JNP GROUP
CONSULTING ENGINEERS

TECHNICAL NOTE

Job name: KMCPRP-139-010-049 A629 Halifax Road

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Subject: Updated Conceptual Site Model – Area C (Prince Royd)

1. Introduction

1.1 At the request of Kirklees Council, JNP Group has undertaken a review of the previous Phase I, GIR, and planning comments for Area C – Prince Royd to address outstanding comments raised by Kirklees Council (Environmental Health). This is required to progress with the proposals at the site from a geo-environmental perspective, to gain approval for the proposed scheme given that no updated Conceptual Site Model (CSM) was undertaken following the previous ground investigations (undertaken by others with the exception of recent sampling associated with the culvert).

1.2 This report aims to address comments from the EHO (reference: WK/202334886) in relation to Condition 15 of Planning Permission 2021/92734. A meeting was also held with the EHO on 31st July 2024. It was agreed that comparing the existing laboratory results against POS screening values and a detailed updated CSM and would be sufficient at this site to satisfy the EHO's comments and the Condition.

2. Location and Proposed Work

2.1 The site is located south of the A629 Halifax Road, approximately 3 km northwest of Huddersfield. The centre of the site is located at National Grid Reference 412023 418648. The A629 is present to the north, residential properties are present to the east, and woodland is present to the west and south of the site.

2.2 It is proposed to construct a new car park with associated access and drainage, the proposals are shown on the GA Plan (TF5/Area C/GA-1, dated 21/06/22). The works include raising the site with 6F5 and 6B for construction of the car park, small areas of planting are also to be included.

2.3 In preparing this updated CSM, JNP Group has reviewed the following reports in conjunction with a variety of planning documents, responses from Kirklees Council and information on an existing culvert across the site:

- Leeds City Council Geotechnical Section. Prince Royd Car Park, A629, Halifax Road, Huddersfield. Phase 1 Desk Study Report. Scheme Ref: 446368. December 2019
- Leeds City Council Geotechnical Section. Prince Royd Car Park, A629, Halifax Road, Huddersfield. Ground Investigation Report. Scheme Ref: 446368. December 2019.

- Consultation Response from KC Environmental Health. Responding Ref: WK/202122840. 27 October 2021.

2.4 This report should be read in conjunction with the following:

- S12427-JNP-XX-XX-TN-G-1002– Summary of Existing Ground Conditions and Ground Investigation – Area C (Prince Royd), dated 27st June 2024.
- S12427-JNP-XX-XX-TN-G-1005 - Area C – Prince Royd – Culvert Sludge Sampling, dated 24th October 2024.

3. Summary of Site History

3.1 A brick and tile works were present on-site between the 1880s and 1980s extending into and across the south of the site. An associated quarry was present 100m to the south, extending across the site in the 1960s. Two licensed landfills operated at the site; the first between 1942 and 1979 which received inert, commercial and industrial waste; the second between 1985 and 1990 which received inert and commercial waste.

3.2 A shaft was present immediately south of the site in the early 1900s, and tanks were present on the site between 1930 and 1956; it is assumed these were associated with quarrying, and the shaft is not a coal mine shaft, it is assumed that the shaft was removed by subsequent quarrying activities at the site.

3.3 A pond was present on the site in the 1930s and 15m west of the site in the 1970s and early 1980s, where 'issues' are also denoted.

3.4 A garage has been present immediately opposite the north of the site since the 1960s and is now used as a car dealership.

3.5 The nearest controlled surface water is an unnamed drain, 14m north of the site. The drain is upgradient from the site.

3.6 There is an indication of a watercourse on drawing TF5/AREAC/GA1, culverted under the southern edge of the site and connecting to the outfall from the other culvert on-site, which allowed the discharge of water from the former brickworks off-site.

4. Summary of Ground Conditions

Soils

4.1 The scope of the previous ground investigation comprised three trial pits to a maximum depth of 3.30m bgl. Made ground was encountered across the site and was partly proven between 0.70m to greater than 1.50m bgl. Deleterious materials of brick, concrete, tile, macadam, ash, clinker, ash, metal and plasterboard were recorded. Firm sandy gravelly clay was recorded as residual soil in TP012, overlying weathered bedrock (Lower Coal Measures), which was encountered between 2.80m bgl, and comprised mudstone.

4.2 Six soil samples were submitted for chemical analysis of heavy metals, PAH, asbestos and organic

matter; no exceedances were recorded with respect to public open space screening values using an SOM of 1%.

4.3 During the ground investigation, TP011 encountered a brick culvert. JNP Group were provided with historical records of the brick culvert across the site (included on Drawing No. TF5/AREA C/EW-1). The soffit of the culvert is approximately 0.60m bgl, and the invert is 2.10m bgl.

4.4 It was subsequently confirmed by the client that there was no connection between the culvert and watercourses or sewers outside of the site and that 6.40m of the culvert is intact within the site, and either end of the culvert has collapsed.

4.5 JNP Group undertook some sampling of the sludge in the brick culvert (refer to S12427-JNP-XX-XX-TN-G-1005 dated 24th October 2024 for full details) with samples analysed for WAC assessment.

Groundwater

4.6 Perched groundwater was encountered in TP010 and TP011 at 1.30m bgl. A sample from TP010 showed 'no significant' contamination.

Gas

4.7 Gas monitoring was recommended in the previous ground investigation to assess the requirement for gas protection measures at the site due to the former landfill(s) and historic tank, however, monitoring was not undertaken as part of the ground investigation.

5. Updated Soil Assessment Results

5.1 EHO's comments indicated that the previous reports did not screen results against POS, however, after a thorough review of the previous GI report, this was undertaken, concluding that there were no exceedances recorded with respect to public open space screening values using an SOM of 1%. As agreed with the EHO, we have checked these results as presented below.

5.2 Given that the proposals include small areas of planting, the chemical test results from the previous ground investigation of five samples of made ground and one sample of natural soil have been compared with the C4SL and the LQM S4UL values for a 'Public Open Space'. These comparisons are summarised in the following table.

5.3 The following determinants were recorded at concentrations less than their respective limits of laboratory detection, and hence have not been included in this assessment: asbestos, TPH C10-C25, TPH C25-40 and unlisted PAH species

Table 5.1 Comparison of Soil Chemical Test Results with Public Open Space Guideline Values

Determinant	Maximum Measured Concentration (mg/kg)	Background Concentration (mg/kg)	LQM/CIEH S4UL: (mg/kg)	Number of tests	Number of exceedances
Arsenic	16	<15	79	6	0
Cadmium	0.3	<1.8	120	6	0
Chromium (total or trivalent)*	150	>180	1500	6	0

Determinant	Maximum Measured Concentration (mg/kg)	Background Concentration (mg/kg)	LQM/CIEH S4UL: (mg/kg)			Number of tests	Number of exceedances
Copper	920	50.75	12000			6	0
Lead	110	<100	630			6	0
Mercury (inorganic)	0.06	-	120			6	0
Nickel	30	30-45	230			6	0
Selenium	0.7	-	1100			6	0
Vanadium	48	-	2000			6	0
Zinc	1600	-	81000			6	0
			1%	2.5 %	6%		
Naphthalene	0.2	-	4900	4900	4900	6	0
Acenaphthene	0.2	-	15000	15000	15000	6	0
Fluorene	0.2	-	9900	9900	9900	6	0
Phenanthrene	1	-	3100	3100	3100	6	0
Anthracene	0.2	-	74000	74000	74000	6	0
Fluoranthene	1.6	-	3100	3100	3100	6	0
Pyrene	1.5	-	7400	7400	7400	6	0
Benzo(a)anthracene	0.8	-	29	29	29	6	0
Chrysene	0.8	-	57	57	57	6	0
Benzo(b)fluoranthene	0.6	-	7.1	7.2	7.2	6	0
Benzo(k)fluoranthene	0.4	-	190	190	190	6	0
Benzo(a)pyrene	0.9	-	5.7	5.7	5.7	6	0
Indeno(1,2,3-c,d)pyrene	0.7	-	82	82	82	6	0
Dibenzo(a,h)anthracene	0.2	-	0.57	0.57	0.58	6	0
Benzo(g,h,i)perylene	0.5	-	640	640	640	6	0

5.4 The analysis recorded no elevated concentrations of contaminants with respect to the selected screening values. On the basis of the chemical testing undertaken, JNP Group consider that the concentrations of contaminants within the soil do not pose significant risk to human health. Although no elevated concentrations of contaminants have been identified as a risk to human health and controlled waters, where deleterious material is encountered it should be screened out of the soils.

6. Conceptual Site Model

6.1 This section uses information from the data sources presented herein and the original reports to provide an updated conceptual model and qualitative assessment of the potential risks posed to human health and environmental receptors from potential on-site and off-site sources of contamination. The potential risk are considered pre and post the proposed site works to identify if the works result in additional or increased risks.

6.2 The assessment is presented as a 'source-pathway-receptor' model in accordance with Part IIA of the Environmental Protection Act 1990. Risk management is then considered to provide an overall residual risk. The categories of environmental risk used by JNP Group are given in the table that follows.

Table 6.2 Risk Matrix

Environmental Risks		
HIGH		Issues within this category likely to provide a significant cost or liability. Further detailed investigation may be required to clarify the risk.
MEDIUM		It is possible that issues within this category may provide a cost or liability. Further investigation may be required to clarify the risk.
LOW		It is unlikely that issues within this category will provide a significant cost or liability. Basic investigation may be required to clarify the risk.
NONE		No source – pathway – receptor linkage present.

6.3 Potential On-Site Sources of Contamination

- A brick and tile works were present extending into and across the south of the site between the 1880's and 1980's.
- Historic tanks were present on the site between 1930-1956, it is assumed these were associated with quarrying.
- Two licensed landfills operated at the site which received inert, commercial and industrial waste between the 1940s and 1990s.
- A pond was present on the site in the 1930s.
- Contaminants associated with the recorded made ground (heavy metals, hydrocarbons and fill materials) – our updated assessment (refer to Section 5) used threshold screening values for POS to represent post construction conditions. Therefore, this is included to assess risks during construction and in the event unexpected contamination is encountered.

6.4 Potential Off-Site Sources of Contamination

- A shaft was present immediately south of the site in the early 1900s but this was concluded as unlikely to be still present.
- A pond was present 15m west of the site in the 1970s and early 1980s.
- A garage has been present immediately opposite the north of the site since the 1960s and is now used as a car dealership.
- An associated quarry was present 100m to the south extending across the site in the 1960s.

6.5 Receptors

6.6 The site is to be redeveloped as a new car park with associated access and drainage. In addition, the site overlies a Secondary-A Aquifer (Pennine Lower Coal Measures). The primary receptors, considered to be potentially at risk from any identified contamination are as follows:

Human Health

- Construction workers during the redevelopment phase.
- End users in nearby properties

Controlled Waters

- The Pennine Lower Coal Measures Formation beneath the site is classified as a Secondary-A Aquifer, a source protection zone (SPZ) is present approximately 20m north of the site.
- Perched groundwater within granular made ground.
- The nearest controlled surface water is an unnamed drain, 14m north of the site. The drain is upgradient from the site therefore not considered to be a sensitive receptor.
- There is an indication of a watercourse on drawing TF5/AREAC/GA1, culverted under the southern edge of the site and connecting to the outfall from the other culvert on-site (noted above). This is considered a sensitive receptor.

Ecological

- Sensitive ecological receptors are not anticipated.

Property / Infrastructure

- Build-up of gases with potential for explosion in nearby properties. Accumulation in the car park is not considered to be likely as it is not an enclosed space.

6.7 Pathways

6.8 Potential contaminant migration pathways considered relevant to the site are:

Human Health

- Ingestion of contaminated soils and dust particles by construction workers;
- Direct physical contact with near surface soils and contaminated dust particles by construction workers;
- Inhalation of wind-blown contaminated dust by construction workers;
- Inhalation of landfill gases, migrating vertically into nearby buildings post construction.

Controlled Waters

- On-site contamination leaching into underlying aquifers.

Ecological

- Migration of contamination through groundwater and subsequent uptake by plant roots;
- Direct contact between ecological receptors and contaminated surface water;
- Direct contact between ecological receptors and contaminated soils;
- Ingestion of contaminated soils/surface waters by ecological receptors.

Property

- Migration of landfill gas into nearby buildings.

Pollutant Linkages

- A contaminant, pathway and receptor must all be present for a pollutant linkage and therefore risk to exist. Potential sources, pathways and receptors have been assessed above. The following table summarises the viable pollutant linkages potentially active at the site during and post development. These are put in context with the current risk where relevant.

Table 6.2 Potential Source-Pathway-Receptor Linkages

Source	Pathway	Receptor	During Construction	Post Construction
Contaminated soils.	Ingestion of soil Ingestion of dust Dermal contact	Construction workers and residents in nearby properties	**Low Risk** Potential contact with soils on-site during construction works. No visual or olfactory evidence of contamination was observed on site. No contamination sources identified with respect to POS screening values. No risk therefore from ingestion of soils. Limited potential for unanticipated contamination – to be assessed and remedial actions proposed if identified. Risks from dermal contact mitigated by PPE. Risks from dust mitigated by damping down during dry / windy weather.	**No risk** Work will not be conducted within the adjacent residential garden areas. No contact with contaminated soils anticipated.
	Leaching	Pennine Coal Measures	**Low risk** No visual or olfactory evidence of contamination was observed on site. No contamination sources identified with respect to POS screening values. Limited potential for unanticipated contamination – to be assessed and remedial actions proposed if identified. Near surface largely cohesive soils, will limit infiltration potential (confirmed by previous ground investigation).	**No risk** Contamination sources not identified. Limited potential for unanticipated contamination – to be assessed and remedial actions proposed if identified. Roads and car park are impermeable preventing infiltration across most of the development site.

Source	Pathway	Receptor	During Construction	Post Construction
	Migration	Perched groundwater	**Low Risk** No contamination sources identified with respect to POS screening values. Limited potential for unanticipated contamination – to be assessed and remedial actions proposed if identified. Near surface predominantly cohesive soils will limit infiltration potential.	**No Risk** No contamination sources identified with respect to POS screening values. Roads and car park are impermeable preventing infiltration. Near surface predominantly cohesive soils will further limit infiltration potential. Levels are to be raised and suitable drainage measures implemented to minimise migration of groundwater from the site.
	Run-off	Surface water	**Low Risk** No contamination sources identified with respect to POS screening values. Limited potential for unanticipated contamination, to be assessed and remedial actions proposed if identified. Watercourse is culverted across the site so limited potential to receive run-off.	**No Risk** Levels are to be raised and suitable drainage measures implemented to prevent run-off. No contamination sources identified with respect to POS screening values.

Source	Pathway	Receptor	During Construction	Post Construction
	Ingestion of soil Ingestion of dust Dermal contact Plant uptake	Ecological Receptors	**No risk** No receptors identified. Contamination sources not identified Limited potential for unanticipated contamination – to be assessed and remedial actions proposed if identified.	**No risk** No receptors identified. Contamination sources not identified.
Potentially infilled land	Inhalation of ground gases and landfill gas	Construction Workers	**Low risk** Filling ceased 35 years ago. No structures (with the exception of limited drainage) on site below existing levels. Possible risk to construction workers during below ground works due to gas (depleted O_2 levels and CO_2) as gas monitoring not undertaken, however this could be mitigated by monitoring and / or not working within excavations.	**No risk** Filling ceased 35 years ago. Proposed works could affect gas migration pathways as the site surface will be more impermeable than at present. However, the proposed works are to raise ground levels with granular fill adjacent to the residential properties in the east. Therefore, the granular fill would act as a vent, breaking the pathway for gas and there is no increase in risk.
	Migration of gas into adjacent residential buildings	Residents in nearby properties.	**No risk** Filling ceased 35 years ago. No building proposed.	**No risk** Filling ceased 35 years ago. Proposed works could affect gas migration pathways as the site surface will be more impermeable than at present. However, the proposed works are to raise ground levels with granular fill adjacent to the residential properties in the east. Therefore, the granular fill would act as a vent, breaking the pathway for gas and there is no increase in risk. It is proposed to remove the collapsed culvert on site and re-engineer inert fill. The risk therefore remains the same as pre-construction and provides betterment.

Source	Pathway	Receptor	During Construction	Post Construction
				The pond was present in the 1930s 15m from the site, and is therefore not considered to be generating significant gas given the amount of time since the pond was infilled. The risk therefore remains the same as pre-construction and provides betterment.

7. Conclusions and Recommendations

7.1 Following review and subsequent update of the conceptual site model, it is considered that there is negligible change to the gas risk to the adjacent properties at the site due to the nature of the proposals which include a granular makeup to the car park which will allow any remaining gas to vent to the atmosphere.

7.2 JNP Group do not consider there to be an increased risk to human health or controlled waters from elevated soil concentrations or the proposals at the site as no contamination has been identified to date. There is a small risk to construction workers, perched groundwater and surface water from unanticipated contamination which would be mitigated by suitable remedial measures should this be encountered.

7.3 JNP Group recommend that a CEMP be completed for the site.

Document Issue Record

Technical Note No	Rev	Date	Prepared	Reviewed	Approved
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