the Environment, Transport and the Regions (1999) (Ref. 13.2); and
- a review of previous site investigation/remediation reports pertaining to the Site.

Information from these data sources enabled the identification of potential pollution sources and pathways for pollutants to migrate from the source areas to potential receptors (e.g. humans, ecosystems, buildings, etc.). Based on this information, a Conceptual Site Model (CSM) has been formed for the Site and its proposed end use. The CSM is based on the risk assessment principles of source, pathway and receptor.

The potential effects have been classified, prior to mitigation, as minor, moderate or major (either 'Adverse', 'Negligible' or 'Beneficial'). Where the predicted effects are considered to be significant, mitigation measures have been incorporated to eliminate or reduce the impacts to an acceptable level.

## 13.4 Legislation, Planning Policy and Guidance

### *13.4.1 National Policy and Legalisation*

The NPPF (2018) (Ref. 13.3) sets out the Government's planning policies for England and how these are expected to be applied. The NPPF constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications. Fundamental to the NPPF is a presumption in favour of sustainable development.

Planning policies and decisions should also ensure that:

- the 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;
- after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the *Environmental Protection Act 1990*; and
- adequate site investigation information, prepared by a competent person, is presented.

The NPPF specifies that the minimum information that should be provided by an applicant, is the report of a desk study and site reconnaissance.

The planning process can influence how contaminated sites are managed through planning policy and development control. In terms of the latter, planning conditions often require detailed site assessment or, in some cases, the restoration of a site to render it suitable for its proposed new use.

Part 2A of the Environmental Protection Act 1990 ("Part 2A") provides the legislative framework for the contaminated land regime in England, Wales and Scotland. It provides for contaminated land to be identified and dealt with in a risk-based manner. The Contaminated Land (England) Regulations 2006 (SI 2006/1380) set out provisions for procedural matters under Part 2A. The 2006 regulations were modified in 2012 with the introduction of The Contaminated Land (England) (Amendment) Regulations 2012. This includes an amendment to Regulation 3(c) to take account of the updated definition of "controlled waters" in Section 78A(9) of the Environmental Protection Act 1990.

Section 78A(2) of Part 2A of the EPA 1990 defines contaminated land as "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 there is a significant possibility of such hard being caused; or
- pollution of controlled waters is being, or is likely to be caused.

The implementation of Section 86 of *The Water Act 2003* on 6th April 2012 by *The Water Act 2003 (Commencement No. 11) Order 2012* (SI 2012/264) modifies the definition of contaminated land to also include land where there is "significant possibility of significant pollution of controlled waters". This applies to England only.

Contaminated Land Statutory Guidance (Ref. 13.4) published in April 2012 provides for a new four category test which is intended to clarify when land does or does not need to be remediated, where Category 1 is deemed as being high risk and Category 4 as being low risk.

“Significant harm” is defined in the Guidance on risk-based criteria and must be the result of a significant “pollutant linkage”. The presence of a pollutant linkage relies on the Source-Pathway-Receptor concept, where all three factors must be present and potentially or actually linked for a potential risk to exist. An initial assessment of pollutant linkage can be made qualitatively (i.e. through identifying these factors) and may be assessed using qualitative risk assessment models.

Contaminated Land Report 11 (CLR 11), Model Procedures for the Management of Land Contamination (Ref. 13.5) identifies the risk management framework to be followed when dealing with land affected by contamination.

Further guidance documents relevant to the assessment of contaminated land are provided by various statutory and non-statutory bodies and are referenced where applicable. The following list details the main legislation and guidance that has been used in preparation of this impact assessment:

- Part IIA Environmental Protection Act 1990 (as inserted by Section 57 of the Environment Act 1995);
- Contaminated Land (*England)* Regulations 2006;
- Contaminated Land (England) (Amendment) Regulations 2012;
- Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, DEFRA, April 2012 (Ref. 13.4).
- Environment Agency (2004): The Model Procedures for the Management of Land Contamination, CLR 11 (Ref. 13.5).
- Indicative Atlas of Radon in England and Wales (HPA-RPD-033), published by Public Health England (November 2007) (Ref. 13.1) and
- Radon: guidance on protective measures for new dwellings, published by the BRE & Department of the Environment, Transport and the Regions (1999) (Ref. 13.2).

### *13.4.2 Local Planning Policy*

#### *13.4.2.1 North Northamptonshire Minerals & Waste Local Plan (2017)*

Policy 12 of the Minerals and Waste Local Plan (2017) states that development should, where appropriate, and particularly in the case of advanced treatment facilities “maximise the use of previously developed land (particularly existing and designated industrial land, and derelict, despoiled, or brownfield urban land)”.

#### *13.4.2.2 Part 1 Local Plan: North Northamptonshire Joint Core Strategy (2016)*

Policy 6 of the Part 1 Local Plan relates to development on brownfield land and land affected by contamination. Planning permission will be granted for development on land affected by contamination where it can be established by the proposed developer that the site can be safely and viably developed with no significant impact on either future users or on ground and surface waters.

## 13.5 Baseline Conditions (No material change to the 2016 ES)

### *13.5.1 Introduction*

This chapter of the ES presents the findings in relation to the soil and groundwater conditions, within the boundary of the Proposed Development. The assessment addresses potential sources of contamination, the pathways of exposure and potential receptors.

ERM has reviewed the 2016 ES baseline and updated it where required. In particular, new information was added from data sourced from Envirocheck in February 2019 (**Appendix 13.1**). No material changes were made to the baseline.

### *13.5.2 Current Activities On-Site*

The majority of the Site is currently utilised as a car storage area (*i.e.* tarmac roads with gravelled areas) (**Photograph 13.1**)) bounded with palisade fencing. The northern elevation of the Site is landscaped and acts as a buffer between the Site and the adjacent watercourse (**Photograph 13.2**).

**Photograph 13.1 View Across the Site**

**Photograph 13.2 Northern Boundary Fence and Northern Stream (located off-site)**

No formal waste storage areas were observed on-site. The Site is operational and as a result small-scale domestic and vehicle maintenance type wastes are likely to be produced by the current Site operator. These could include waste oils, rags, plastic, cardboard, empty drums and scrap metal. During the Site visit carried in 2016, thirty four 205-litre oil drums (contents unknown) were noted

adjacent to the Site entrance located off Shelton Road (i.e. acting as a barricade to prevent unauthorised access on to the site) **(Photograph 13.3)**). No significant hydrocarbon staining was noted. A subsequent site visit was carried out in February 2019, which confirmed that the drums have been removed. There is however a potential for historical contamination to be present within the area of any drums on Site.

**Photograph 13.3 Drum Storage Near Entrance to Site**


The Site is approximately rectangular in shape and occupies an approximate area of 2.5 ha. Access to the Site is via Shelton Road on the eastern elevation of the Site. The topography of the Site appears to be relatively flat lying at approximately 106 m Above Ordnance Datum (AOD).

No evidence of current or historic Above Ground Storage Tanks (ASTs) or Underground Storage Tanks (USTs) *i.e.* fill points, unexplained manhole covers, vent pipes, *etc.* were observed during the Site inspection. The only materials storage on site are the 205-litre drums outlined in Photograph 13.3.

According to the sales documentation, oil interceptors are located on-site. Information provided by the previous land owner indicates that these were installed when the site was remediated.

There are no emissions to atmosphere from the current Site activities other than the movement of road vehicles.

There are no permanent built structures on the Site in which Asbestos Containing Materials (ACMs) could be located and hence the presence of ACMs is considered unlikely. The presence of ACMs in the ground which may have been introduced as a result of historic Site uses (for example, as a result of the demolishment of structures) cannot be discounted.

### *13.5.3 Historical Activities On-Site*

A number of historical maps were examined as part of the desk-based review. A summary of the historical development of the Site is provided in **Table 13.1**. The maps are reproduced in **Appendix 13.2**.

## Table 13.1 Site History

| Date/Scale | Features On-Site | Features Off-Site |
|---|---|---|
| 1885<br>1:10,560 | The Site was undeveloped agricultural land with Northern Stream, which flowed in an approximate southwest to northeast direction, annotated on the Site. | The immediate and wider surrounds were undeveloped agricultural land and woodland interspersed with occasional residential properties. |
| 1886<br>1:2,500 | No apparent changes were noted. | No apparent changes were noted. |
| 1900<br>1:2,500 | No apparent changes were noted. | No apparent changes were noted. |
| 1901<br>1:10,560 | No apparent changes were noted. | No apparent changes were noted with the exception of a number of quarries c.500m to the west of the Site. These quarries were connected to a railway line 1.1km to the west of the Site. |
| 1938<br>1:2,500 | Due to the small-scale map, it was unclear what activity the Site was being used for; however, the Site no longer appeared to be in agricultural use. In addition, the watercourse had been channelized and moved northwards to a position where the watercourse only flowed across the north-eastern elevation of the Site. | Due to the small-scale map, it was unclear what activities were undertaken within the surrounds. |
| 1950<br>1:10,560 | The Site appeared to be unused and devoid of any features, with the exception of the watercourse on the north-eastern elevation of the Site. | Approximately 375m to the south of the Site was the Lancashire and Corby Steel Works, while c.700m to the south-west, a number of railway sidings and a large industrial-style unit were depicted. Further industrial-style properties were noted beyond 1km to the south-west. |
| 1952<br>1:10,560 | Approximately 40% of the Site was depicted as a pond or lagoon and likely to be associated with the industrial activities undertaken within the immediate and wider surrounds. The remainder of the Site was unused. | An ironstone quarry was depicted c.500m to the north of the Site with and 'old ironstone quarry' depicted c.280m to the south-east. To the south and south-west, further industrial properties with railing sidings were noted. Beyond the Lancashire and Corby Steel Works, further evidence of opencast surface excavation had taken place. |
| 1958<br>1:10,000 | No apparent changes were noted. | No apparent changes were noted. |
| 1964<br>1:2,500 | The channel of the watercourse had been moved again and was located completely off-Site. The lagoon or pond was no longer annotated and had potentially been infilled.<br><br>On the northern and eastern boundaries, embankments were annotated and industrial-style units were depicted on the south-western corner of the Site. | Railway lines and sidings were depicted in the immediate surrounds to the norther, east and south of the Site. To the south-west and west, industrial-style units were depicted and adjacent to the Site's north-western corner, a pond was depicted. |

| Date/Scale | Features On-Site | Features Off-Site |
|---|---|---|
| 1973<br>1:2,500 | A square shaped feature, annotated as a drain, was depicted on the south-western corner of the Site. With the exception of the embankments on the northern and elevation boundaries, the remainder of the Site remained featureless. | No apparent changes were noted. |
| 1982/87<br>1:10,000 | No apparent changes were noted. | The quarry to the north of the Site has extended its operations Southwards towards the Site. The old ironstone quarry to the south-east was no longer annotated and had been infilled, beyond which industrial-styled units were depicted.<br><br>To the south and south-west, further industrial development had taken place in the area of the opencast excavation.<br><br>To the west, a series of ponds and lagoons, annotated as sludge beds, were annotated. |
| 1987<br>1:2,500 | The drain and embankments remained annotated on-Site; however, the industrial-style units on the south-west corner of the Site were no longer depicted. The remainder of the Site was devoid of any features. | Adjacent to the Site's southern boundary, part of the Willowbrook East Industrial Estate had been constructed. No other changes were apparent. |
| 1992<br>1:10,000 | No apparent changes were noted. | The opencast excavation to the north was no longer annotated and had possibly been infilled. Further industrial development had taken place to the south-east, south and south-west. |
| 1993<br>1:10,000 | No apparent changes were noted. | No apparent changes were noted. |
| 2006<br>1:10,000 | The drain was no longer annotated and two tracks were depicted on-Site crossing the Site in a north-east to south-west orientation. | Rockingham Motor Speedway and associated car parking was located c.280m to the north-east of the Site. Further industrial development had taken place to the south-east and south-west of the Site. The sludge beds to the north-west of the Site were no longer annotated. |
| 2012<br>1:10,000 | No apparent changes were noted. | No significant changes were apparent. |
| 2019<br>Aerial imagery | The Site is depicted as a car storage facility with hard standing across the majority of the Site and landscaping along the northern boundary. | No significant changes were apparent. |

In summary, from the earliest available map (1885) until the late 1930s, the Site was undeveloped agricultural land with a watercourse, known as Northern Stream, flowing eastwards across the Site. The 1938 map appeared to indicate that the Site was no longer in agricultural use. In addition, the watercourse had been channelized and moved northwards to a position where the watercourse only flowed across the north-eastern elevation of the Site.

By the early 1950s, approximately 40% of the Site was depicted as a pond or lagoon (likely to be associated with the steel industry). By the mid-1960s, the channel of the watercourse had been moved again and was located completely off-site. The lagoon or pond was no longer annotated and had potentially been infilled. On the northern and eastern boundaries, embankments were annotated and industrial-style units were depicted on the south-western corner of the site. The Site remained unchanged until 1973, when a square-shaped feature, annotated as a drain, was depicted on the south-western corner of the Site. By 1987, the drain and embankments remained annotated on-site; however, the industrial-style units on the south-west corner of the Site were no longer depicted. The 2006 map indicated that the drain was no longer annotated and two tracks were depicted crossing the Site in a north-east to south-west orientation.

Corby was a significant steelmaking centre following the establishment of the Stewarts & Lloyds production site in 1930s. When the British steel industry was nationalised in the 1960s, the Stewarts & Lloyds works, located to the south and south-west of the Site, became part of British Steel. The site, which comprised a total of 280ha with four blast furnaces, two coke ovens and various ancillary facilities, closed in the early-1980s, although the tube making facility, now operated by Corus/Tata, was retained and remains in operation. During its operation, a large quantity of waste was produced which was deposited in various (mostly unregulated) landfills located around the Site. Possible contaminants will depend on the nature of these activities and wastes, but may include asbestos, general steel works wastes, chemicals, metals, fuels and oils, etc. Furthermore, the potential exists for on-site leachate and land gas generation as a result of the deposited wastes.

Based upon the above information the potential for contamination to have arisen at the Site as a result of the historic use is considered to be HIGH.

### 13.5.4 Local Authority Planning Department

Corby Borough Council's on-line planning website was accessed in order to view any planning records (post January 2000) associated with the Site. One planning record was noted associated with the south-west corner of the Site and extended off-site for '*side extension for steam plant, chemical tanker and offloading*' (*ref:* 10/00451/DPA). Permission was granted on Tuesday 16th November 2010.

The Site was granted planning permission for use as a car storage facility in October 1999. In addition, the property has been designated in the Local Plan as an area for development as industrial use under B1, B2 or B8.

There are several planning records for the site as described in Chapter 1 (Introduction), section 1.2 planning history.

### 13.5.5 Environmental Database

A commercial database (provided by Landmark®) was obtained to provide further information regarding the Site and the surroundings (ref: 191077915_1_1, January 2019,). Relevant information and records are summarised below.

**On Site**

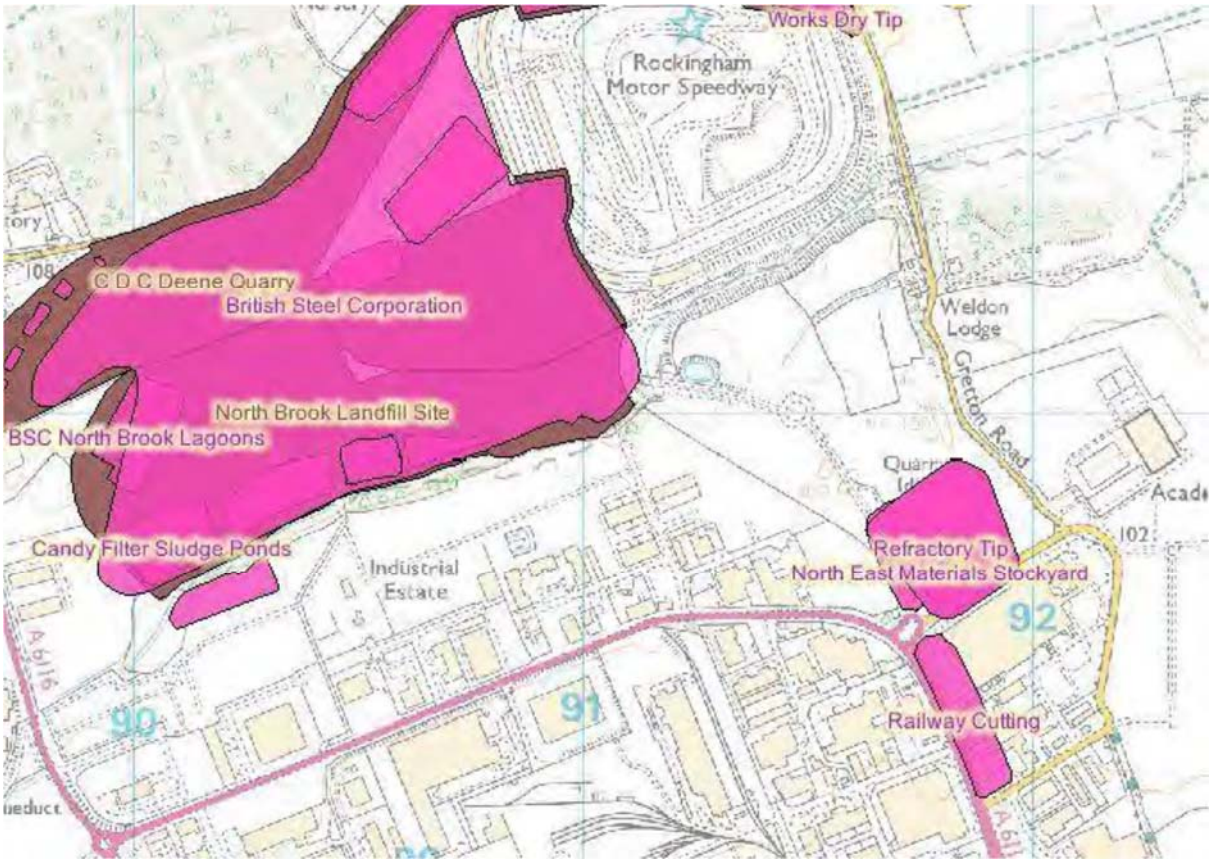
- There is one application for an Integrated Pollution Prevention and Control (IPPC) permit on Site registered to Clean Power (UK) Limited for the disposal of non-hazardous waste and the incineration of hazardous waste involving biological treatment. The status of this application is reported to be valid.

- Licenced Waste Management Facility: there is one licenced waste management facility on Site, registered as North Brook Landfill Site which was operated by Tata Steel UK Ltd. This facility is now closed. It was formerly licenced as an industrial waste landfill.

**Off Site** – the following permit related details were noted within 1 km of the Site.

- BGS Recorded Landfill Sites: there is one BGS Recorded Landfill site within 1 km of the Site. Operated by the British Steel Corporation which is located 10metres north of the Site. This landfill has been classified as posing no threat to groundwater or surface water.
- Historical Landfill Sites: there are twelve historical landfill sites within a 1 km of the Site, three of which are located within the Planning Consultation Zone (250 m). Eleven of the historical landfills were operated by British Steel Corporation. The nearest of which is the BGS Recorded Landfill site, located 10m north of the Site, registered to British Steel Corporation and was operational between 1950 and 1986 for the deposition of inert and industrial wastes. The second landfill registered as the 'Candy filter sludge pond' is located 50m west of the Site, which was operated by British Steel Corporation (BSC) **(Figure 13.1**);

## Figure 13.1 Landfills in the Vicinity of the Site (Source: Environmental Agency)




- Registered Landfill Sites; there are no registered landfill sites within a 250 m (the Planning Consultation Zone) radius of the site, however, seven are located within a 1 km radius. Six of which are no longer operational. The closest is operational and is registered to Corus UK Ltd T/A Corus Tubes, located 390 m west of the Site and is operated by Corus UK Ltd T/A Corus Tubes (ref: C/017). The licence is currently classed as 'operational'.
- Licensed Waste Management Facilities: there are eight licensed waste management facilities located within 1km of the Site. Seven of which are no longer operational. The nearest of which is registered to Corby Borough Council at CDC Deene Quarry, located 170 m north of the Site, which was licenced as a household, commercial and industrial waste landfill. The operational

facility is registered to Peterborough Metal Recycling Ltd, located 630 m southwest of the Site, which is licenced as a metal recycling site.

- Registered Waste Treatment or Disposal Sites: there is one registered waste treatment or disposal sites within a 250m radius and a further three within 1 km of the Site. Three are not operational, as two licences have lapsed/cancelled and one is not yet started. The operational facility is registered to Corus U K Ltd T/A Corus Tubes, located 690 m west of the Site, authorised to accept liquid sludge. The nearest site (which is no longer operational) is located 60 m west of the Site and was operated by British Steel (ref: C/003). The British Steel site, was classified as a 'storage – lagoon' for the waste produced on-site only and was authorised to accept such wastes as aliphatic acids and hydrocarbons, alkali metal oxides, aromatic hydrocarbons, chromic acids, fuel and mineral oils, phenols, paint waste and sulphuric acid.
- Part A(1) and Part A(2) Environmental Permits: there are two registered within 1 km of the Site, the nearest is registered to Material Change Limited located 730 m northeast for recovery and disposal of non-hazardous waste involving biological treatment.
- Part B Environmental Permits: there are twelve Local Authority Pollution Prevention and Control Permits (LAPPC) permits within 1 km of the Site. The nearest of which is registered to Weldon Plant Ltd, located 250 m southeast for PG3/16 mobile screening and crushing processes.
- Substantiated Pollution Incident Register: there are three reported substantiated pollution incidents within 1 km of the Site. In March 2012, a release of organic chemicals (adhesives/sealants) 80 m south-east of the Site, caused a category 2 (significant incident) to water and a category 3 (minor incident) to air. In May 2008, a release of an atmospheric pollutant (smoke), biodegradable materials, inert (construction/demolition material), oils, tyres and vehicle parts, 580 m east of the Site, caused a category 2 (significant impact) to land and a category 3 (minor impact) to air. In August 2003, a release of biodegradable materials (food and drink) 910m southwest of the Site, caused a category 2 (significant impact) to water. Contaminated Land Register: according to the database there are no Contaminated Land Register Entries or Notices associated with the Site or within 1 km of the Site.
- Radioactive Materials: there are no consents listed for the holding or disposal of radioactive material associated with the Site or within a 1 km of the Site.
- Planning Hazardous Substances Consents: there is one Planning Hazardous Substances Consent within 1 km of the Site, registered to Persil Ltd, located 860m south-east, for the storage of the 'liquefied extremely flammable gas (including LPG) and natural gas (whether liquefied or not)' (ref: Co/92/C204/Hs).
- Control of Major Accident Hazards Sites: there are no operational Control of Major Accident Hazards (COMAH) sites within a 1 km search radius. A former COMAH site, operated by Starion International is located 840 m southeast of the Site and was a lower tier COMAH site.
- BGS Mineral Sites: there are six BGS mineral sites within 1 km of the Site, all of which were opencast mined for iron ore (ironstone) and are no longer operational. The nearest was registered to Stewarts & Lloyds Minerals Ltd, located 530 m north of the Site.

### *13.5.6 Geology*

According to the relevant British Geological Survey (BGS) Solid and Drift Geology Map (Sheet 171: Kettering), the Site is directly underlain by Infilled Ground, 'opencast ironstone workings and major limestone and sand and gravel quarries, may be partly or completely backfilled'. The Infilled Ground is underlain by the bedrock geology of the Northampton Sand Formation, part of the Inferior Oolite Group. According to the BGS Lexicon of Named Rock Units, the Northampton Sand Formation is described as 'sandy, berthierine-ooidal and sideritic ironstone, greenish grey where fresh, weathering to brown limonitic sandstone, typically displaying a box-stone structure. The basal part is commonly muddy and less ferruginous. The uppermost beds are generally more or less ferruginous sandstone. The unit includes lenses of mudstone and limestone in places, and contains a fairly abundant marine

fauna of bivalves, brachiopods and ammonites, which are not generally evident in weathered sections'. The Site is not underlain by superficial deposits.

According to data issued by the Public Health England (Ref. 13.1), the land is located in an area where less than 1% of residential properties are above the action level for Radon. No radon protection measures are considered necessary by the BGS.

### 13.5.7 Hydrogeology

The aquifer classification system was updated on 1st April 2010 which provided new aquifer designations to replace the old system of aquifer classifications, such as Major, Minor and Non-Aquifer. This new system is in line with the Environment Agency's Groundwater Protection Policy (GP3) and the Water Framework Directive (WFD) and is based on British Geological Survey mapping.

From a review of the Environment Agency on-line maps the Site is located on the Northampton Sand Formation (Secondary A Aquifer). This consists of permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as Minor Aquifers. However, given the historical context of the area, the widespread iron mining activities in the past and the presence of known contamination, the distribution and usability of groundwater is probably limited. This is confirmed by the absence of any groundwater abstraction licences associated with the Site or within a 2km search radius.

The Environment Agency have defined Groundwater Source Protection Zones (SPZs) for 2,000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones are designated to protect the location from the risk of contamination from any activities that might cause pollution in the area, i.e. the closer the activity, the greater the risk. The maps show three main zones: an inner, an outer and the total catchment with a fourth zone of special interest, which the Environment Agency occasionally apply to a groundwater source. The third-party database and Environment Agency website indicate that the Site is not located in an SPZ.

According to the Environment Agency[1], the groundwater in the vicinity of the Site was classified as having overall good water quality status in 2016 (in accordance with the Water Framework Directive).

According to the database there are no active groundwater abstractions within 2 km of the Site.

### 13.5.8 Hydrology

According to the most recent Ordnance Survey map, the nearest surface water feature is Northern Stream, which is a tributary of Willow Brook and flows in an approximate south-west to north-east direction, along the Site's northern boundary.

For each River Basin District, the Water Framework Directive requires a River Basin Management Plan to be published. These are plans that set out the environmental objectives for all the water bodies within the River Basin District and how they will be achieved. The plans are based upon a detailed analysis of the pressures on the water bodies and an assessment of their impacts. The plans must be reviewed and updated every six years. The ecological status of surface water bodies is based on the following quality elements: biological quality, general chemical and physico-chemical quality, water quality with respect to specific pollutants (synthetic and non-synthetic), and hydromorphological quality. There are five classes of ecological status (i.e. high, good, moderate, poor or bad). Ecological status and chemical status together define the overall surface water status of a watercourse. As such, Northern Stream has been classified as having overall moderate water quality status in 2016. The ecological quality was reported to be moderate and the chemical quality was reported to be good.

According to the database, there are no active surface water abstraction licences within a 2 km radius of the Site.

[1] https://environment.data.gov.uk/catchment-planning/WaterBody/GB40502G402400

According to the MAGIC website, the Site is located within a drinking water safeguard zone for surface water.

### 13.5.9 Sensitive Land Uses

The MAGIC website, which is managed by the Department for Environment, Food and Rural Affairs (DEFRA), and Natural England website was queried to locate ecological receptors within 1km of the Site, as defined by Table 1 of the Environmental Protection Act 1990: Part 2A: Contaminated Land Statutory Guidance, 2012 (Ref. 13.4). These include, but not limited to, Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Ramsar Sites, National Nature Reserves, Areas of Outstanding Natural Beauty (AONB), National Parks and Local Nature Reserves. There are no sensitive ecological receptors within a 1km radius of the subject site.

Nitrate Vulnerable Zones (NVZs) cover some 62% of England and indicate all land draining to waters that are affected by nitrate pollution. NVZs were implemented by the Nitrate Pollution Prevention Regulations 2008, which came into force on 1st January 2009. According to the database, the Site is located in a Surface Water NVZ area.

The nearest residential housing is located 760 m east of the Site at Gretton Road.

## 13.6 Review of Previous Reports

The previous site owner provided ground investigation reports (*i.e.* investigation and remediation) in relation to the Site, including:

- Frank Graham Consulting Engineers (1996), Shelton Road, Corby, Northamptonshire Site Assessment Report, Ref. CKG/590196/000, May 1996 (Ref. 13.6 , see **Appendix 13.3**).
- Babtie Group (2002), Site G – Shelton Road, Willowbrook Industrial Estate, Corby, Validation Report, Babtie Group, Ref: BGE 200945, March 2002 (Ref. 13.7, see **Appendix B of Appendix 12.1**).

The key findings of the reports are outlined below. All reports are included as Appendices to this ES chapter.

### 13.6.1 Frank Graham Consulting Engineers, Shelton Road, Corby, Site Assessment (1996)

Frank Graham Consulting Engineers were commissioned by the Commission *for the* New Towns (CNT) in 1996 to undertake a soil and groundwater investigation at the Shelton Road Site. It should be noted that this report pertains to both the Site and immediate surrounds, as such, only information and data concerning the Site has been summarised below. The report states that five previous investigations had been undertaken on the Site between 1983 and 1995.

It is reported that the wider-site area once formed part of a larger area of Corby involved in ironstone quarrying, associated with the steelworks and coke production. The Site itself had been previously worked for Northampton Ironstone using opencast methods during the 1920/30s. Over some of the Site, sludge lagoons were formed in the depression left by the ironstone workings. The Site had been subsequently levelled by backfilling with opencast spoil including Boulder Clay.

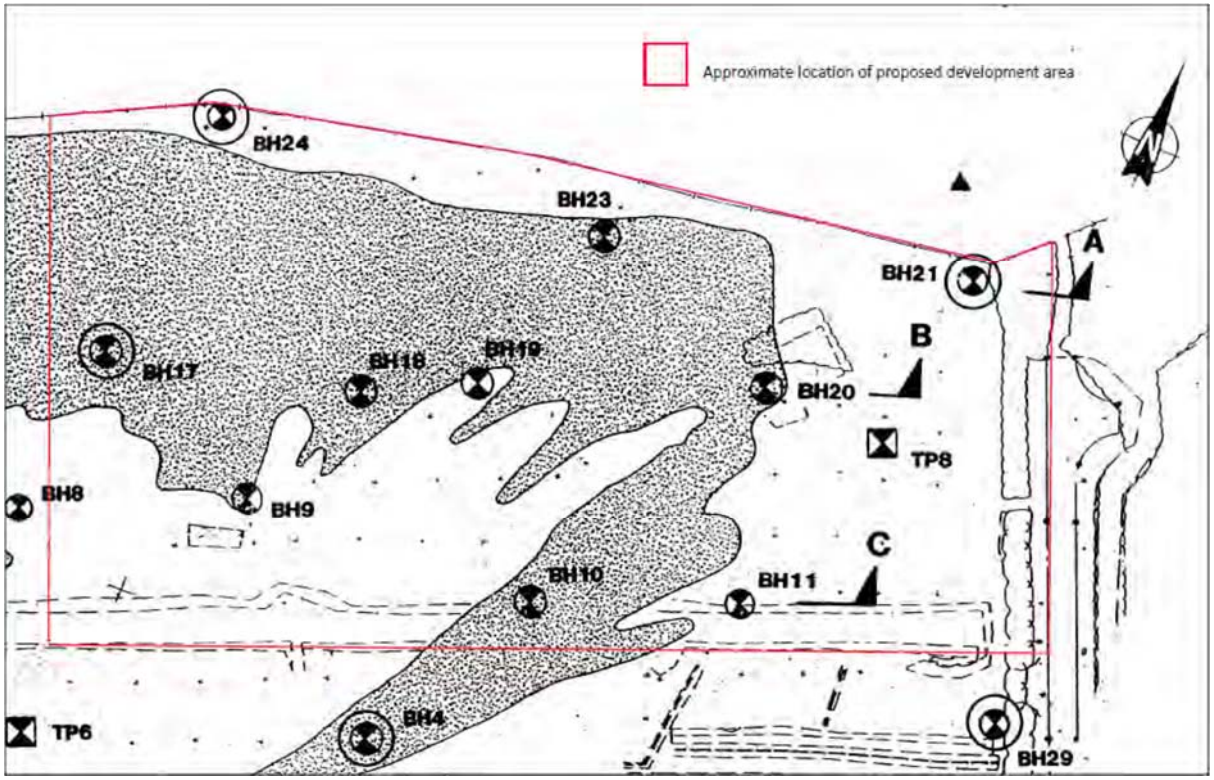
The Frank Graham Consulting Engineers investigation involved 13 trial pits and 22 boreholes of which 10 boreholes and 1 trial pit were located on the Proposed Development Site (**Figure 13.2)**

The principle objectives of the investigations were:

- to assess the levels of hydrocarbons, Poly Aromatic Hydrocarbons (PAHs), heavy metals and phenol concentrations within the deeper groundmass and groundwater at the Site;
- to characterise the leachate potential of the soil materials and the potential for off-site migration of contaminants;

- to measure the potential for landfill gas generation at the Site, or migration onto the site from surrounding landfills; and
- to investigate the stability of the slope along the northern Site boundary.

**Figure 13.2 Borehole and Trial Pit Plan (Ref 14.6)**




The report concluded that the Site is of low sensitivity to the transmission of pollutants arising from the steelworks waste. The identified source of contaminants on the Site was the former sludge lagoons (hatched area shown in **Figure 13.2**) which contained elevated concentrations of heavy metals (primarily Zinc), occasional elevated concentrations of lead and high sulphur/sulphate concentrations. The glacial clays surrounding and covering the sludge lagoons exhibited low contamination levels. It is considered that the migration of compounds off-site is unlikely due to the presence of the low permeability boulder clays and the low solubility of the contaminants (as demonstrated through the leachability testing).

The report recommended that gas protection measures should be incorporated into any proposed building design and that the largest constraint to development is the poor engineering properties of the sludge lagoons.

**Site G – Shelton Road, Willowbrook Industrial Estate, Validation Report (2002)**

Babtie Group were appointed by Kenilworth Corby Limited to provide '*advice and observation services for remedial works at Site G - Shelton Road*'. The Validation Report details the clearance and remediation undertaken at Site G and was required to confirm that the remediation works were carried out in accordance with the associated Remediation Strategy. It should be noted that this report pertains to both the Site and immediate surrounds, as such, only information and data concerning the Site has been summarised below.

The works were undertaken by Weston Landfill Limited and commenced in October 2000 and effectively complete on 21st December 2001. A Babtie engineer was deployed, on a part-time basis, throughout the contract to observe and record the works.

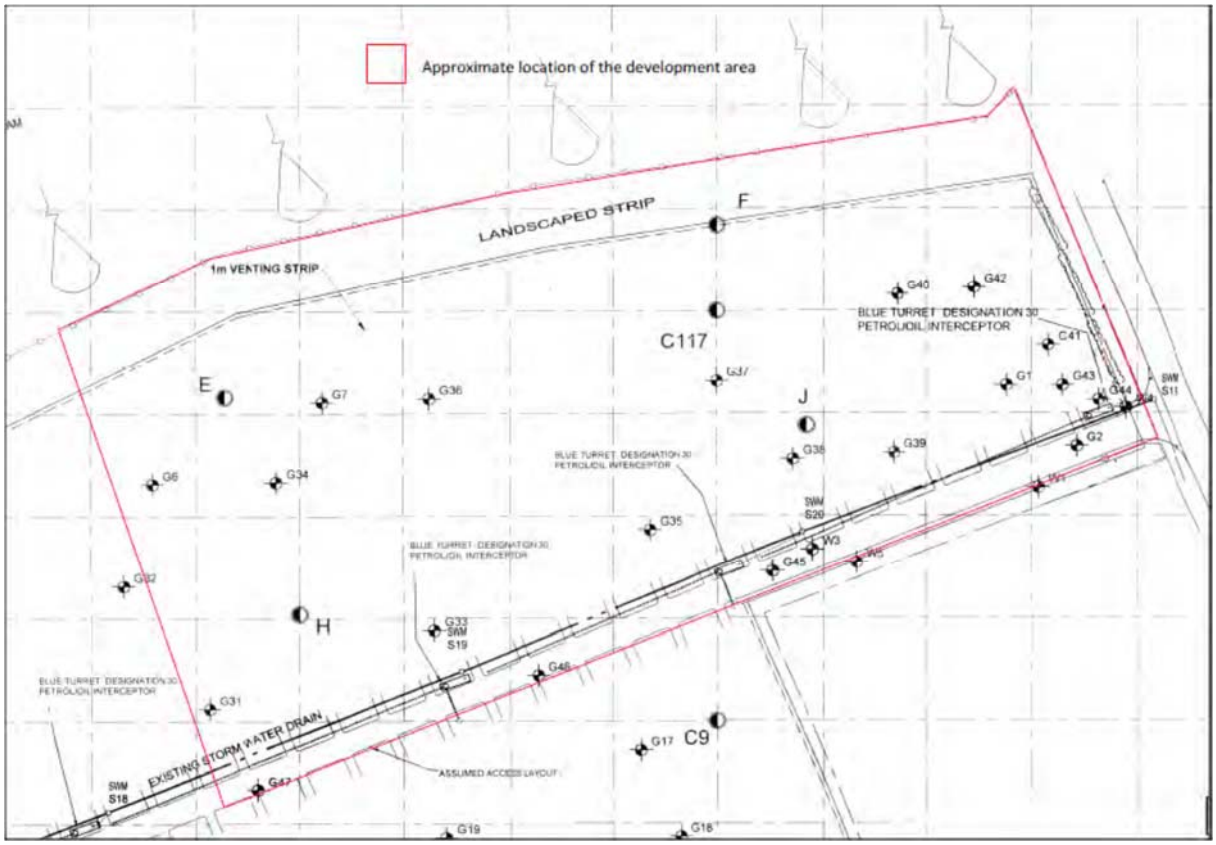
The remedial works comprised the following:

- the ground surface was reshaped, balancing cuts and fills as far as possible. As part of this process unwanted vegetation and contaminated topsoil was removed off-site to a suitably licensed landfill;
- along the northern boundary, a zone of landscaping 17m wide was provided along the bank of the Willowbrook North Arm to allow for any future instability in the bank. On the east, south and west sides of the Site a zone of landscaping (4m wide) was provided;
- regrading of the site and finished surface to ensure a minimum crossfall of 1:50 graded to fall towards a central valley where storm water drains through a system of gullies and oil separators into the existing piped storm water drainage system;
- the installation of a drainage layer beneath a 500mm thick Type 1 capping layer that incorporates a polypropylene geotextile; and
- the infilling of the deep central drainage ditch to form a haul down road.

The report states that the majority of the contamination is found within the steelworks wastes which are encapsulated in glacial till within the Site. The near surface deposits are impacted but with contaminants which do not pose a risk to the users of the proposed 'industrial' development. The contamination found has been shown to be relatively insoluble and therefore immobile.

The Babtie Group investigation comprised of 48 soil and 4 water samples of which 5 boreholes and 23 validation soil sample locations were obtained on the Site (**Figure 13.3**).

**Figure 13.3 Borehole Trial Pit Plan (Ref 14.7)**




The Babtie report states that the low level gas risk may be magnified by the Site capping. Therefore, remedial measures (*i.e.* venting of ground gasses by the construction of perimeter granular trenches) were implemented to mitigate such risks.

The Babtie report states that the findings of the Site investigation and subsequent remediation statement have been discussed and agreed with the Environment Agency Groundwater Protection

Officer and the local Environmental Health Officer at Corby Borough Council prior to the commencement of the site remediation works. The remediation of the Site, as observed by Babtie, was carried out in accordance with the Remediation Statement and Contractors Method Statements.

In summary the remediation of the Site was designed to reduce infiltration and direct any rainwater or runoff into the dedicated subsurface drains and surface water systems. Remediation involved the reworking and levelling of the Site, with validation samples taken of the surface soils to confirm soil concentrations were below the acceptable concentrations, prior to capping with imported crushed natural stone. Venting of any underground gasses was facilitated by the construction of perimeter granular trenches.

With the exception of zinc and nickel all validation samples taken from reworked and levelled ground had concentrations of contaminants below the Babtie derived remediation criteria. As zinc and nickel are phytotoxic contaminants it is not considered to be a potential risk to the end use of the Site. Clean topsoil was provided in the landscaped areas.

## 13.7 Identification and Evaluation of Key Effects (No change to the 2016 ES)

This section considers the potential effects of the Proposed Development, both during the construction and operational phases of the development.

The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the *Environmental Protection Act 1990* (EPA), as inserted by S.57 of *The Environment Act 1995* and came into effect in England on the 1st April 2000 as '*The Contaminated Land (England) Regulations 2000* (SI 2000/227)'. These regulations were subsequently revoked with the provision of '*The Contaminated Land (England) Regulations 2006* (SI 2006/1380)', which came into force in England on 4th August 2006, and consolidated the previous regulations and amendments. The 2006 regulations were modified with the introduction of *The Contaminated Land (England) (Amendment) Regulations 2012*, which came into force on 6th April 2012. Under Part 2A of the EPA Section 78A(2), "contaminated land" is defined as "land which appears… to be in such a condition, by reason of substances in, on or under the land, that –

- significant harm is being caused or there is a significant possibility of such harm being caused; or
- significant pollution of controlled waters [including streams, lakes and groundwater] is being caused or there is a significant possibility of such pollution being caused.

Based on the above factors, an initial qualitative assessment of the presence of potential pollutant linkages can be undertaken.

### *13.7.1 Conceptual Site Model*

The soil and groundwater conditions on the Site, as identified through the Phase I assessment, have been summarised into a Conceptual Site Model (CSM), which defines the key sources, pathways and receptors that have been identified as being relevant to this Site. The CSM considers the situation and potential pollutant linkages before the planned redevelopment of the area and afterwards and considers the following factors:

- SOURCES – the identification of contaminants within the soils and groundwater that represent potential pollution sources;
- PATHWAYS – the identification of the potential exposure mechanisms and migration pathways from the potential sources; and
- RECEPTORS – the identification of the potential receptors that could be sensitive to harm if exposed to these pollution sources.

Collectively each of these scenarios would be considered a potential pollutant linkage that may require action.

For the purposes of this assessment that the following has been assumed.

- The Site use will change from its current use (car storage yard) into an Energy Recovery Facility.
- The planned Site use will mainly consist of hardstanding with the occasional landscaped area. The assessment does not consider a more sensitive future end use such as residential housing or large unsurfaced/landscaped areas.
- The building of the plant will involve significant ground disturbance (e.g. piling, excavation, landscaping, waste disposal etc.).

A preliminary conceptual model is presented below in accordance with the guidance outlined within Contaminated Land Report 11 (CLR11) Model Procedures for the Management of Land Contamination, Environment Agency (September 2004) (Ref. 13.5).

### 13.7.2 Identification of Potential Sources

Based on the information from the desk study, historical maps and published information, a summary of potential contaminant sources is provided below:

- (A) Infilled lagoon likely to be associated with the Steel industry (Category: Historic – On-site) – Possible contaminants will depend on the nature of these activities and wastes, but may include metals (especially zinc and lead), PAHs, cyanide, phenols, sulphide, sulphates *etc.* Furthermore, the potential exists for leachate and land gas generation on-site as a result of the deposited materials.
- (B) General steel industry related activities (Category: Historic – Off-site) – The Corby steel industry covered some 280ha from the 1930s until the 1980s within the immediate and wider surrounds of the Site. Potential contaminants will depend on the nature of the activities undertaken but may include heavy metals, metalloids, dioxins, phenols, asbestos, sulphides, benzene, toluene, ethylbenzene, and xylenes (BTEX) and hydrocarbons.
- (C) Landfills adjacent to site (Category: Historic – Off-site) – The steel industry produced a large quantity of waste which was deposited in various landfills around the Site. The closest landfill is located to the north of the Site, beyond the Northern Stream, and was operated between 1950 and 1986 for the deposition of inert and industrial wastes. The Site has been classified as a threat to both groundwater and surface water. A second landfill was located 25m to the north-west and was known as the ‘Candy Filter Sludge Ponds’, which was authorised to accept ‘special waste and liquid sludge’.
- (D) Historical storage of unknown materials in drums (Category: Historic – On-site) – Possible contaminants will depend on the types of materials stored within the drums (if any) and the condition of the drums, relating to the potential for leaks.
- (E) Storage, movement and potential maintenance areas of vehicles (Category: Historic – On-site) – The movement and storage of vehicles on-site may lead to the release of contaminants including fuel and oils.

### 13.7.3 Identification of Potential Exposure Pathways

Exposure pathways are the potential routes and mechanisms by which potential on-site sources could be linked to the identified potential receptors and thereby expose them to potential harm. The following potential exposure pathways have been identified at the Site:

- vertical migration of contaminants from the made ground to groundwater bodies (where contaminants exist at significant levels and if shallow groundwater is present);
- lateral migration of land gases to built structures, such as commercial and industrial buildings, *etc.*
- inhalation of landfill gases by future ground workers and workers within commercial and industrial buildings.

- inhalation, dermal contact and ingestion of contaminated ground by human receptors (*i.e.* future ground workers, the general public) through *e.g.* dust generation during construction activities and lateral migration through underlying strata; and
- horizontal migration of contaminants (if present) via shallow groundwater flow to surface water bodies via through flow or via transmission along conduits, for example drains or the gravel pack surrounding a drain.

### 13.7.4 Identification of Potential Receptors

Based on the Site's environmental setting and the proposed future end use of the area following redevelopment, the following potential receptors have been identified:

- groundwater that may be present within the underlying Northampton Sand Formation (Secondary A Aquifer);
- surface water features *i.e.* Northern Stream;
- built structures onsite and off-site within which landfill gases could accumulate;
- third-party land (*i.e.* the possibility of contamination migrating off-site onto third party land via contaminated groundwater, surface water run-off);
- ground workers (*i.e.* construction workers, maintenance workers or other personnel who may be directly exposed to contaminated materials in the course of their activities); and
- flora and fauna (*i.e.* off-site terrestrial ecology)

If the Site is redeveloped, any associated activities may bring site personnel and construction workers into contact with potentially contaminative materials, however, it is considered that the risks to workers will be short term and controlled by safe working procedures onsite.

Any future planned construction work will inevitably disturb the ground, and thus appropriate mitigation measures will need to be included as part of the Construction Environmental Management Plan (CEMP) which will reduce the level of impact and ensure protocols are in place to minimise the potential for exposure.

### 13.7.5 Potential Pollutant Linkages

In order for there to be a plausible pollutant linkage there must be a source, receptor and pathway and a feasible linkage between them (a so-called pollutant linkage). Consequently, even where a contaminant is identified, if there is no pathway for the contamination to reach a receptor, or no receptor then there can be no significant risk and remedial actions are not required. Furthermore, even if there is a complete pollutant linkage, it is possible that the contaminant concentration that can pass along the linkage does not represent a significant risk to human health or the Environment. Central to this risk assessment process is the development of a 'conceptual model'. This is a descriptive and/or pictorial representation of the area of potential contamination, the surrounding environment and the processes acting on the contaminants by which they can move and come into contact with receptors (*e.g.* by leaching and migration into groundwater).

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, in order to assess risk both the likelihood and the consequences of an event must be taken into account. This report adopts the methodology for risk evaluation presented in CIRIA report C552 'Contaminated Land Risk Assessment – A Guide to Good Practice', 2001 (Ref. 13.8).

The method is qualitative and involves the classification of the following:

- the magnitude of the potential severity or consequence of the risk occurring **(Table 13.2)**
- the magnitude of the likelihood or probability of the risk occurring **(Table 13.3)** and

- once the likelihood of an event occurring and its severity have been classified, a risk category can be assigned using **Table 13.4**

## Table 13.2 Classification of Consequence

| Consequence | Definition |
|---|---|
| Severe | Short term (acute) risk to human health likely to result in 'significant harm' as defined by the *Environment Protection Act 1990, Part IIA.*<br><br>Short term risk of (significant) pollution of sensitive water resource.<br><br>Catastrophic damage to building/property.<br><br>A short term risk to a particular ecosystem, or organism forming part of such ecosystem. |
| Medium | Chronic damage to human health (significant harm).<br><br>Pollution of sensitive water resources.<br><br>A significant change in a particular ecosystem, or an organism forming part of such an ecosystem. |
| Mild | Pollution of non-sensitive water resources.<br><br>Significant damage to crops, buildings, structures and services.<br><br>Damage to sensitive buildings/structures/services or the environment. |
| Minor | Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.<br><br>Non-permanent health effects to human health (easily prevented by means such as personal protective clothing *etc.)*<br><br>Easily repairable effects of damage to buildings, structures and services. |

## Table 13.3 Classification of Probability

| Likelihood | Definition |
|---|---|
| High | 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 pollutant 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 | 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 that such an event would take place and is even less likely in the shorter term. |
| Unlikely | There is a pollution linkage but circumstances are such that it is improbably that an event would occur even in the very long term. |

## Table 13.4 Risk Assessment Matrix

| | | Consequence | | | |
|---|---|---|---|---|---|
| | | **Severe** | **Medium** | **Mild** | **Minor** |
| **Likelihood of Occurrence** | **High** | Very High | High | Moderate | Moderate/Low |
| | **Likely** | High | Moderate | Moderate/Low | Low |
| | **Low** | Moderate | Moderate/Low | Low | Very Low |
| | **Unlikely** | Moderate/Low | Low | Very Low | Very Low |

The description of the classified risks and likely actions required, in accordance with CIRIA C552, are:

- VERY HIGH RISK – There is a high probability that severe harm could arise to a designated receptor from an identified hazard OR, there is evidence that sever 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 RISK – 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 RISK – It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is 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.
- LOW RISK – It is possible that harm could arise to a designated receptor from n identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
- VERY LOW RISK – 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.

A conceptual model has been derived based on the information obtained through the desk-based study and based on the current and future commercial usage of the Site. This is detailed in tabular format in **Table 13.5**5 and pictorially in **Figure 13.4.**

Consideration has also been given to the potential effects associated with the construction phase of the Site's redevelopment in addition to the operational phase of the Site following its redevelopment.

## Table 13.5 Preliminary Conceptual Site Model

**Source**

(A) Infilled lagoon likely to be associated with the Steel industry (Category: On-Site – Historic)
(B) General steel industry related activities (Category: Historic – Off-Site)
(C) Landfills adjacent to site (Category: Historic – Off-Site)

| Source | Pathway | Receptor | Potential Pollutant Linkage and Significance |
|---|---|---|---|
| (A) | Ingestion<br>Inhalation<br>Dermal Contact | Human Health (HHR) (Off-Site Public) | **HHR – Low Risk**<br>Mitigation measures would need to be included as part of the Construction Environmental Management Plan (CEMP) which would reduce the level of potential exposure. Exposure would be short term and unlikely to significantly affect human health. Good working practices include the damping down on construction sites thus reducing the potential for dust generation.<br><br>No housing within 750m of the site. |
| (A) | Ingestion<br>Inhalation<br>Dermal Contact | Human Health (HHR) (Construction workers) | **HHR – Moderate to Low Risk**<br>Construction workers are likely to come into direct contact with shallow soils and groundwater. The use of appropriate Personal Protective Equipment (PPE) and the provision of hygiene facilities should be adopted.<br><br>Mitigation measures would need to be included as part of the Construction Environmental Management Plan (CEMP) which would reduce the level of potential exposure.<br><br>Exposure would be short term and unlikely to significantly affect human health. Good working practices include the damping down on construction sites, thus reducing the potential for dust generation. |
| (A) | Ingestion<br>Inhalation<br>Dermal Contact | Human Health (HHR) (Future site users) | **HHR – Moderate to Low Risk**<br>Based on the proposed industrial end use with hardstanding, there will be limited interaction with the sub-surface areas thus reducing any potential exposure.<br><br>However, land gas control techniques may be required to protect future site workers. |
| (A) | Direct contact of contaminants with building materials | Built Environment (BER)<br>(On-site buildings and services) | **BER – Moderate Risk**<br>Potential for direct exposure of buildings and services to site-derived contaminants. Appropriate engineering design will be required for the construction of buildings and services. |

**Source**

(A) Infilled lagoon likely to be associated with the Steel industry (Category: On-Site – Historic)
(B) General steel industry related activities (Category: Historic – Off-Site)
(C) Landfills adjacent to site (Category: Historic – Off-Site)

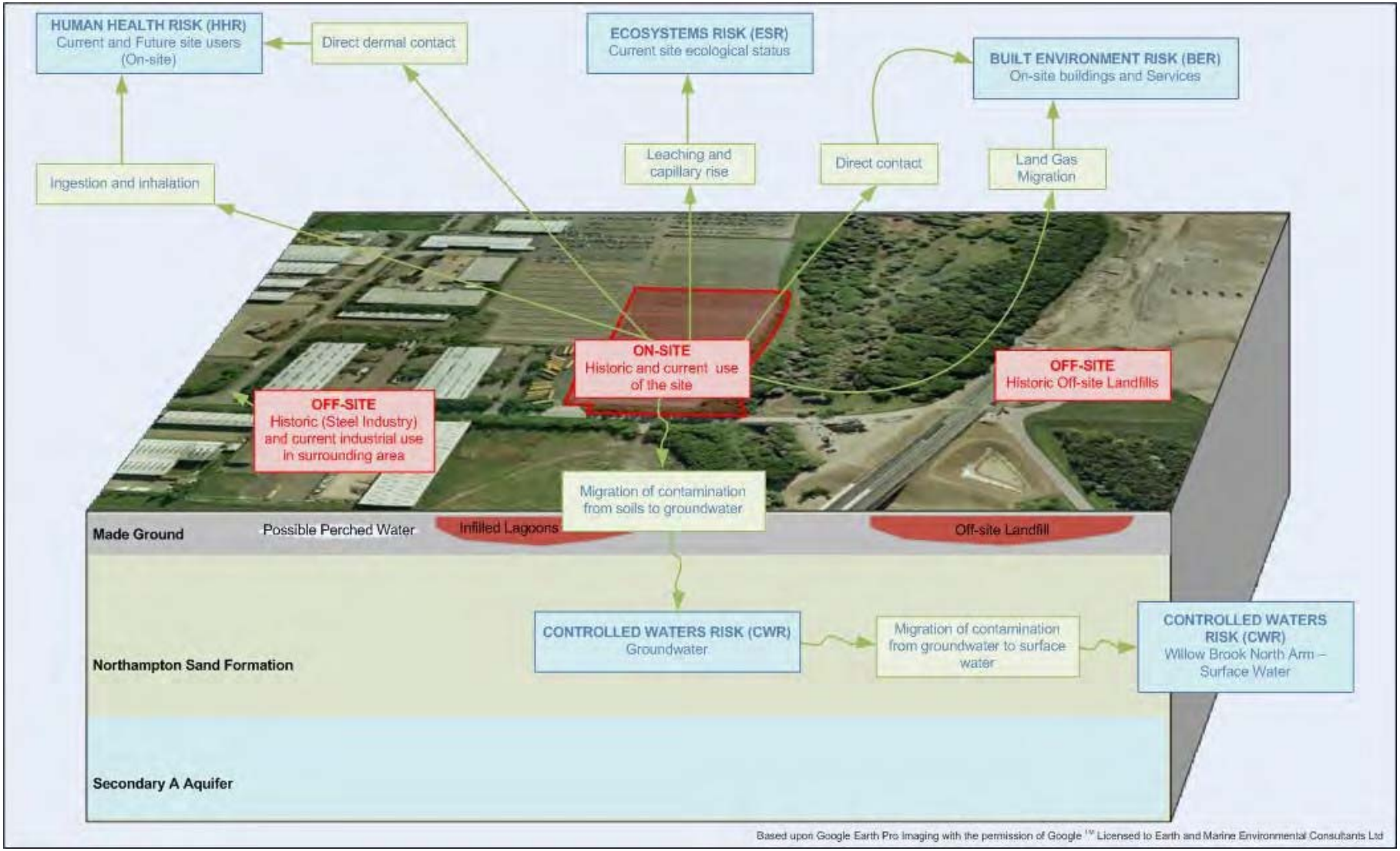
| Source | Pathway | Receptor | Potential Pollutant Linkage and Significance |
|---|---|---|---|
| | | | Appropriate engineering design will be required for the construction of buildings and services. Mitigation measures such as the use of sulphate resistant cement and suitable barrier water supply pipes. |
| (A) | Mitigation from impacted soils to groundwater<br><br>Migration of contaminants from groundwater to surface water resources via permeable conduits | Controlled Waters (CWR) (Surface Water) | **CWR – Moderate to Low Risk**<br>The watercourse (Northern Stream) is located adjacent to the Northern site boundary.<br><br>The surface water feature appears to be engineered and the water quality is considered moderate.<br><br>According to the previous reports (1966 and 2005), the perched groundwater, underlying the site is confined and is unlikely to impact upon the watercourse. |
| (A) | Vertical migration from impacted soils to groundwater | Controlled Water (CWR) (Groundwater) | **CWR – Low Risk**<br>The Site is located on the Northampton Sand Formation (Secondary A Aquifer).<br><br>Given the historical context of the area (ie. Widespread ironstone mining activities and the presence of known contamination) the distribution and usability of groundwater is probably limited.<br><br>There are no sensitive groundwater abstractions within a 2km radius.<br><br>A foundation risk assessment should be completed for any proposed deep piled foundations and this should be provided to Environment Agency for approval. |
| (A) | Leaching and capillary rise<br>Land gas migration | Ecosystems (ESR) (On-Site terrestrial ecology) | **ESR – Low Risk**<br>There are no sensitive ecological receptors within a 1km radius of the Site.<br><br>The Site is considered to have a low ecological value due to the previous and current usage. |
| (B) | Migration of off-site derived contamination through permeable horizons | Human Health (HHR) (Construction workers) (Future site users) | **HHR – Low Risk**<br><br>Limited ability to impact site based on current available information. |

**Source**

(A) Infilled lagoon likely to be associated with the Steel industry (Category: On-Site – Historic)
(B) General steel industry related activities (Category: Historic – Off-Site)
(C) Landfills adjacent to site (Category: Historic – Off-Site)

| Source | Pathway | Receptor | Potential Pollutant Linkage and Significance |
|---|---|---|---|
| (C) | Migration of land gas and vapours through permeable horizons | Human Health (HHR) (Construction workers) (Future site users) | **HHR – Moderate to Low Risk**<br><br>Limited ability to impact site based on current available information. |

## Figure 13.4 Conceptual Site Map



## 13.8 Potential Effects (No change to the 2016 ES)

### *13.8.1 Demolition and Construction*

There are two main issues relating to Contaminated Land that are relevant to the assessment of contamination risks during the construction phase of the Development:

- potential risk to human health, from the exposure of receptors to any contamination that is currently in the underlying soils and groundwater as a result of site preparation and construction activities; and
- potential for the impact on soil, groundwater and ecological receptors via the mobilisation of any contamination present at the Site to water resources that currently are not adversely affected by contaminants, either through the creation of new migration pathways; exposure of previously sealed contamination to leaching by rainfall; or leakages or spillages of fuels during demolition and construction works.

A conceptual Site model illustrating the relationship of the Proposed Development to the ground conditions is included as **Figure 13.4.**

#### *13.8.1.1 Disposal of Contaminated Spoil*

It is understood that no basements are proposed within the Proposed Development. However, a certain volume of material will be required to be excavated for the laying of building foundations and services.

Sustainable solutions will be implemented to enable, as far as applicable, the re-use of waste materials and avoidance of landfill disposal.

Opportunities for reusing material from excavations on site are likely to be minimal as no ground raising is proposed and the majority would therefore be used for landscaping (where appropriate) or require removal from Site for off-site disposal.

Due to the previous use of the Site some material excavated from the Site may require off-site disposal and could be classified as hazardous waste. All waste material will be disposed of at a licensed landfill site with prior consent from the Environment Agency. The material will require transporting and disposal in accordance with Waste (England and Wales) Regulations 2014. The excavated material will beassessed and classified to confirm whether or not it is hazardous in accordance with Technical Guidance WM3 (v1.1) and an appropriate disposal facility would be identified.

In order to determine whether the excavation waste is hazardous or not, the potential contaminants will be identified based on the history of the waste, with sufficient representative samples of the waste being subjected to appropriate laboratory chemical analysis. The data will be assessed in accordance with Environment Agency guidance.

The Made Ground will likely be classified as either ‘hazardous’ or ‘non-hazardous’. The natural soils (e.g. from pile arisings) would be expected to be classified as inert.

Following the classification of excavation wastes, the options available for the waste will be considered in the context of the waste hierarchy:

- on-site reuse (with or without prior treatment);
- off-site reuse (with or without prior treatment), e.g. use of waste in construction at a site exempt from the requirement to hold an environmental permit; and
- off-site disposal (with or without prior treatment), i.e. landfill.

All waste transfer documentation shall be maintained by the Principal Contractor for the required statutory period (i.e. two years for general waste and three years for hazardous waste).

However, assuming that legislative requirements are adhered to, the disposal of this material would result in negligible environmental effects.

#### *13.8.1.2 Risks to Site Workers and Public Safety*

During the construction, earthworks could disturb potentially contaminated material, to which construction workers may be exposed. These activities could create plausible pollutant linkages. In the absence of appropriate mitigation and the use of Personal Protective Equipment (PPE), any contamination present in the soil would present a risk to construction workers. However, worker safety will be the subject of the mandatory requirements of the Control of Substances Hazardous to Health Regulations 2003 (COSHH) and the Construction (Design and Management) Regulations 2015 (CDM). These regulations set out the extensive requirements for the protection of the workforce and stress the importance of appropriate procedures in the event of the workforce encountering pockets of unknown contamination.

Adherence to the legislative requirements described above will significantly reduce the health and safety risk posed to site workers during the construction phase. The potential effect of demolition and construction works on site workers will therefore be negligible.

In respect of public safety, the Site will be surrounded by hoarding and will be secured at all times. Furthermore, no residences or major thoroughfares have been identified in close proximity to the Site. The risk to individual members of the public during construction will therefore also be negligible. Dust control measures will reduce the potential for exposure to contaminants associated with dust to an acceptably low level. The potential effect of construction works on public safety will therefore be temporary, short-term, local and of negligible significance.

#### *13.8.1.3 Risk to Water Resources*

Piling has the potential to create new pathways for contamination to be introduced into deeper strata. The depth of the foundations for the Proposed Development will be assessed following the results of a geotechnical ground investigation. Should piles be required appropriate measures would need to be employed to prevent the downward migration of contamination.

Ground disturbance during piling is a key factor in determining whether preferential pollutant pathways are formed. The degree to which any piling method displaces soil horizontally and vertically is critical in assessing the risks of contamination pathways being created.

The form of piling to be used for the Proposed Development will be determined following completion of the geotechnical ground investigations and during the detailed design stage. If properly carried out to high standards of workmanship, there would be no significant disturbance of the surrounding soil. Provided that the pile is formed or placed in intimate contact with the surrounding soil there would be no formation of preferential pathways.

Overall, the use of appropriate piling techniques and the requirement to carry out a Foundation Works Risk Assessment (FWRA) (Ref 13.9) and agree the final piling strategy with the Environment Agency will significantly reduce the risks. Therefore, construction activities within the Site would be expected to give rise to a local, temporary, short/medium-term effect of moderate adverse significance to groundwater quality.

During the construction process, surface water runoff and groundwater removed from the excavations through dewatering operations could contain new sources of contaminants such as sediments of oil. If this was to be discharged to the storm water system leading to the local watercourse, a local, temporary, adverse effect of minor significance could arise in terms of water quality adjacent to the outflow on this reach of the watercourse.

#### *13.8.1.4 Exposure of Soil to Leaching*

The existing Site incorporates some areas of rough grassland and scrub and therefore there already exists the potential for contaminants to leach into the underlying perched groundwater. However, further pathways may be created by the construction activities. As such, effects from construction activities would be expected to give rise to temporary, short to medium term, local in effect and of minor adverse significance.

#### *13.8.1.5 Contamination of Ground during Construction*

During the construction works potential new sources of contamination will be introduced and stored on the Site in the form of, for example, diesel fuel, oils, chemicals and construction materials. As a result, there could be a risk related to material or fuel leakages or spillages directly or indirectly to the soil. In the absence of the adoption of mitigation methods, the risk of soil contamination occurring as a direct result of construction would be temporary, short-term, local in effect and of minor adverse significance.

### *13.8.2 Completed Development*

#### *13.8.2.1 Risks to Future Site Users*

While some Made Ground is likely to be removed during the construction works, it is considered likely that the majority of the existing Made Ground will remain in-situ following completion of the development.

The Proposed Development is understood to comprise large areas of hardstanding, although open ground may still be present. In view of the nature of proposed site activities, it is considered likely that site workers will not come into direct contact with underlying soil or groundwater.

Operations on Site will be controlled by an Environmental Permit, which will place requirements on the Site to manage potential sources of ground contamination.

The potential risk posed to future Site users from exposure to contaminated soils will be very limited because:

- Intrusive investigation works will be undertaken and any contaminated soils will be removed (where necessary);
- The majority of the operational site will be hard-surfaced, forming a barrier between the Site users and direct contact with contaminated soil, and thus breaking the potential contaminant pathway; and
- The hard surfacing will also prevent atmospheric exposure of contaminants leading to the potential inhalation of contaminated dust.

In those areas where hardstanding will not be present (i.e. landscaped areas) a low risk will remain. On that basis, the Proposed Development will give rise to a long-term, local effect of minor adverse significance to future site users.

The potential for exposure to ground gas (generated from the areas of infilling) could exist, although the use of ground gas protection measures, where necessary, would reduce their accumulation. The risk arising from the presence of ground gas and vapours has been estimated as moderate, and in the absence of mitigation, the effect would be long-term, local and of minor adverse significance.

#### *13.8.2.2 Risk to Water Resources*

The Proposed Development is likely to predominantly comprise drained hardstanding, which will prevent significant rainwater infiltration through any potentially contaminated Made Ground. However, some areas of the Proposed Development may consist of unsurfaced ground, where infiltration and

limited leaching of contaminants may occur. As such, the effects on shallow groundwater from the completed Proposed Development will be long-term, local and of minor adverse significance.

The Proposed Development will be built and operated in line with current standards of best practice. It is not considered to give rise to any significant sources of contamination which could pose a risk to surface water resources. The contamination risks and effects of the completed Development upon surface water will therefore be negligible.

#### *13.8.2.3 Contamination of Ground by the Completed Development*

The Proposed Development includes land uses that may give rise to the contamination of soil or groundwater in exceptional circumstances. However, if the facility is operated in line with current standards of best practice, no adverse impact to ground is anticipated. Spillages of fuel within car park areas cannot be excluded. However, hard-surfacing will protect the underlying soil from such spillages. The overall risk of ground contamination resulting from the Proposed Development is therefore considered to be negligible.

## 13.9 Mitigation Measures (No change to the 2016 ES)

### *13.9.1 Demolition and Construction*

#### *13.9.1.1 Environmental Ground Investigation*

The potential for contamination on the Site will be assessed further during the intrusive environmental ground investigation that will be undertaken following grant of planning permission for the Proposed Development. The proposed scope of the investigation is likely to comprise the following:

- drilling of boreholes across the Site in combination with trial pitting;
- appropriate in-situ testing and sampling including headspace analysis using a photo ionisation detector (PID);
- installation of dual-purpose ground gas/groundwater monitoring standpipes in the Made Ground and natural strata;
- monitoring of groundwater levels;
- groundwater sampling;
- ground gas monitoring;
- chemical laboratory testing of soils, groundwaters and surface waters;
- surveying in to National Grid and levelling of each borehole; and
- preparation of a Factual Report (including all fieldwork, monitoring results and chemical test results).

Following completion of the Factual Report a quantitative environmental risk assessment will be undertaken, the results of which will be reported in a Generic Quantitative Environmental Risk Assessment interpretative report. This report will further assess the potential risks and identify the requirement for remediation. If remediation is required (considered unlikely at this stage), a Remediation Strategy would be prepared that outlines the requirements for remediation and mitigation of any unacceptable risks and consequent likely adverse effects identified.

The remediation and mitigation measures that could be required include treatment of contaminated soils and groundwater and the incorporation of gas protection measures in buildings.

#### *13.9.1.2 Protection of Site Workers and Public*

During site preparation and construction phases, precautions will be taken to minimise the exposure of workers and the general public to potentially harmful substances. Attention will be paid to restricting possible off-site nuisances, such as those arising from any dust and odour emissions. Such precautions will be included within the Construction Environmental Management Plan (CEMP) and include:

- personal hygiene, washing and changing procedures;
- personal protective equipment (PPE) and respiratory protective equipment (RPE), including disposable overalls, gloves and particulate filter masks to be worn
- adoption of dust suppression methods, e.g. water spraying, wheel washing facility for vehicles leaving the Site;
- covering of stockpiled material on the Site;
- enclosure of vehicles used to transport materials;
- measures to avoid surface water ponding and positive collection and disposal of all on-site runoff; and
- regular cleaning of all site roads, access roads and the public highway.

The above measures will be carried out in accordance with the Health and Safety Executive (HSE) publication HS(G)66 'Protection of workers and the general public during the development of contaminated land' (Ref. 13.11) and CIRIA Report 132, 'A guide for safe working on contaminated sites' (Ref. 13.10). The contractor will (prior to construction) provide method statements which will show how the safety of the work force and the public will be ensured.

On the basis of the survey results, appropriate plans will be developed as required by the Control of Substances Hazardous to Health Regulations 2003 (COSHH) and the Construction (Design and Management) Regulations 2015 (CDM).

#### *13.9.1.3 Piling and Risks to Water Resources*

The Environment Agency (Environment Agency) guidance document on piling on Contaminated Land (Ref. 13.9) describes various methods and scenarios for piling through contaminated land. The report recommends that a Foundation Works Risk Assessment report (FWRA) is prepared in such cases, in order to assess foundation works to prevent migratory pathways for contamination migration. It is considered that with the application of an appropriate piling methodology, the risks to the deep aquifer from piling works penetrating through potentially contaminated land will be low. The piling method to be used at the Site will be confirmed following implementation of an intrusive ground investigation and through further consultation with the Environment Agency.

As previously identified, the only potentially significant contamination risk posed to surface waters is via the release of contaminated surface water runoff from the Site. This will be mitigated by identifying and suitably containing contaminated soils.

#### *13.9.1.4 Exposure of Soil to Leaching*

Spoil containing 'leachable' (i.e. potentially soluble or otherwise mobile) contaminants will be identified and suitably contained, by bunding or similar containment measures, to prevent the release of contamination through surface water runoff.

#### *13.9.1.5 Contamination of Ground during Construction*

Several mitigation measures will be used to reduce the risks of potential contamination of the Site during construction. The measures to be employed will be detailed in a Construction Environmental Management Plan (CEMP) for the Site and include measures to store and handle hazardous substances safely and procedures to manage spills.

### *13.9.2 Completed Development*

#### *13.9.2.1 Future Site Users and Soil Remedial Measures*

The undertaking of an intrusive investigation and the implementation of any remedial measures deemed necessary on the basis of the investigation will ensure that the Site will be suitable for the proposed end use and that no significant unacceptable contaminative risk will be posed to future human receptors.

The proposed building structures, ground slabs and areas of hardstanding will form a physical barrier to migration of any potential contaminants, and thus eliminate any risk to workers at the Proposed Development.

#### *13.9.2.2 Risk to Water Resources*

As previously described an intrusive investigation will be undertaken to establish the nature and extent of ground contamination. Depending on the results of the investigation, a remediation strategy would be implemented to ensure that there are no unacceptable risks of in- situ Made Ground causing contamination to the underlying aquifer.

Car parking areas will be designed to prevent uncontrolled discharges to drains, through the inclusion of oil/water separator systems.

#### *13.9.2.3 Gas Control Measures*

The potential for moderate adverse effects are identified in relation to ground gas. Assessment of the requirement for gas protection measures to the buildings will be undertaken as part of the Generic Quantitative Environmental Risk Assessment and mitigation measures incorporated in the detailed building design as necessary in agreement with the Local Authority.

## 13.10 Residual Effects (No change to the 2016 ES)

### *13.10.1 Construction*

#### *13.10.1.1 Disposal of Contaminated Spoil*

During the excavation works the majority of contaminated arisings (if present) would be removed from Site. The disposal of contaminated spoil would be subject to legislative and regulatory control. As such, the likely residual effects would remain the same as the identified potential effects, that is, negligible.

#### *13.10.1.2 Risks to Site Workers and Public Safety*

As above, the legislative and regulatory framework set out to protect construction site workers and the public will be implemented as part of the Proposed Development. The likely residual effect of the Development on soils and ground conditions from the demolition and construction phase will therefore be negligible.

#### *13.10.1.3 Risk to Water Resources*

Although the potential effect of piling is considered to be negligible, a Foundation Works Risk Assessment will be undertaken prior to construction. This will be based on the results of the full ground investigation to be undertaken following grant of any planning permission. The likely residual effect of the demolition and construction phase of the Proposed Development of piles on water resources will therefore remain negligible.

#### *13.10.1.4 Exposure of Soil to Leaching*

During demolition and construction works, spoil containing leachable materials will be suitably bunded. The likely residual effect of the Proposed Development will therefore be negligible.

#### *13.10.1.5 Contamination of Ground during Construction*

The implementation of protective measures will reduce the potential for contamination of the ground during construction. However, owing to unforeseen accidental spillages, some risk will still remain. The likely worst-case residual effect of contamination from accidental spillages will therefore be temporary, short-term, local and of minor adverse significance.

Completed Development

#### *13.10.1.6 Risk to Future Site Workers*

The operational areas of the Proposed Development will comprise hardstanding, with some grassland areas likely to remain.

The overall effect of the completed Development on ground contamination and its effects on future users and occupants will be negligible with the mitigation measures in place.

Gas protection measures incorporated into the Proposed Development (if necessary) will minimise the risk of gas/vapour migration into buildings and underground voids. Appropriate mitigation incorporated into the design of the Proposed Development will therefore reduce the risk to the future users to acceptable levels.

The overall effect of the ground gas and vapours on future users of the completed Development will be negligible with mitigation measures in place.

Residual contamination risks to human health, following mitigation, will therefore be reduced to a negligible level. Therefore, the likely residual effect of any ground gas/contamination on human health during the occupational use of the completed Development will be negligible.

#### *13.10.1.7 Risk to Water Resources*

Assuming the correct and appropriate installation of piles, the likely residual effect of the Proposed Development on the aquifer will be negligible.

#### *13.10.1.8 Contamination of Ground by the Completed Development*

For reasons discussed in the assessment of potential effects, the likely residual effects of potential contamination on ground conditions following completion of the Development will remain negligible.

Assessment of Cumulative Effects

Development schemes which have been identified in the consideration of cumulative effects are included in Chapter 3 (EIA Methodology). There are no cumulative effects from these schemes with respect to contaminated land.

## 13.11 Differences from the Consented Development

The Proposed Development has made only very minor changes to the design of the Consented Development in so far as it influences soils, geology and land contamination. The assessment from the 2016 ES has been reviewed and updated in this context. Some minor updates have also been made to the baseline conditions, but these are not substantive. The conclusions of the assessment of the Proposed Development on soils, geology and contamination are the same as reported in the 2016 ES.

## 13.12 Summary

The Site once formed part of a larger area of Corby involved in ironstone quarrying, associated with the steelworks and coke production. The Site itself had been previously worked for Northampton Ironstone using opencast methods during the 1920/30s. Over some of the Site sludge lagoons were formed in the depression left by the ironstone workings. The Site had been subsequently levelled by backfilling with opencast spoil including Boulder Clay.

The Site has been subject to numerous intrusive investigations between 1983 and 1996. The 1996 investigation by Frank Graham Consulting Engineers concluded that the Site is of low sensitivity to the transmission of pollutants arising from the steelworks waste. The identified source of contaminants on the Site was the former sludge lagoons which contained elevated concentrations of heavy metals (primarily zinc), occasional elevated concentrations of lead and high sulphur/sulphate concentrations. The glacial clays surrounding and covering the sludge lagoons exhibit low contamination levels. It is considered that the migration of compounds off-site is highly unlikely due to the presence of the low permeability boulder clays and the low solubility of the contaminants.

The remediation of the Site (2000-2001) was designed to reduce infiltration and direct any rainwater or runoff into the dedicated subsurface drains and surface water systems. Remediation involved the reworking and levelling of the Site, with validation samples taken of the surface soils to confirm soil concentrations were below the acceptable concentrations, prior to capping with imported crushed natural stone. Venting of any underground gasses was facilitated by construction of perimeter granular trenches. With the exception of zinc and nickel all validation samples taken from reworked and levelled ground had concentrations of contaminants below the Babtie derived remediation criteria. As zinc and nickel are phytotoxic contaminants it is not considered to be a potential risk to the end use of the Site. Clean topsoil was provided in the landscaped areas.

In order to verify Site conditions, an intrusive investigation will be undertaken prior to construction. The investigation will include an assessment of land gas conditions at the Site, with gas monitoring undertaken over an appropriate period of time. The findings of the investigation will be reported to the Local Authority and a strategy for dealing with any issues will be prepared and agreed with the Local Authority. It is considered that it will be possible to eliminate or minimise all significant pollutant linkages to an acceptable level.

There is potential for ground contamination to arise during the construction period but with appropriate control measures this can be mitigated against. Similarly, there will be potential for ground contamination to arise from the storage and handling of oils, chemicals and waste materials at the new facility. However, this will be mitigated against through the application of appropriate design and operational controls.

## Table 13.6 Soils, Geology and Land Contamination Summary Table

| Potential Effect | Nature of Effect (Permanent or Temporary) | Significance | Mitigation/ Enhancement Measures | Residual Effects |
|---|---|---|---|---|
| Demolition and Construction<br><br>Disposal of demolition and construction spoil including treatment of contaminated soils. | Temporary<br>Short term<br>Local | Minor Adverse | Implementation of a ground investigation, assessment of the requirement for remediation and implementation of remediation measures together with on-site treatment to ensure reduction in potential contamination levels prior to disposal. | Negligible |
| Demolition and Construction<br><br>Contamination risks to Site workers and the public. | Temporary<br>Short term<br>Local | Minor/Moderate Adverse | Implementation of the CEMP which will stipulate the use of PPE, health and safety planning, dust control and other Site management measures. | Negligible |
| Demolition and Construction<br><br>Contamination risks to water resources posed by piling activities. | Temporary<br><br>Short/Medium term<br><br>Local | Moderate Adverse | Implementation of an intrusive ground investigation and finalisation of pile design together with preparation of a FWRA in consultation with the Environment Agency. | Negligible |
| Demolition and Construction<br><br>Contamination risks to water resources and ecological receptors via leaching of soils. | Temporary<br><br>Short/Medium term<br><br>Local | Minor Adverse | Implementation of a ground investigation, segregation and containment of any contaminated soils to prevent uncontrolled release of runoff. | Negligible |
| Demolition and Construction<br><br>Contamination risks to ground via accidental spillage of materials and fuels. | Temporary<br>Short term<br>Local | Minor Adverse | Implementation of the CEMP will stipulate the use of bunded fuel tanks and contingency planning and other Site management measures. | Negligible |

| Potential Effect | Nature of Effect (Permanent or Temporary) | Significance | Mitigation/ Enhancement Measures | Residual Effects |
|---|---|---|---|---|
| Completed Development<br><br>Contamination risk and exposure of future users of the Proposed Development. | Permanent<br>Long term<br>Local | Minor Adverse | Implementation of a ground investigation, assessment of the requirement for remediation and implementation of remediation measures and gas protection measures to buildings as necessary.<br><br>The majority of the operational Site will be hard-surfaced, forming a barrier between the Site users and direct contact with contaminated soil, and thus breaking the potential contaminant pathway | Negligible |
| Completed Development<br><br>Contamination risks to water resources. | Permanent<br>Long term<br>Local | Minor Adverse | Implementation of an environmental ground investigation and remediation works (considered unlikely at the current time). | Negligible |
| Completed Development<br><br>Contamination of the ground during facility operation. | Temporary<br>Short term<br>Local | Minor Adverse | Provision of oil/water separators to external drainage (as necessary).<br><br>Operation of facility in line with current best practice. | Negligible |

## 13.13 References

**Ref. 13.1:** Public Health England (2007), HPA-RPD-033 - Indicative Atlas of Radon in England and Wales, Miles JCH, Appleton JD, Rees DM, Green BMR, Adlam KAM, Myers AH, November 2007.

**Ref. 13.2:** BRE & Department of the Environment, Transport and the Regions (1999), Radon: guidance on protective measures for new dwellings, Third Edition, 1999.

**Ref. 13.3:** Department for Communities and Local Government (2018), National Planning Policy Framework

**Ref. 13.4:** Department for Environment, Food and Rural Affairs (DEFRA) (2012), Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, April 2012.

**Ref. 13.5:** Environment Agency (2004), Model Procedures for the Management of Land Contamination, CLR 11, September 2004.

**Ref. 13.6:** Frank Graham Consulting Engineers (1996), Shelton Road, Corby, Northamptonshire Site Assessment Report, Ref. CKG/590196/000, May 1996.

**Ref. 13.7:** Babtie Group (2002), Site G – Shelton Road, Willowbrook Industrial Estate, Corby, Validation Report, Babtie Group, Ref: BGE 200945, March 2002.

**Ref. 13.8:** Construction Industry Research and Information Association (CIRIA) (2001), CIRIA report C552 'Contaminated Land Risk Assessment – A Guide to Good Practice'.

**Ref. 13.9:** Environment Agency (2001), Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater & Contaminated Land Centre report NC/99/73, F J Westcott, C M B Lean & M L Cunningham, May 2001.

**Ref. 13.10:** Construction Industry Research and Information Association (CIRIA) (1996), CIRIA report C132 'A Guide for Safe Working on Contaminated Sites'.

**Ref. 13.11:** Health and Safety Executive (HSE) (1991), HS(G)66 Protection of Workers and the General Public during Development of Contaminated Land.