



DEPARTMENT OF OPERATIONS

Dean Clapworthy
Bury Council Development Control

Date 5 April 2024
Reference CL295.050424.1

Dear Dean

Site of Radcliffe Leisure Centre, Spring Lane, Radcliffe, Manchester, M26 2SZ, Planning Application: 70071 – Contaminated Land

I write regarding the above planning application. The Environment Section has received copies of the following reports:

- Phase II Geo-Environmental Assessment Report, Star Academy, Reference: PH/C5394/12387, October 2023
- Phase II Geo-Environmental Assessment Report, Star Academy, Reference: PH/C5394/12387 Rev C, January 2024.
- Remediation Strategy, Star Academy, Reference: PH/C5394/12387 - FS1013-BSL-XX-XX-T-O-1001 Rev P01, October 2023.

The following documents have previously been received and reviewed:

- Desk Study, Star Radcliffe, Geotechnics, Reference: PN228400 Rev 1, May 2022.
- Preliminary Ground Investigation Report with Interpretative Chapter, Star Radcliffe, Geotechnics, Reference: PN224390 Rev 1, August 2022.

The Environment Section has reviewed the above information in order to assess the following points:

1. The adequacy of the desk study information available for this site.
2. The adequacy of the site investigation.
3. The adequacy of the final risk assessment.
4. The acceptability of the proposed remediation strategy.
5. Whether the information submitted is sufficient to determine that the site presents a low risk to human health and the environment.

The site was formerly used as Spring Lane School (a pupil referral unit) and a Leisure Centre including a temporary swimming pool, and a former electricity sub-station. Current uses in the surrounding area include housing, a Metrolink Line and station and commercial buildings. Previous uses at the site have included open land associated with a farm, followed by railway land including a goods shed and goods station, a cricket ground and allotment gardens. By 1979 the site had



been developed as a school. Surrounding former land uses have included a former railway line, a gravel pit, mineral water works, iron works, a rope walk, sawmill, unspecified works, a colliery and residential developments. The site is within 250m of one landfill site, known as Darbyshire Street Landfill, which is an infilled railway cutting. There are two surface watercourses situated within 250m of the site including the Manchester, Bury and Bolton Canal which flows along the northwest boundary of the site and the River Irwell to the south. The site is situated above the Carboniferous Middle Coal Measures Secondary A Aquifer which is overlain by Glacial Till and River Terrace Deposits. It is likely that deposits of made ground exist at the site. The site is not located within a Radon Affected Area.

It is understood that the proposed development comprises the construction of a new secondary school alongside supporting sports facilities, car parking, landscaping, site infrastructure, new access road and associated access infrastructure.

A temporary school (Planning Application: 70002) will be constructed on part of the site, whilst the permanent school is being constructed.

1. The adequacy of the desk study information available for this site

The report includes a description of the site including its past historical uses. An appraisal of the site environmental setting is presented including its geology, hydrogeology and hydrological regime, mining activities, waste management issues, and identification of additional environmental sources, pathways and receptors. This information has been used to compile a clear site conceptual model, which identifies potential sources, pathways and receptors and likely pollution linkages. A site walkover was carried out on 24 January 2022 and evidence of the presence of made ground and construction rubble was noted.

The desk study information provided appears to be sufficient to assess the potential risks at the site. The report concluded that there was a potential risk to future site users and the environment from potential contamination at the site. Consequently, a site investigation was recommended and has been completed.

It is recommended that an invasive species/Japanese Knotweed survey is completed.

It is understood that the demolition of the current buildings will be carried out under Application 70002, therefore, any issues relating to the presence of asbestos containing materials in the building will be dealt with under that application.

2. The adequacy of the site investigation

A preliminary site investigation was carried out by Geotechnics in May 2022 and comprised the following:

Technique	No.	Comments
Geotechnics, May 2022		
Cable percussion with rotary follow-on boreholes	5	Excavated to a depth of between 15.10m and 21.66m bgl (BH01, BH02, BH03A and BH04). BH03 was terminated at 2.45m due to the presence of hydrocarbon contamination. BH01, BH02, BH03A and BH04 were extended to depths of between 45.0m and 51.5m bgl.
Window samples	7	Excavated to a depth of between 3.45m and 5.45m bgl (DS01, DS02, DS03, DS04, DS05, DS06 and DS07).
Trial pits	6	Excavated to a depth of between 3.7m and 4.0m bgl (TP01, TP02, TP03, TP04, TP05 and TP06).
Hand dug pits	5	Excavated to a depth of between 0.6m and 1.2m bgl (HD01, HD02, HD03, HD04 and HD05).
Soil sampling	16	Samples of made ground were analysed for a suite of analysis that included metals, TPH CWG, MTBE, speciated PAHs, phenol, VOCs and asbestos.
Soil leachability sampling	4	Samples of made ground were analysed for a suite of analysis that included metals, inorganics and phenol.
Groundwater sampling	4	Samples of groundwater were tested for a suite of analysis that included metals, inorganics, speciated TPH, speciated PAHs.
Ground gas monitoring	6 visits over 6 weeks	Monitoring wells installed in 4 boreholes with the following response zones: • BH01 (glacial sand and gravel) • BH02 shallow (made ground/glacial sand and gravel). • BH02 deep (glacial sand and gravel) • BH03A (made ground/glacial sand and gravel). • BH04 (made ground/glacial sand and gravel).
Brownfield Solutions, August 2023		
Window samples	6	Excavated to a depth of between 1.2m and 5.45m bgl (WS101-WS106).
Trial pits	11	Excavated to a depth of between 1.5 and 3.5m bgl (TP101-TP111).
Hand dug pits	2	Excavated to a depth of between 1.1m and 1.2m bgl (HP101 and HP102).
Rotary boreholes	8	Excavated to a depth of 45.0m bgl (RO101-RO108)
Soil sampling	8	Samples of made ground were analysed for a suite of analysis that included metals, TPH CWG, speciated PAHs, BTEC, MTBE and asbestos: • WS101 0.2-0.6m (cohesive made ground) • WS103 1.5m (cohesive made ground) • WS106 0.15-1.2m (granular made ground) • TP101 0.0-0.2m (topsoil-like made ground) • TP103 0.0-0.2m (topsoil-like made ground)

		• TP106 0.4-1.25 (ashy made ground with slight hydrocarbon odour) • TP108 0.1-1.0m (ashy made ground with slight hydrocarbon odour) • HP101 0.3-1.0m (ashy made ground).
Ground monitoring	gas 3 visits over 1 month	Monitoring wells installed in 6 boreholes with the following response zones: • WS101 0.6-1.2m (made ground) • WS102 0.5-1.5m (made ground) • WS103 0.5-1.5m (made ground) • WS104 1.0-2.0m (made ground) • RO103 18.0-20.0m (mudstone) – flooded on all occasions. • RO104 17.5-20.0m (mudstone) – flooded on all occasions.
Brownfield Solutions, November 2023		
Trial pits	5	Excavated to a depth of between 1.5 and 3.5m bgl (TP201-TP205).
Trial trenching	2	Excavated to a depth of between 0.1 and 1.2m bgl in the vicinity of WS101 to confirm extent of organic made ground.
Trial trenching	2	Excavated to a depth of between 0.7 and 1.5m bgl in the area of the former railway sidings (TT01-TT02). An unrecorded manhole was encountered at TT02.

Site Ground Conditions Both investigations found similar ground conditions at the site comprised locally of tarmac, concrete, sub-base, concrete slabs or topsoil, over granular made ground typically to approximately 2.0m but locally to in excess of 3.45m bgl (DS07) containing ash, brick, concrete, coal, glass, across the east of the site. Cohesive made ground was identified locally in WS101, WS102, WS103 and WS105 towards the north and central area of the site. Slight hydrocarbon odours were noted in the made ground in DS05, TP106, TP107 and TP108.

Organic matter and a mild organic odour was noted in WS101 between 0.6m and 1.20m bgl. Further investigation was carried out in November 2023 to delineate the extent. The material was found to be 0.10m thick at its edge and up to 1.20m at the centre (approximate volume of 144m³), located around WS101 in the northwest corner of the proposed building footprint.

The natural strata comprises glacial clays and glaciofluvial sand and gravel deposits to between 11.2m and 20.5m bgl. Bed rock of interbedded mudstone, siltstone and sandstone (Middle Coal Measures) were identified in all rotary boreholes with thin coal seams. No evidence of former coal workings was found.

Site Water Conditions: Groundwater strikes were encountered in the granular made ground and within sand and gravel deposits at between 0.8m and 3.0m bgl during the August 2023 investigation.



Very-high water levels were encountered during the trial pitting exercise in November 2023. The high groundwater levels recorded during the gas monitoring programme are not thought to be representative of the true groundwater conditions at the site, but due to the wells acting as sumps for the shallow groundwater on the site.

Site Ground Gas Conditions: Two phases of gas monitoring have been carried out:

- Geotechnics undertook a total of six visits over a period of five weeks between 16 June and 20 July 2022 with atmospheric pressure less than 1000mb on one occasion. During the Geotechnics investigation, no methane was recorded. The maximum carbon dioxide concentration was 4.0%v/v. Flow rates were typically <0.1 l/h with a maximum flow rate of 0.7 l/h. A flow rate of 3.6 l/h was recorded in BH02 on the final visit, however, this is likely attributed to a significant rise in groundwater levels within the borehole.
- Three additional visits were carried out by Brownfield Solutions over a period of one month between 30 August and 27 September 2023 with atmospheric pressure above 1000mb on all occasions. During the Brownfield Solutions monitoring, significantly elevated concentrations of methane (32.3%v/v, 41.6%v/v, 23.9%v/v) were recorded in WS101. No methane was recorded in any of the other boreholes. Elevated levels of carbon dioxide (maximum 11.7% in WS104). The maximum flow rate recorded was 37.8 l/hr in RO103 within the mudstone, but this can be attributed to changes in groundwater levels within the borehole. Typical flow rates within the shallow boreholes were between <0.1 and 0.4 h/l.

3. The adequacy of the final risk assessment

Human Health Risk Assessment: The soil analysis results have been compared to the Defra C4SLs and CIEH/LQM S4ULs residential without homegrown produce land use:-

The following elevated concentrations of contaminants were found in the made ground during the Geotechnics and Brownfield Solutions investigations:

- Arsenic – Samples DS01 0.5m (130mg/kg), TP108 0.1-1.0m (43mg/kg), HP101 0.3-1.0m (43mg/kg), based on C4SL of 40mg/kg.
- Lead – Sample DS01 0.5m (380mg/kg), based on C4SL of 310mg/kg.
- Naphthalene - Sample DS05 0.5m (21mg/kg), based on S4UL of 5.6 mg/kg.
- Benzo(a)anthracene – Sample DS05 0.5m (23mg/kg), based on S4UL of 14mg/kg.
- Benzo(b)fluoranthene - TP106 0.4-1.25m (6.9mg/kg), DS05 0.5m (23mg/kg), based on S4UL of 4mg/kg.
- Benzo(a)pyrene – Samples TP106 0.4-1.25m (5.7mg/kg), DS05 0.5m (19mg/kg), based on S4UL of 3.2mg/kg.
- Dibenzo(ah)anthracene – Samples TP106 0.4-1.25m (0.65mg/kg), HP101 0.3-1.0 (0.33mg/kg), DS05 0.5m (2.1mg/kg), HDP04 0.2m (0.34mg/kg), based on S4UL of 0.32mg/kg.

No asbestos was encountered. Based on the findings of the site investigations, the consultant considers that there is a potential risk to future site users and that remedial action is required.

Controlled Waters Risk Assessment: The results of the groundwater / soil leachate analysis carried out as part of the Geotechnics investigation were compared to the UK Drinking Water Standards and Environmental Quality Standards.

The following elevated concentrations of contaminants were identified in the groundwater samples:

- Copper - BH01 (2.0µg/l), BH02 Deep (1.6µg/l), BH04 (1.5µg/l) compared to EQS of 1µg/l and DWS of 2000µg/l.
- Manganese - BH01 (1,500µg/l), BH02 Shallow (300µg/l), BH04 (360µg/l), BH02 (Deep) (58µg/l) compared to EQS of 123µg/l and DWS of 50µg/l.
- Selenium - CP01 (29µg/l), CP03 (37µg/l) compared to DWS of 10µg/l.
- Zinc - BH01 (37µg/l), BH02 Shallow (15µg/l), BH02 Deep (32µg/l), BH04 (59µg/l) compared to EQS of 10.9µg/l and DWS of 3000µg/l.
- Aliphatic TPH >C5-C6 - BH02 Shallow (14µg/l) compared to EQS of 10µg/l and DWS of 10µg/l.
- Fluoranthene - BH01 (0.01µg/l), BH02 Shallow (0.01µg/l), BH02 Deep (0.04µg/l), BH04 (0.02µg/l) compared to EQS of 0.0063µg/l.
- Benzo(a)pyrene - BH02 Deep (0.02µg/l) compared to EQS of 0.00017µg/l and DWS of 0.01µg/l.
- Benzo(b)fluoranthene - BH02 Deep (0.03µg/l) compared to EQS of 0.00017µg/l and DWS of 0.01µg/l (BaP values).
- Benzo(ghi)perylene - BH02 Deep (0.03µg/l), BH04 (0.01µg/l) compared to EQS of 0.00017µg/l and DWS of 0.01µg/l (BaP values).

The following elevated concentrations of contaminants were identified in the soil leachability samples:

- Chromium (VI) – Sample HD03 (7.4µg/l) compared to EQS of 3.4µg/l and DWS of 50 µg/l.
- Copper - DCP05 (2.5µg/l), BH03 (3.7µg/l), HD01 (1.7µg/l), HD03 (2.3µg/l), WS02 (1.4µg/l) compared to EQS of 1µg/l and DWS of 2000µg/l.
- Iron - BH03 2,300µg/l, HD03 (1,400µg/l), BH03 (2,300µg/l), HD03 (1,400µg/l) compared to EQS of 1000µg/l and DWS of 200µg/l.
- Lead - BH03 (3.0µg/l) compared to EQS of 1.2µg/l and DWS of 10µg/l.

The consultant considers that levels of contaminants identified do not pose a significant risk to controlled waters due to the minor nature of the exceedances, the lack of anthropogenic sources for the contaminants and lack of gross or mobile contamination on the site. Additionally, the nearest surface water (Manchester, Bury and Bolton Canal) is unlikely to be in hydraulic continuity with the site due to having a clay liner. The underlying Coa Measures aquifer is overlain by a significant depth of clay deposits, reducing the likelihood of any vertical migration of contaminants. Consequently, no remedial measures are considered necessary. This Section is satisfied with this assessment.

Ground Gas Risk Assessment: The consultant has used the methodology set out in CIRIA 665 and BS8485:2015 to assess the gas regime at the site. Worst-case Gas Screening Values (GSVs) of 0.0166 l/h methane and 0.0456 l/h carbon dioxide have been calculated for the shallow boreholes (WS101-WS104) targeting the made ground (41.6%v/v methane, 11.7%v/v carbon dioxide and 0.4 l/h flow). No GSVs were calculated for the deep boreholes (RO103 and RO104) as these were designed to target possible mine gas and the response zones of these boreholes were flooded on all occasions.

The GSVs place the site into Characteristic Situation 1 (CS1) for carbon dioxide, however, where the maximum concentrations of methane and carbon dioxide exceeds 1%v/v and 5%v/v respectively, the consultant should consider increasing the gas regime at the site to Characteristic Situation 2. Consequently, a detailed gas risk assessment has been completed.

The elevated levels of methane recorded in WS101 were attributed to introduction of oxygen to the localised cohesive organic made ground, as a result of the installation of the borehole. The recorded flow rates were low indicating no significant ongoing gas generation. The consultant considers that these levels of methane could not be generated in normal conditions. Additionally, it is considered likely that this soft cohesive made ground would be removed during construction of the main school and no other boreholes recorded elevated concentrations of methane during either period of monitoring.

Ground gas ratio plots have been completed which indicate that the source of the elevated levels of carbon dioxide encountered in WS104 are due to microbial respiration and naturally occurring oxidation of the organic material within the made ground. No elevated levels of carbon dioxide were encountered in the other boreholes.

Consequently, the consultant considers that the gas regime at the site is representative of Characteristic Situation 1 and that no special gas protection measures are required. This assessment appears reasonable.

3. The acceptability of the proposed remediation strategy

The following remedial measures are proposed so that the contamination identified on site no longer presents a risk:

- Production of Materials Management Plan (MMP) under the CL:AIRE Definition of Waste Protocol for the re-use of soil materials on site.
- Removal of all hardstanding, floor slabs, relict foundations and in ground obstructions. Hard materials will be crushed for re-use. Samples of crush will be tested at a rate of 1 per 1000m³ (minimum of 3 samples per source) for a suite of analysis that includes metals, speciated PAHs and asbestos. A watching brief and a photographic record will be kept.
- Excavation, screening and engineering / re-use of made ground and soils and importation of soils (earthworks). Samples of made ground will be tested at a rate of 1 per 1000m³

(minimum of 3 samples per source) for a suite of analysis that includes metals, speciated PAHs, TPH CWG, BTEX and MTBE and asbestos. Visual inspections and VOC screening using a PID will be carried out at a rate of 1 test per 250m³. Waste transfer documentation will be required for any unsuitable soils removed from site.

- Excavation of organic made ground in the vicinity of WS101 to remove sources of methane gas. A watching brief should be in place to confirm successful removal of organic soils and to obtain photographic evidence. The excavated material will either be accommodated elsewhere on-site away from the building footprint or sent for off-site disposal. If the material is removed off-site, waste disposal documentation will be required.
- Installation of a cover system of 450mm of 'clean' validated topsoil/subsoil within the limited areas of soft landscaping located towards the front of the site. Deeper tree pits will be used where required. The imported topsoil and subsoil, and any suitable site won soils, will be tested at a rate of 1 per 150m³ for brownfield and site won soils (minimum of 6 samples per source) and 1 per 250m³ for proven greenfield sources (minimum of 3 samples per source). Samples will be tested for a suite of analysis that includes metals, speciated PAHs, TPH CWG, BTEX and MTBE and asbestos. The results will be compared to GACs for residential without homegrown produce. The thickness of the clean cover system will be validated using trial holes and photographs.
- A United Utilities water supply pipe risk assessment will be completed to determine if barrier pipe is required on site. Where barrier pipe is required, validation information will be required including photographic evidence and receipts/delivery notes for the barrier pipe.
- A watching brief to identify and deal with any previously unidentified contamination will be maintained during demolition and clearance/soils strip works. Confirmation that no unforeseen contamination was encountered during the development will be required. This should include a photographic record of the development and should focus particularly on the excavations for the foundations in order to illustrate the ground conditions encountered.

The proposed remediation strategy is acceptable to this Section. The remedial works should be fully implemented in accordance with the strategy's recommendations.

Conclusion

In order for this Section to be satisfied that this development does not pose a risk to human health or the environment, the following information needs to be submitted to the Council for approval:

- (i) A materials management plan, where the CL:aire Definition of Waste Code of Practice is to be used.
- (ii) After completion of site works, a verification report is required to validate that the work undertaken conforms to the remediation proposals received and agreed by this Section.



This Section is satisfied that the requirements of Condition 3 have been met and that this condition can now be recommended for discharge.

Condition 4 requires the submission and approval of items (i) to (ii) above.

All parties involved with waste and soil movement at the site should be aware that materials illegally deposited or deposited at inappropriate sites may be subject to relevant landfill taxes, payable by all parties. Only robust due diligence is a defence against joint liability. Illegal deposits can include moving waste soil material on sites, or between sites, without the appropriate permits, exemptions or duty of care.

Please Note: The Environment Section has used all reasonable endeavours to determine the risk from contaminated land and ground gas based upon the information available to it. However, the comments made above should not be taken to imply that the land is safe or otherwise suitable for this or any other development. The ultimate responsibility for safe implementation of the development scheme resides entirely with the landowner and/or Planning Applicant.

Please do not hesitate to contact me if you require any clarification of the above.

Yours sincerely

Rebecca Jones
Environmental Protection Officer

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