CAPITA

Radlett Strategic Rail Freight Interchange

Areas 1 and 2

Geo-environmental Monitoring Proposals

January 2018

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Quality Management

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Client	Helioslough Limited		
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Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Authorised
-	29/6/17	DRAFT FOR COMMENT	PWE	NRB
v1	17/8/17	Dust monitoring protocol updated. Reference list added.	PWE	NRB
v2	22/1/18	Revised seasonal water level and water quality monitoring in line with EA comments	JD	PWE

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Appendices

1. Introduction

1.1 Preamble

1.1.1 This document has been produced by Capita Property and Infrastructure Limited for Helioslough Limited (the Client) to describe proposals for the monitoring of groundwater and ground gases at Areas 1 and 2 of the Radlett SRFI development. High level commentary is also provided in relation to dust and fibre monitoring.

1.2 Development Proposals

1.2.1 Area 1 of the development is proposed to comprise an intermodal freight terminal and rail and road served distribution units. A new rail line is proposed to service the development via a link from the nearby Midland Mainline. The new rail line will pass through Area 2 before entering Area 1 at approximately the mid-point of its eastern boundary.

1.2.2 A visual / acoustic mound is proposed to be constructed to the east of the new rail link, along most of the eastern side of Area 2. Bunds are also proposed to be constructed at Area 1 on that plot's northern, western and southern boundaries.

1.2.3 An architect's drawing illustrating the proposed development layout at Areas 1 and 2 is provided in Appendix A.

1.2.4 It should be noted that remaining Areas 3 to 8 of the SRFI scheme comprise country park enhancements on land surrounding the new built development and fall outside the scope of this monitoring proposal.

1.3 Previous Relevant Reports

1.3.1 This document follows and is informed by three preceding geo-environmental assessments undertaken by Capita:

- Ground Contamination Assessment and Remediation Strategy for Area 1, ref CS-070751-PE-16-134-R rev B dated October 2016.
- Ground Contamination Assessment and Remediation Strategy for Area 2, ref CS-070751-PE-16-143-R rev C dated October 2016.
- Controlled Waters Detailed Quantitative Risk Assessment for Area 2, ref. CS070751-CAP-00-XX-RP-Y-CWDQRA rev 2.0 dated January 2017.

1.4 Planning Context and Report Purpose

1.4.1 The proposed development benefits from outline planning consent granted by the Secretary of State for Communities and Local Government in July 2014 (ref. APP/B1930/A/09/2109433). Condition 24 of the consent relates to the investigation and assessment of ground contamination.

1.4.2 The above-listed Capita reports have been submitted to the local planning authority, St Albans District Council (SADC), in relation to particular parts of condition 24. The reports have also been reviewed by the Environment Agency (EA) in its role as a statutory planning consultee, with particular reference to evaluation of risks to controlled waters.

1.4.3 This monitoring proposal aims to address specific points raised by both SADC and the EA in their responses to the previous reports. Copies of associated correspondence are provided in Appendix E.

2. Site Setting

2.1 Location

2.1.1 The proposed development site comprises land in and around the former Radlett Aerodrome to the south of North Orbital Road (the A414) and to the north of the M25 motorway in the Upper Colne Valley, Hertfordshire.

2.1.2 Area 1 is approximately centred on Ordnance Survey National Grid Reference (NGR) 515690, 203720 and can be located at postcode AL2 2ET. Area 2 is approximately centred on NGR 516123, 203253. Location plans are provided in Appendix B.

2.2 Description

2.2.1 Detailed site descriptions are provided in the previous Capita reports. In summary, Area 1 covers an area of about 146 hectares and at the time of writing predominantly comprises agricultural fields for animal grazing, leased and operated by Hedges Farm. The farm buildings are situated at the northern end of the site, accessed directly from the A414.

2.2.2 Area 2 covers an area of about 26 hectares and comprises disused land with sporadic, locally dense vegetation. A number of small ditches bisect this area centrally from west to east, and a north-south ditch is also present on the western boundary and along most of the eastern boundary.

2.2.3 The Midland Mainline railway forms the north-south boundary between Areas 1 and 2. The railway is on an embankment which is typically about 2 to 3m above current site levels, becoming level with the sites towards the northern end of Area 1.

2.3 Previous Development History

Area 1

2.3.1 Area 1 was in agricultural use from at least 1883 until the late 1920s. It was developed for Radlett Aerodrome in 1929 and was occupied by runways and some small associated buildings until the 1970s. The main aerodrome buildings were located off-site to the south. In the 1990s the southern half of the site was quarried for sand and gravel, which led to a general lowering of levels in that area. On completion of mineral extraction, the sand and gravel pits were infilled and restored using clean inert overburden and/or interburden. Restoration was completed by 2006 and the site reverted to agricultural land.

Area 2

2.3.2 Area 2 was in agricultural use until the 1960s. Quarrying of parts of the site for sand and gravel took place in the 1960s and ’70s and the resultant voids were used for landfilling of household and commercial wastes in the 1970s and ‘80s.

2.3.3 It was a condition of the landfill licence that a cover layer of clay reject material not less than 30cm thick be placed over the uppermost waste layer. The clay layer should be covered by not less than 60cm overburden or subsoil.

3. 2016 Ground Investigations

3.1 Scope

3.1.1 Intrusive ground investigation works were undertaken by Capita in 2016 across Areas 1 and 2. These comprised construction of boreholes with monitoring wells and extensive trial pitting to both areas. Soil, soil leachate and groundwater samples were laboratory tested for a range of potential chemical contaminants and a programme of water level and ground gas monitoring was undertaken.

3.1.2 Drawings illustrating the exploratory hole locations are provided in Appendix C.

3.2 Summary of Ground Conditions Encountered

Area 1

3.2.1 The superficial deposits consisted of topsoil (average 0.25m thick) over discontinuous Made Ground / re-worked natural soils typically comprising gravelly sandy clay. This was underlain by the Lowestoft Formation, consisting of interbedded gravelly clay, clayey sand and clayey/sandy gravel), over discontinuous Kesgrave Catchment Subgroup over Undifferentiated Lewes Chalk / Seaford Chalk.

3.2.2 The level of the top of the chalk varied between about 70 and 80mAOD below the northern half of the site (about 5 to 10m below current ground level), dipping towards the south to a surface level of between about 60 and 63mAOD below the site's southern half.

3.2.3 Field data indicated groundwater to lie at between about 67mAOD below the northern end of the site (about 15 to 16m below ground level)) falling to about 62mAOD below its southern end (about 7 to 8m below ground level). Flow direction was towards the south at an approximate gradient of between about 1:250 and 1:300.

Area 2

3.2.4 The whole of Area 2 was found to be surfaced with a layer of topsoil between about 0.1 and 0.5m thick. In areas of historic landfilling this was generally underlain by: 1 to 2m gravelly clay (landfill capping); 4 to 6m landfill (a mix of domestic refuse and commercial and construction type wastes); and a 1 to 2m thick clayey / gravelly base layer of re-worked soil (possibly a landfill lining or unworked natural deposits).

3.2.5 The underlying natural soils, which were detected at much shallower depths outside landfilled areas, comprised the Kesgrave Catchment Subgroup - interbedded gravelly clay and clayey sand layers over sand and gravel - over Chalk. The top of the Chalk was reached at between about 9 and 14mbgl (59.3 and 62.7mAOD).

3.2.6 Groundwater below Area 2 was between about 64mAOD (about 9m below ground level) at the northern end falling to about 60.5mAOD (circa 14m below ground level) in the south-east corner. This generally coincided with the deeper sand and gravel of the Kesgrave and the top of the underlying Chalk.

3.2.7 Localised pockets of perched groundwater were occasionally detected within the landfill deposits, at between about 3 and 5mbgl.

3.3 Summary of Soil and Groundwater Contamination Assessment

Area 1

3.3.1 61 soil and 27 groundwater samples were analysed for a range of potential chemical contaminants. None were found to contain significantly elevated concentrations in the context of the development proposals.

Area 2

3.3.2 32 soil, 5 soil leachate and 10 groundwater samples were analysed from Area 2 in August 2016. This was followed by analysis of six further groundwater samples in October 2016.

3.3.3 Laboratory analysis of the soil samples did not detect significant concentrations of chemical contaminants and risks to human health were concluded to be low. However isolated fragments or loose fibres of asbestos containing materials were detected locally within the landfilled material, as tabulated below:

Location	Depth (mbgl)	Asbestos ID
TP51	0.75	Chrysotile, Crocidolite - Insulation lagging
TP63	3.0	Amosite – loose fibres
TP65	3.2	Amosite – loose fibres
TP66	0.5	Chrysotile – loose fibres
TP67	0.8	Chrysotile – insulation lagging
TP70	2.5	Amosite – loose fibres
TP71	2.5	Chrysotile – loose fibres

3.3.4 The laboratory testing detected moderate exceedances of several determinands within the groundwater, as summarised in the following table. These were all taken forwards for quantitative risk assessment using the ConSim contaminant transport model.

Contaminant	EQS (µg/l)	DWS (µg/l)	Maximum Recorded Concentration (µg/l)	Number above EQS	Number above DWS
Ammoniacal Nitrogen	300	500	120,000	7	7
Nitrite	N/A	500	250	-	0
Naphthalene	2	N/A	13.3	3	-
Anthracene	0.1	N/A	0.77	3	-
Fluoranthene	0.0063	N/A	0.89	3	-
Boron	750	1000	1100	1	1
Copper	1	2000	2.2	4	0
Nickel	4	20	17	7	0
Zinc	10.9	N/A	70	5	-
TPH Aromatic C10-C12	N/A	10	23	N/A	4
TPH Aromatic C12-C16	N/A	10	20	N/A	2

EQS = Environmental Quality Standard
DWS = Drinking Water Standard

3.3.5 The ConSim modelling was undertaken on the basis of two potential controlled waters receptors: the chalk aquifer, and the River Colne (located approximately 380m down groundwater hydraulic gradient at its proximal point).

3.3.6 The modelled compliance points were selected to be:

1) The most down hydraulic gradient point of the landfill.
2) A theoretical compliance point located 50m down-gradient of Area 2, to compare predicted dissolved phase groundwater contaminants with appropriate drinking water standards.
3) The River Colne, with predicted concentrations at the river being screened against the relevant environmental quality standards (where appropriate).

3.3.7 The assessment found that for the 95th percentile concentrations there were exceedances of the adopted standards for naphthalene, anthracene, fluoranthene, TPH CWG Aromatic C10-C12, TPH CWG Aromatic C12-C16, and ammoniacal nitrogen.

3.3.8 Boron, copper, zinc, and nitrite were calculated to be below the EQS at the River Colne receptor.

3.3.9 The model was also run with infiltration reduced, to simulate the effects of a capping layer with surface water run-off management. Under such infiltration conditions the number of exceedances was reduced although ammoniacal nitrogen and fluoranthene were found still to marginally exceed the adopted standards.

3.3.10 Determinands that are identified as Priority (naphthalene and nickel) or Priority Hazardous (anthracene) substances were modelled to a groundwater receptor underlying the source zone. These contaminants were calculated at the receptor during the regular model run. The discharges were lowered with the implementation of a capping layer, simulated by reducing the infiltration to the source zone.

3.3.11 A separate model was run to simulate the effects of the construction phase and acoustic bund on the contaminant profile (called the 'squeezed' model). This model found that the effects of squeezing the landfill will not serve to significantly increase the concentrations of non-priority contaminants at the receptors. The modelled concentrations of Priority and Priority Hazardous substances were seen to increase marginally under the squeezed conditions.

3.4 Summary of Ground Gas Assessment

Area 1

3.4.1 No significant concentrations of methane were present (maximum 0.7% in BH49 but <0.1% in all other locations).

3.4.2 The maximum carbon dioxide concentration was 9.0% at BH50 (on 26/7/16), but the CO2 concentrations in this location on three preceding monitoring rounds were 0.8%, 0.3% and 2.6%. Marginally 'elevated' CO2 concentrations (>5%) were recorded at two other locations only – BH37 (5.5% on 8/6/16 and 26/7/16) and BH47 (6.5% on 8/6/16).

3.4.3 Relatively low concentrations of oxygen were detected in several monitoring wells situated towards the southern end of the site, with <15% recorded in each of BH31 to BH50 on one or more occasion.

3.4.4 Gas flow rates were predominantly very low (<1.0 l/hr), with moderate rates detected at BH21 (maximum 4.4 l/hr) and BH32 (maximum 4.2 l/hr) only.

Area 2

3.4.5 Very high concentrations of methane were detected at BH52, BH54, BH57 and BH58 (between about 15 and 55% by volume). Elevated carbon dioxide (circa 20 to 30% by volume) was also detected in these locations.

3.4.6 The highest concentrations were detected in wells sealed within the landfill, indicating ongoing degradation (aerobic and anaerobic) of putrescible materials. Ground gases were not detected in exploratory holes situated outside the landfilled areas.

3.4.7 Gas flow rates were in many cases below detection limits (<0.1 l/hr), but measurable flow was recorded at BH52, BH57 and BH58 (max 0.1 l/hr); BH53 and BH56 (max 0.2 l/hr); and BH51 (max 0.3 l/hr).

Ground Gas Protection Recommendations

3.4.8 It was recommended that ground gas protection be incorporated into the south-eastern Area 1 development units – namely DC4, DC6 and DC7 – comprising:

- Reinforced concrete cast in situ floor slab(s) with minimal penetrations.
- A gas resistant membrane beneath all floor slabs, meeting the following criteria:
    - Sufficiently impervious to the gases present;
    - Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
    - Sufficiently strong to withstand in-service stresses;
    - Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc);
    - Capable, after installation, of providing a complete barrier to the entry of the relevant gases; and
    - Verified in accordance with CIRIA C735 ‘Good practice on the testing and verification of protection systems for buildings against hazardous ground gases’

3.4.9 Protection from ground gases is not required at Area 2 as, other than the rail chord, no new built development is proposed.

4. Monitoring

4.1 Introduction

4.1.1 In consideration of the ground conditions encountered, and following consultations with the Environment Agency and St Albans District Council, additional site monitoring is proposed in respect of ground gases and groundwater as described in the following sections.

4.1.2 Construction-stage monitoring of dust and airborne fibres is also described.

4.1.3 A drawing illustrating the locations of the various monitoring points is provided in Appendix D.

4.2 Ground Gas Venting and Further Monitoring

4.2.1 The SRFI development proposals include a requirement (under the outline planning consent) for soil bunds to be constructed in Area 2 to provide visual and acoustic screening. The bunds will be constructed using inert soils derived from the earthworks operation to be undertaken on Area 1, with no soils imported to site from outside the SRFI development area.

4.2.2 The most significant bund in Area 2 will range in height between about 5m and 12m above current ground levels and will be positioned to the east of the new rail chord. As noted, much of the underlying ground has been landfilled with a variety of wastes.

4.2.3 It is recognised that the bund could have a local effect on the way in which the ground gases being generated from that waste behave. However there is considered to be a low risk of significant horizontal migration given the prevailing geological conditions. Exploratory hole BH56, located on the western side of Area 2, between the landfill and the site boundary, indicates low permeability clayey soils to be present. It is also noted that there is a distance of some 150m between the western edge of the Area 2 landfill and the eastern side of the proposed new Area 1 buildings.

4.2.4 In this context, risks from ground gases to the proposed new buildings are considered to be low. Furthermore, it is proposed that a network of gas venting pipes be installed within the landfilled ground to provide preferential pathways for gas release to atmosphere.

4.2.5 Nevertheless, and as discussed with St Albans District Council, a programme of supplementary ground gas monitoring is proposed during the development period as described below. This is intended to provide further comfort regarding risks from ground gases to the new Area 1 buildings.

Gas Monitoring Locations

4.2.6 Monitoring is proposed to be undertaken at the following locations:

Locations	Applicable Unit	Comment
BH49, BH50	DC7	Gas protection currently proposed as described in Section 3.4 above. Additional monitoring to confirm protection requirements.
BH40, BH43, BH45, BH47	DC6	
BH46, BH48	DC4	

Locations	Applicable Unit	Comment
BH39, BH42, BH44	DC3	Ground gas not previously detected, but given location in southern / eastern sector of Area 1 further monitoring is warranted.
BH38, BH33, BH29, BH25	DC5	

Gases to be monitored

4.2.7 The following parameters are to be monitored:

- Methane concentration (as % by volume)
- Carbon dioxide concentration (as % by volume)
- Oxygen concentration (as % by volume)
- Gas flow rate (litres per hour)

Instrumentation

4.2.8 Monitoring is to be undertaken in the field using a portable infra-red spectrophotometer (e.g. Geotechnical Instruments GA5000) with integral or ancillary flow meter.

4.2.9 In accordance with BS 8576:2013 the accuracy / detection range of the instrument should be:

Accuracy:

Methane and carbon dioxide	± 0.2% v/v across 0.0% to 5.0% v/v range
	± 1.0% v/v across 5.0% to 15.0% v/v range
	± 3.0% v/v across 15% v/v to full scale of instrument
Oxygen	± 1.0% v/v across full scale of instrument

Detection Range:

Methane	0% to 100%
Carbon dioxide	0% to 100%
Oxygen	0% to 25%

Gas Monitoring Programme

4.2.10 Subject to agreement with the Local Authority, monitoring is proposed to be undertaken as follows:

- At 6 months prior to commencement of Area 2 bund construction.
- At commencement of bund construction.

- At six-month intervals during Area 2 bund construction (estimated to take 18 to 24 months in total).
- On completion of Area 2 bund construction and at 6 and 12 months after completion.

4.3 Area 1 Hydrogeology

4.3.1 The surface water drainage strategy for the built development at Area 1 envisages the use of above-ground infiltration basins and below-ground infiltration tanks. These are to be located towards the northern end of the site, where investigations undertaken in 2016 identified appropriate ground conditions with adequate soil permeability. Further details of the drainage strategy are set out in Capita report reference SS018844-GM-16-136-R dated August 2016.

4.3.2 Monitoring undertaken by Capita between June and August 2016 typically identified about 2.5m of unsaturated ground between the proposed soakaway invert levels of 69.5 mAOD and the resting water table, which ranged between approximately 66.7 to 67.5 mAOD. This substantially exceeds the recommended minimum of 1m described in the CIRIA SuDS manual (2015).

4.3.3 Nevertheless, in order to include seasonal fluctuations within the dataset, and following recent consultations with the Environment Agency, it is proposed that water levels be further monitored in the following existing well locations:

BH09

BH15

BH16

BH17

4.3.4 Monitoring is proposed to be undertaken at approximately monthly intervals over a 12 month period, beginning in January 2018, to ensure a full calendar year of water level data is recorded.

4.4 Area 2 Groundwater Analysis

4.4.1 As noted above, the 2017 Area 2 hydrogeology risk assessment concluded that:

- Groundwater concentrations of the Contaminants of Concern (CoC) were elevated in some of the monitoring wells with regards to either drinking water standards or environmental quality standards.
- The construction of a capping layer with surface water run-off management to reduce rainwater infiltration has been modelled to have a significant beneficial effect, reducing concentrations at the underlying Chalk aquifer receptor.
- Simulation of the effects of squeezing or compressing the landfill through construction of the bund above was predicted to lead to a marginal increase in some CoC concentrations. However this is expected to be substantially mitigated by the associated reduction in infiltration.

4.4.2 It was therefore concluded that a programme of supplementary groundwater analysis would be prudent, to monitor groundwater quality over the medium term. This accords with Environment Agency advice given in a letter dated 24th November 2016 which states (inter alia):

> "For Areas 1 & 2, we have no objection in principle for a reactive remedial strategy, however the verification plan should include a comprehensive groundwater monitoring programme to encompass regular monitoring for a period before, during and after ground works."

4.4.3 Further, in response to comments made in an Environment Agency letter dated 22nd December 2017, monitoring is proposed to be undertaken in accordance with the technical guidance contained within LFTGN02 (Monitoring of Leachate, Groundwater and Surface Water, EA 2003).

4.4.4 As less than half of the 26-acre site in Area 2 is occupied by the former landfill, a monitoring programme to fit the 10 – 25 ha site area bracket is proposed.

4.4.5 In this context, and in view of the findings of the DQRA, the following groundwater analysis is proposed for the existing monitoring wells sealed within the deep Chalk aquifer:

Location	Analysis Suite	Monitoring Frequency
BH52 BH53 BH54 BH55 BH56 BH57 BH58	• TPH-CWG • BTEX • Spectated PAH (US EPA 16) • Volatile Organic Compounds • Ammoniacal nitrogen as N • Nitrate as N • Metals and metalloids: As, Bo, Cd, Ca, Cr (VI), Cu, Pb, Mg, Hg, Ni, K, Se, Na, Zn)	• 1 month intervals for 6 months prior to commencement of Area 2 bund construction, to establish baseline conditions. • 1 month intervals during bund construction. • 1 month intervals for the first 6 months after completion of bund construction. • At 9 and 12 months post bund construction.

4.4.6 The data will be reviewed at the end of the 12 month post-construction period and any requirement for additional monitoring determined at that time.

4.5 Dust / Asbestos Fibre Monitoring

4.5.1 It is recognised that due consideration must be given to the protection of workers and local residents during development groundworks in respect of dust release. This particularly applies to Area 2, where landfilled materials are present, and where a degree of landfill removal / re-location (within the plot boundaries) may be required to facilitate construction of the new rail chord. However other than in this location there is expected to be relatively little ground disturbance below this part of the site - for the most part Area 2 is to be upfilled with inert soils derived from Area 1 to create screening bunds as previously described.

4.5.2 The exploratory holes formed within the landfill indicate predominantly 'uncontaminated' soils with only isolated and infrequent asbestos presence, and it is not considered practicable or necessary to remove the asbestos-containing materials from the landfill mass. To mitigate any risks associated with dust generation and/or fibre release, the following measures are proposed:

- Damping down of all soils to minimise dust release and, if merited, installation of a boundary misting system.
- Provision of an appropriate airborne dust monitoring network, including at site boundaries.
- Provision of personal protective equipment for all field staff working in of exposed to subsurface materials. This is to be in accordance with HSG66 “Protection of Workers and the General Public during the Development of Contaminated Land.”

4.5.3 Reference to The Society of Brownfield Risk Assessment’s (SoBRA) Dust Monitoring Protocol for Earthworks Activities at Brownfield Sites advises that:

- Dust sampling should only be undertaken during earthworks activity, not during long breaks or downtime.
- The period over which monitoring has been undertaken must be recorded and reported alongside the results.
- Background monitoring should be undertaken so that a local correction factor can if necessary be applied to the results.
- For ambient monitoring, dust concentrations should be measured at a safe distance from the activity being undertaken.
- Monitoring points for ambient data should be positioned downwind of the activity.

4.5.4 SoBRA has also published an Airborne Asbestos Fibre Monitoring Protocol for Earthworks Activities at Brownfield Sites. This complements the dust monitoring protocol and can be used in parallel with it when asbestos is suspected to be present. It notes that monitoring of ambient fibre levels requires long-duration, higher flow rate static air sampling both upwind and downwind of the earthworks activities. Methods for the interpretation of fibre concentration are set out in in HSG 248 (the Health and Safety Executive’s 2005 guide for sampling, analysis and clearance procedures for asbestos) and in MDHS 87 (HSE guidance on the discrimination between fibre types in samples of airborne dust on filters using microscopy, published 1998).

4.6 Reporting

4.6.1 Gas, water level and laboratory analysis data is to be shared with the applicable regulatory authorities at regular intervals to be agreed. At this stage it is suggested that six-monthly reports be produced, with a final report to be submitted on completion collating all applicable data.

4.6.2 A protocol is also to be agreed in respect of the reporting of dust monitoring, in collaboration with the local environmental health department and taking due cognisance of the guidance described herein. It is anticipated that this will be led by the main earthworks contractor.

5. Summary

5.1 This report aims to address a number of points raised by environmental regulators during the town planning consultation process in respect of Conditions 17 and 24 of the outline consent for the Radlett SRFI development.

5.2 It sets out proposals for additional monitoring of the following parameters:

- Groundwater level / depth below Area 1, in the area of proposed surface water drainage soakaways and infiltration basins.
- Groundwater quality within the chalk aquifer below Area 2.
- Ground gas concentrations towards the southern end of Area 1.

5.3 In addition, proposals are outlined regarding installation of a ground gas venting system in the historically landfilled part of Area 2. In this way any risks of gas migration to sensitive receptors – already considered to be relatively low given the prevailing soil conditions and the distances to the new built development – can be further reduced.

5.4 Proposals for monitoring of dust and fibre release during development groundworks, as well as suppression, are also described.

5.5 It is concluded that adoption of the monitoring arrangements described in this report should provide the necessary comfort and assurances in respect of geo-environmental risk management as the development is implemented.

6. References

British Standard Institution (2013). Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs). BS 8576. BSI, London.

CIRIA (2015). CIRIA 753: The SuDS Manual.

CIRIA (2014). CIRIA 735: Good practice on the testing and verification of protection systems for buildings against hazardous ground gases.

Environment Agency (2003). Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water (LFTGN02).

Health and Safety Executive (2005). HSG 248: Asbestos - The Analysts' Guide for Sampling, Analysis and Clearance Procedures.

Health and Safety Executive (1998). MDHS 87: Fibres in Air.

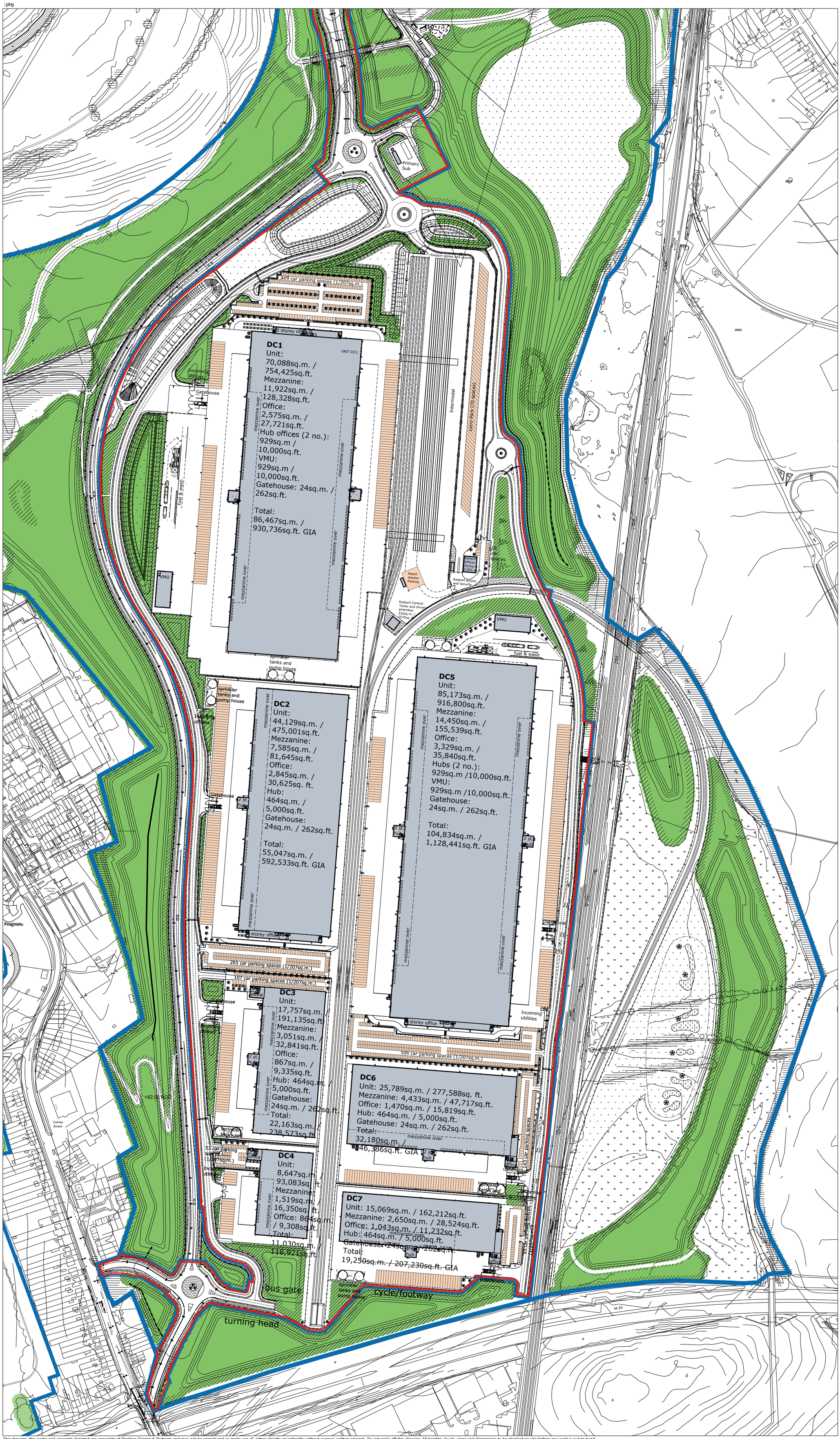
Health and Safety Executive (1991). HGS 66: Protection of Workers and the General Public during Development of Contaminated Land.

Society of Brownfield Risk Assessment (2015): Dust Monitoring Protocol for Earthwork Activities at Brownfield Sites.

Society of Brownfield Risk Assessment (2015): Airborne Asbestos Fibre Monitoring Protocol for Earthwork Activities at Brownfield Sites.

Appendix A – Architect's Proposed Development Layout

Ref:



AREAS SCHEDULE
Logistics Park Buildings (excluding Railport):
330,971sq.m. /
3,562,820sq.ft. GIA

Ancillary Railport buildings:
694sq.m. /
7,465sq. ft. GIA

TOTAL:
331,665sq.m. /
3,570,285sq.ft. GIA

PARKING
1602 car parking spaces total (1/207sq.m.) (including railport)

617 trailer spaces total (1/538sq.m.) (including railport)

Notes:

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Revision:

T NJ 08/12/2017
Updated with revised landscape masterplan for Areas 1 and 2.

S NJ 08/11/2017
Updated with revised landscape masterplan and updated Highway information.

R NJ 22/06/2017
Updated with revised landscape masterplan, rail underpass and estate road lighting.

Q NJ 16/06/2017
Updated with revised bypass alignment, bypass lighting, landscape masterplan. Services/utilities added in model.

P NJ 25/03/2017
Updated with revised bypass alignment, bypass lighting, landscape masterplan, internal estate roads and minor kerb line alterations to plot layouts.

N NJ 22/03/2017
Updated with revised landscape layout, bypass alignment, external lighting and rail mounted crane arrangement.

M NJ 14/03/2017
Updated with revised landscape layout, bypass alignment and estate road access to DC3. Reachstacker parking and fuel bowser added to Intermodal. Incoming utilities, bypass lighting and on-plot lighting added.

L NJ 27/10/2016
Colour fill added to Primary sub-station.

K NJ 28/09/2016
Graphical amendments to Development Site application boundary.

J NJ 26/09/2016
Graphical amendments to Development Site application boundary.

H NJ 15/09/2016
Graphical amendments to rail sidings.

G NJ 07/09/2016
Proposed landscape amended. General draughting updates.

F NJ 20/08/2016
Amendments to Intermodal area, car parking and blue boundary line. General updates to all disciplines.

E NJ 11/08/2016
Red line boundary amended in accordance with CGMS email 10.8.16.

D NJ 10/08/2016
Soakaways, landscape and by-pass layouts updated. Red line boundary amended in accordance with CGMS email 8.8.16.

C NJ 02/08/2016
Estate road updated with Capita laypout rec'd 01.08.16. Intermodal layout updated accordingly.

B NJ 29/07/2016
Proposed contours, soakaways, DC1 car park, proposed landscape updated.

A NJ 26/07/2016
Internal estate roads, vegetation and ponds updated.

heliosslough

Architects | Masterplanners

STEPHEN GEORGE
& PARTNERS LLP

170 London Road
Leicester LE2 1ND

t: 0116 247 0557 **f:** 0116 254 1095
www.stephengeorge.co.uk

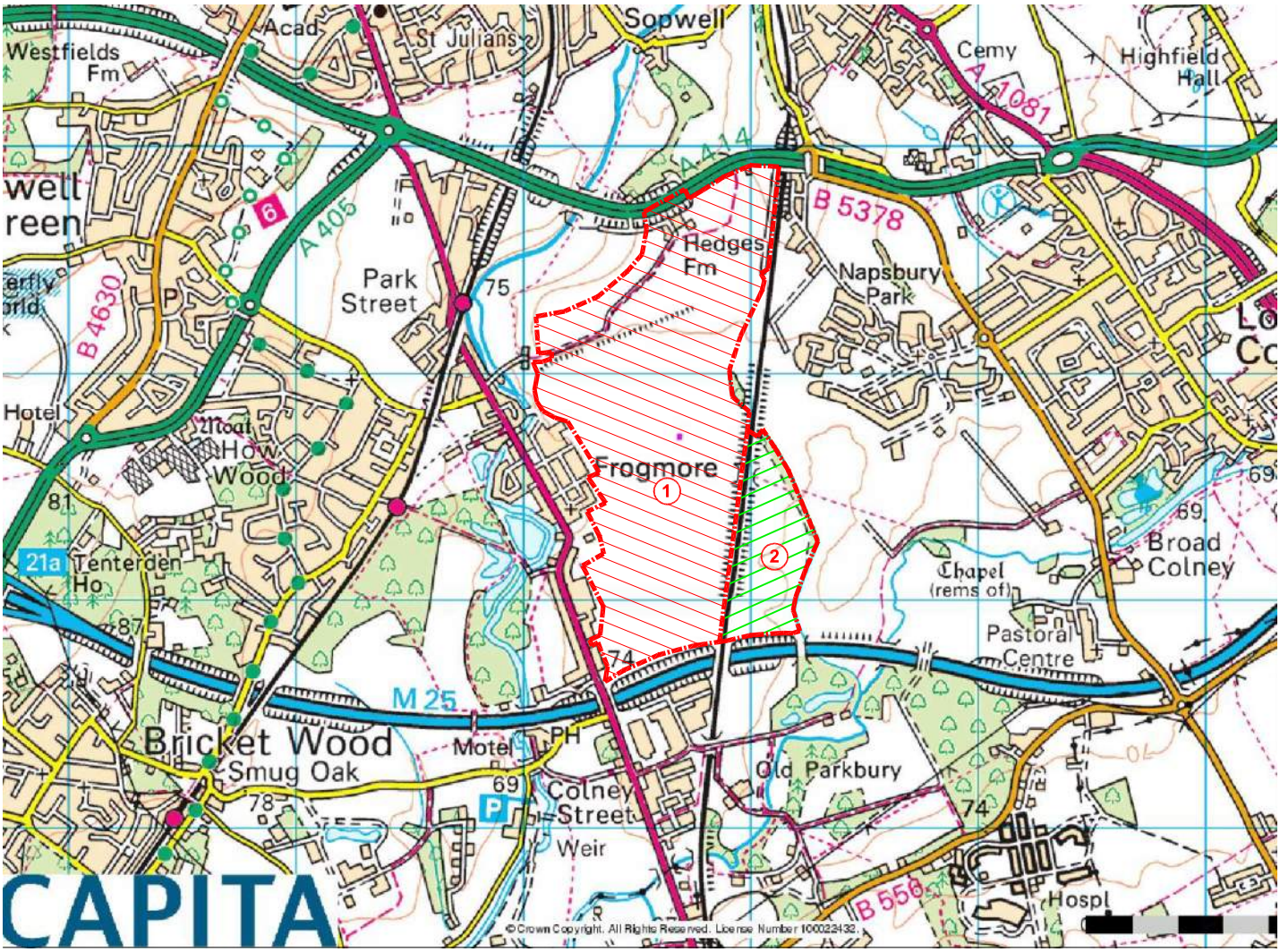
Radlett Strategic Railfreight Interchange

Masterplan

Drawing status:	Planning
CAD reference:	15-857 P002
Drawn:	NJ
Team:	NJ
Date:	24/07/2016
Scale:	1:2,500@ A1

Project no:	Dwg no:	Rev:
15-857	P002	T

Appendix B – Site Location Plans



Boundary Line of Areas 1

Boundary Line of Areas 2

Drawing status

FOR INFORMATION

Client

heliosslough

Project

RADLETT SRFI
HERTORDSHIRE

Drawing

SITE LOCATION PLAN
AREAS 1 & 2

Scale @ A4	Drawn	Checked
NTS	AR	PE
Project No.	**Date**	**Office**
SS/018844	July, 2016	WATFORD

Drawing Identifier — BS1192:2007 / Avanti Compliant

project	origin	zone	level	file type	role	number	revision
018844	-CA-	0 -	G00 -	DSP -	SE -	506 -	P00

CAPITA

Property and infrastructure

Consulting Civil, Structural and Geo-environmental Engineers

London
Tele No: (+44) 0 20 7870 9300

Watford
Tele No: (+44) 0 1923 817537

Manchester
Tele No: (+44) 0 161 486 1521

Bristol
Tele No: (+44) 0 1275 840831

Capita Property and Infrastructure Ltd. www.capita.co.uk/property
Reg. office 71 Victoria Street, Westminster, London SW1H 0XA • No: 2018542

LEGEND

- Strategic Rail Freight Interchange Site Boundary
- Country Park Boundary
- (6) Land Parcel

0 100 250 500 1000 metres

NORTH

Rev	Date	By	Notes

Client

Helioslough Ltd

Project

Former Aerodrome Site, North Orbital

Drawing Title

Location Plan

Drawing Status

For Planning

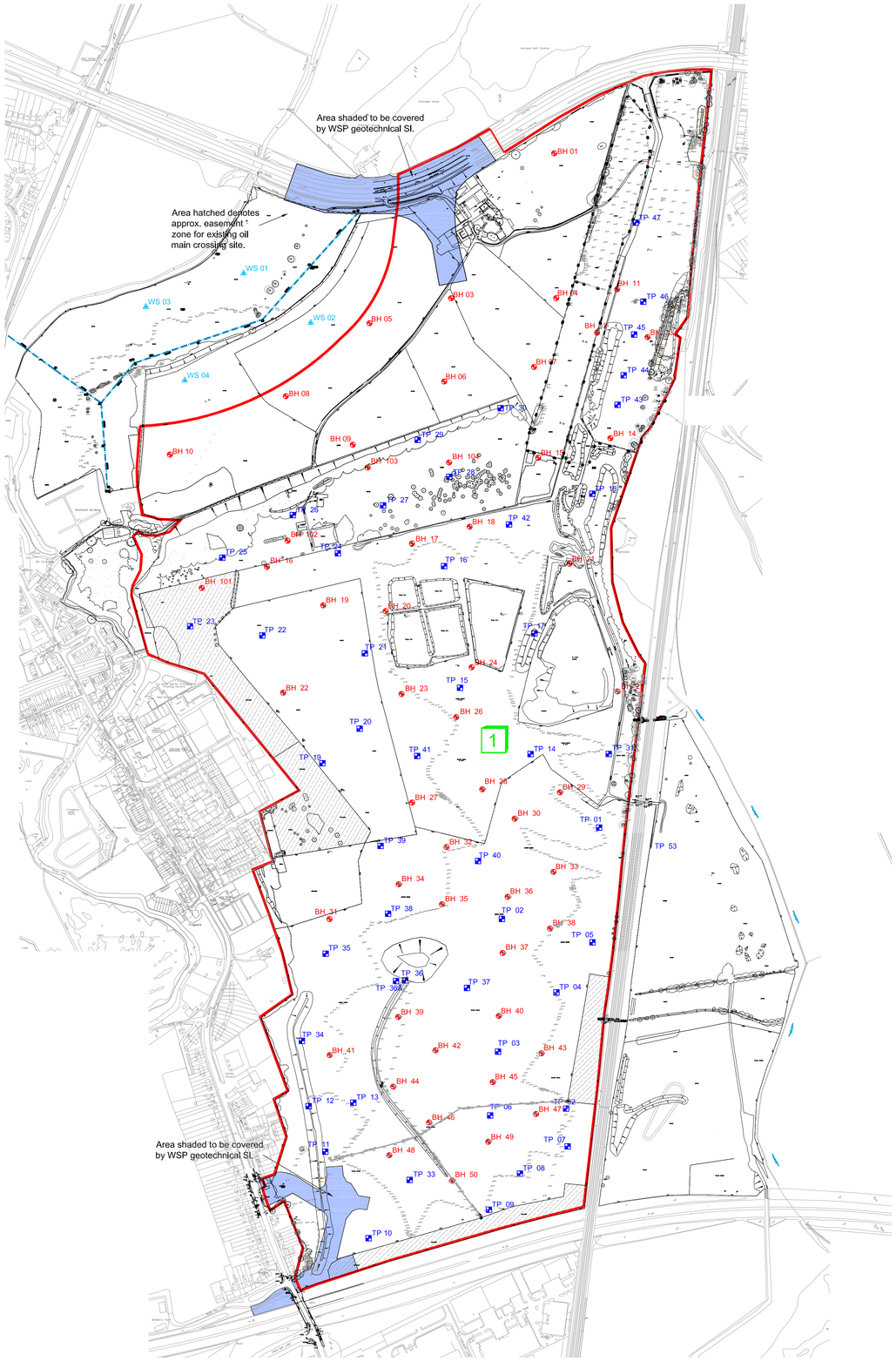
Scale	Date	Drawn
1:25 000@A3	Dec'08	JG
Drawing No	**Checked**	**Approved**
394503-DSD-001	DG	RMK

CAPITA LOVEJOY

land planning by design

Capita Lovejoy
Level Seven, 52 Grosvenor Gardens,
Belgravia, London SW1W 0AU
Tel +44(0)20 7901 9911 Fax +44(0)20 7901 9901
enquiries@lovejoylondon.uk.com
www.capitalovejoy.co.uk
LONDON BIRMINGHAM

Appendix C – Exploratory Hole Location Plans



Legend

TP XX — Trial pits

BH XX — Boreholes

WS XX — Window samples

Note:
Existing statutory services annotated indicatively. Refer to KTA report titled 'Review of Utility Services Infrastructure' ref MJP/WF/7278.

WORK IN PROGRESS
For information Only

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

Refer to the relevant Construction (Design and Management) documentation where applicable.

It is assumed that all works on this drawing will be carried out by a competent contractor, working where appropriate to an approved method statement.

Rev	Date	By	Description	Rev' check
P01	20.09.16	AR	LATEST OS PLAN ADDED	PE

Drawing status: PRELIMINARY

Client: heliosslough

Project: RADLETT SRFI
HERTFORDSHIRE

Drawing: EXPLORATORY HOLE LOCATION PLAN
AREA 1
(ON TOPO PLAN)

Scale @ A1	Drawn	Checked
1:5000	NDH	NRB

Project No.	Date	Office
SS/018844	June 2016	WATFORD

Drawing Identifier (BS1192:2007 / Avanti Compliant)

project	origin	zone	level	file type	role	number	revision
018844	-CA-	0 -	GF -	DR -	S -	509 -	P01

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Property and infrastructure

Consulting Civil, Structural and Geo-environmental Engineers

London Tele No: (+44) 0 20 7870 9300
Watford Tele No: (+44) 0 1923 817537
Manchester Tele No: (+44) 0 161 486 1521
Bristol Tele No: (+44) 0 1275 840831

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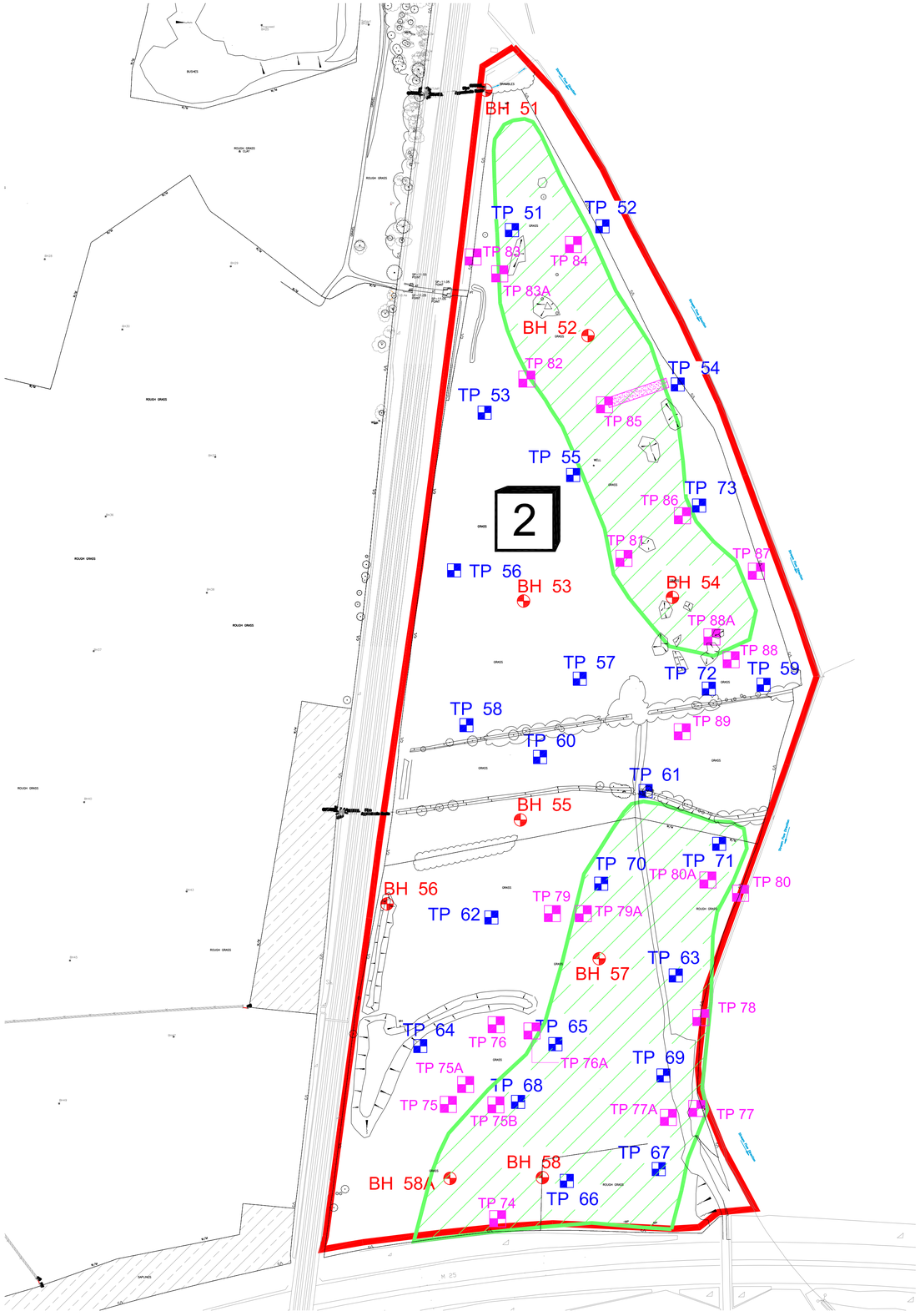


Legend

TP XX — Trial pits July 2016 (No`s. 51-73)

BH XX — Boreholes July 2016

Approx. extent of Landfill Sites

TP XX — Trial Pits October 2016 (No`s> 73-89)

WORK IN PROGRESS
For information Only

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

Refer to the relevant Construction (Design and Management) documentation where applicable.

It is assumed that all works on this drawing will be carried out by a competent contractor, working where appropriate to an approved method statement.

Rev	Date	By	Description	Rev' check
P02	16.11.16	AR	TP (74-89) LOCATIONS REVISED	GA
P01	12.11.16	AR	TP LOCATIONS REVISED	GA

Drawing status
PRELIMINARY

Client
heliosslough

Project
RADLETT SRFI
HERTFORDSHIRE

Drawing
EXPLORATORY HOLE LOCATION PLAN - AREA 2 TRIAL PITS (ON TOPO PLAN)

Scale @ A1	Drawn	Checked
1:2000	NDH	NRB

Project No.	Date	Office
SS/018844	June 2016	WATFORD

Drawing Identifier — BS1192:2007 / Avanti

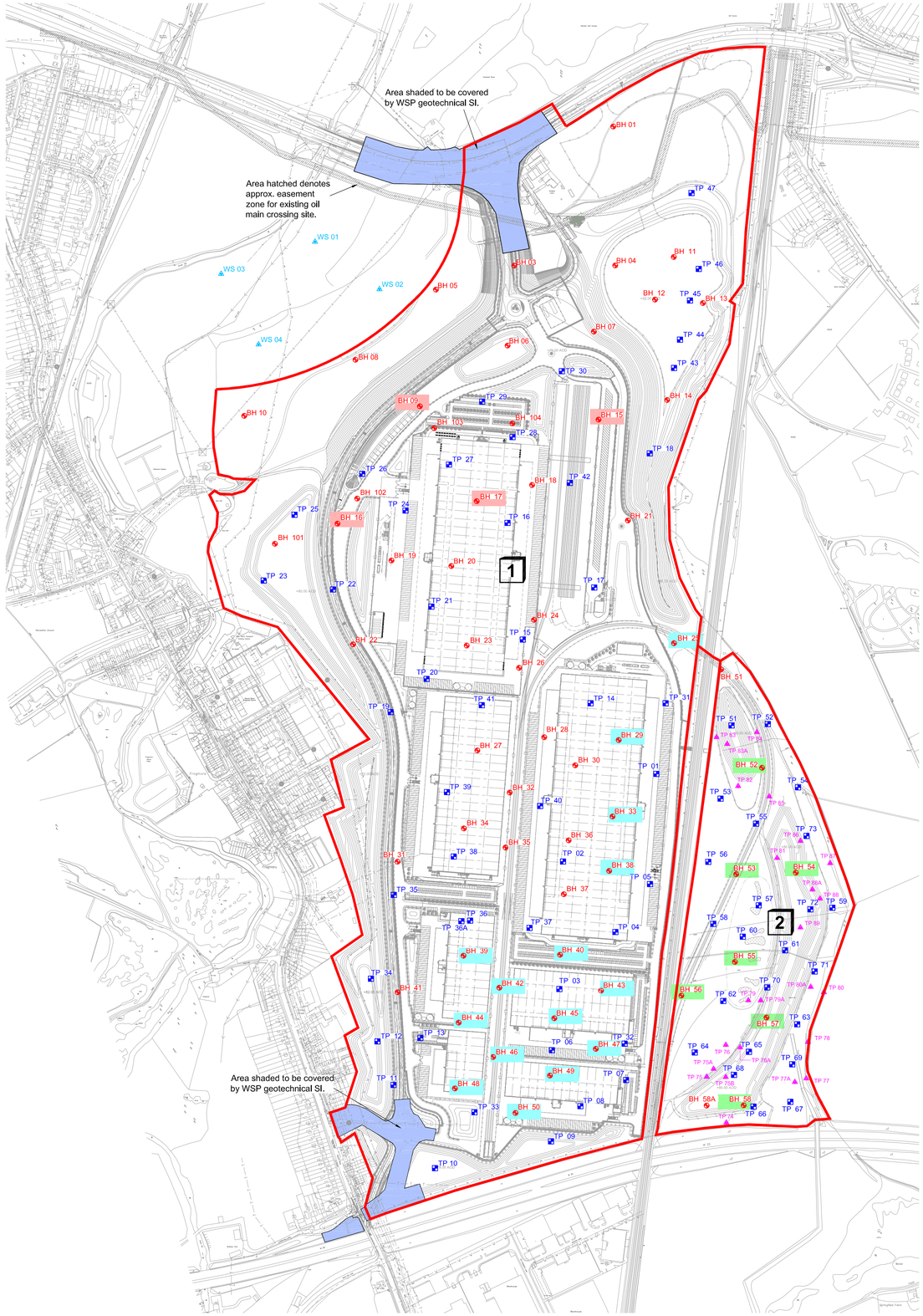
project	origin	zone	level	file type	role	number	Compliant revision
018844	-CA-	0	- GF -	DR	- S -	516	- P02

CAPITA
Property and infrastructure
Consulting Civil, Structural and Geo-environmental Engineers

London Tele No: (+44) 0 20 7870 9300
Watford Tele No: (+44) 0 1923 817537
Manchester Tele No: (+44) 0 161 486 1521
Bristol Tele No: (+44) 0 1275 840831

Capita Property and Infrastructure Ltd.
Reg. office 71 Victoria Street, Westminster, London SW1H 0XA • No: 2016542
www.capita.co.uk/property

Appendix D – Monitoring Well Location Plan



Legend

TP XX — Trial pits

BH XX — Boreholes

WS XX — Window samples

TP XX — Trial Pits October 2016 (No`s> 73-89)

Longer Term Monitoring Locations

Ground Gas monitoring wells

Groundwater Level monitoring wells

Groundwater Quality monitoring wells

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

Refer to the relevant Construction (Design and Management) documentation where applicable.

It is assumed that all works on this drawing will be carried out by a competent contractor, working where appropriate to an approved method statement.

Rev	Date	By	Description	Rev' check
P01	15.01.18	AR	BH 53, 55 & 57 IN AREA 2 REVISED TO HAVE GROUNDWATER QUALITY MONITORING	PE

Drawing status: PRELIMINARY

Client: heliosslough

Project: RADLETT SRFI HERTFORDSHIRE

Drawing: GAS AND GROUNDWATER MONITORING WELL LOCATION PLAN AREA 1 & 2 (ON ARCHITECTS DRAWING)

Scale @ A1	Drawn	Checked
1:5000	AR	PE

Project No.	Date	Office
SS/018844	June 2017	WATFORD

Drawing Identifier (BS1192:2007 / Avanti)

project	originator	zone	level	file type	role	number	Compliant revision
018844	-CA-	0 -	GF -	DR -	S -	522	- P01

CAPITA

Property and infrastructure

Consulting Civil, Structural and Geo-environmental Engineers

London Tele No: (+44) 0 20 7870 9300
Watford Tele No: (+44) 0 1923 817537
Manchester Tele No: (+44) 0 161 486 1521
Bristol Tele No: (+44) 0 1275 840831

Capita Property and Infrastructure Ltd. Reg. office 71 Victoria Street, Westminster, London SW1H 0XA • No: 2018542
www.capita.co.uk/property

Appendix E – Correspondence

Edwards, Paul (Capita)

From: Benjamin Firmin <Benjamin.Firmin@stalbans.gov.uk>
Sent: Wednesday, February 22, 2017 3:26 PM
To: Edwards, Paul (Capita)
Subject: FW: 5/2016/3013 - Proposed Rail Freight Public Open Space And Community Forest Sites North Orbital Road Chiswell Green St Albans Hertfordshire

Hi Paul,

It was good to speak to you this afternoon.

Please see below my comments that were sent to the planning officer.

If I can be of any further assistance, please do not hesitate to contact me.

Kind regards,

Ben Firmin MCIEH
Environmental Compliance Officer (Contaminated Land)
Legal, Democratic & Regulatory Services

St Albans City & District Council
Direct Line: 01727 819438
Email: ben.firmin@stalbans.gov.uk

www.stalbans.gov.uk
www.stalbans.gov.uk/contact-us

From: Benjamin Firmin
Sent: 14 November 2016 10:45
To: Ellie Dilks
Cc: David Webb
Subject: 5/2016/3013 - Proposed Rail Freight Public Open Space And Community Forest Sites North Orbital Road Chiswell Green St Albans Hertfordshire

Hi Ellie,

Please accept my apologies for the delay in providing comments on this application.

I have reviewed the following reports, prepared by Capita Property and Infrastructure Limited:

Area 1 Ground Contamination Assessment and Remediation Strategy (Document Ref. CS-070751-PE-16-134-R);
Area 2 Ground Contamination Assessment and Remediation Strategy (Document Ref. CS-070751-PE-16-143-R);
Area 5 – Moor Mill Phase 1 Geo-Environmental Desk Study Report (Document Ref. CPI-70751-GEO-001);
Area 7 (Harper Lane East) Phase 1 Geo-Environmental Desk Study Report (Document Ref. CPi-70751-geo-002);
Area 8 – Bell Lane Phase 1 Geo-Environmental Desk Study Report (Document Ref. CPI-70751-GEO-003).

Area 1 – the investigation has identified exceedances of PAHs at TP31, ash and clinker is present, which is likely to be the source of the PAHs. TP31 will be under hardstanding or the footprint of a new building. The site was previously used for the quarrying of sand and gravel, the site was infilled and restored using clean overburden and/or interburden, there is no indication of domestic or commercial landfilling (no fill imported from offsite). However, there are moderately elevated $C0_2$ concentrations. A gas resistant membrane has been recommended in the proposed buildings in the southern part of the site.

The consultant has not said whether monitoring of landfill gases will be undertaken.

Area 2 – the investigation has identified elevated concentrations of Chromium VI at TP51 and TP66. Both areas will be under the proposed visual/acoustic earth screening bunds. Asbestos fibres have been identified in a number of samples. The ground is likely to be disturbed in the north of the site where the rail link crosses an infilled area.

Consideration should be given to the health and safety of construction workers and local residents with respect to fibre release during groundworks. Controls should be put in place to protect construction workers and prevent fugitive emissions.

The proposed visual/acoustic earth screening bunds are to be constructed on top of the infilled areas.

Consideration has not been given to the possibility that the bunds could affect the way in which landfill gases behave.

The investigation has identified elevated concentrations of $C0_2$ and CH_4, however the flow rate is low.

The consultant has not said whether monitoring of landfill gases will be undertaken.

Area 5 – the works in this area involve the introduction of a cover layer in publically accessible areas.

Consideration has not been given to the possibility that a cover layer could affect the way in which landfill gases behave.

Some small excavation will be required for planting.

Consideration should be given to the health and safety of landscape workers with respect to the disturbance of waste materials.

Area 7 – the works in this area involve the forming of landscaping mounds.

Consideration has not been given to the possibility that the depositing of soils to form landscaping mounds could affect the way in which landfill gases behave.

Area 8 – Some small excavation will be required for planting.

Consideration should be given to the health and safety of landscape workers with respect to the disturbance of waste materials.

I am unable to recommend that condition 24.1 (contamination) be discharged.

A letter or statement addressing these issues should suffice.

Kind regards,

Ben Firmin MCIEH
Environmental Compliance Officer (Contaminated Land)
Legal, Democratic & Regulatory Services

St Albans City & District Council
Direct Line: 01727 819438
Email: ben.firmin@stalbans.gov.uk

www.stalbans.gov.uk
www.stalbans.gov.uk/contact-us

creating a better place

Environment Agency

Ellie Dilks
St Albans District Council
Development Control
Civic Centre St. Peters Street
St. Albans
Hertfordshire
AL1 3LA

Our ref: NE/2016/125884/01-L01
Your ref: 5/2016/3013

Date: 24 November 2016

Dear Ellie

Discharge of condition 24.1 (contamination) of outline planning permission 5/2009/0708 allowed at appeal dated 14/07/2014 for the development of strategic rail freight interchange comprising intermodal area, distribution buildings (class B8 use)

Land in and around former aerodrome, North Orbital Road, Upper Colne Valley, Hertfordshire

Thank you for consulting us on the above discharge of condition application.

We can only recommend partial discharge of condition 24.1 for Area 1.

In Area 1, the Ground Contamination Assessment and Remedial Strategy 04 Oct 2016 meets the requirements for Condition 24.1 part a (Preliminary Risk Assessment) and Condition 24.1b (Site Investigation) only.

In relation to the imported fill, the proposed imported soil quality may be protective of human health, but not for groundwater. Any importation of soil of this proposed quality (Proposed GACS commercial end use) would be subject to an Environmental Permit.

The CLAIRE Definition of Waste: Development Industry Code of Practice (version 2) only allows the importation of some naturally occurring clean material which can be transferred directly between sites and should not cause further deterioration to soil and groundwater quality.

This Code of Practice includes the Direct Transfer of clean naturally occurring soils and mineral materials from one site to another development site for use, without the need for waste legislation being applied (i.e. the receiving development site does not require an Environmental Permit or Waste Exemption). “Clean naturally occurring soil and mineral materials” includes:

- Soil, both top soil and sub-soil;
- Parent material;
- Clays, silts, sands and gravels;

- Underlying geology; and
- Made Ground consisting of the above materials only, e.g. embankment which is to be removed and is suitable for use without any processing. The materials must be sourced from:
- Greenfield sites not subject to past contaminative use; or
- Brownfield sites where the natural soils have been extensively characterised and proven to be clean."

For Areas 1 & 2, we have no objection in principle for a "reactive remedial strategy" however the verification plan should include a comprehensive groundwater monitoring programme to encompass regular monitoring for a period before, during and after ground works. For example, monthly monitoring before, during and for at least the first quarter after completion of ground works, and then quarterly for the remaining 9-month period.

Please note that the groundwater sampling should be carried out in accordance with BS ISO 5667-22:2010, BS ISO 5667-11:2009. A minimum of 3 groundwater monitoring boreholes are required to establish the groundwater levels, flow patterns and groundwater quality.

Please let me know if you have any questions.

Yours sincerely

Deborah Simons
Planning Specialist

Direct dial 0203 025 9020
Direct e-mail HNLSustainablePlaces@environment-agency.gov.uk

creating a better place

Environment Agency

Ellie Dilks
St Albans District Council
Development Control
Civic Centre St. Peters Street
St. Albans
Hertfordshire
AL1 3LA

Our ref: NE/2016/125884/02-L01
Your ref: 5/2016/3013

Date: 22 December 2017

Dear Ellie

Land in and around former aerodrome, North Orbital Road, Upper Colne Valley, Hertfordshire

Discharge of condition 24.1 (contamination) of outline planning permission 5/2009/0708 allowed at appeal dated 14/07/2014 for the development of strategic rail freight interchange comprising intermodal area, distribution buildings (class b8 use)

We have now reviewed the additional information
Radlett Strategic Rail Freight Interchange Areas 1 and 2: Geo-environmental Monitoring Proposals report dated August 2017 but are not in a position to recommend that this condition be discharged.

Area 1
Paragraph 4.3.3 & 4.3.4 states *BH09, BH15, BH16 and BH17 are to be monitored approximately quarterly intervals over a 12 month period, beginning in autumn 2017, to ensure a full calendar year of water level data is recorded.*

As the surface water management plan relies on there being at least a 1–m unsaturated zone beneath the base of the infiltration basin/tank, quarterly groundwater is insufficient during the winter months to record the seasonal maxima. The programme should be augmented to increase the frequencies to at least monthly.

Area 2
Para 4.4.3 states the proposed groundwater monitoring for the works in *Area 2 for BH52, BH54, BH56 and BH58:*

- *1 month prior to commencement of Area 2 bund construction.*
- *At approximately 3 month intervals, during bund construction.*
- *At 3, 6 and 9 months after completion of bund construction.*

This was submitted in response to our letter ref: NE/2016/125884/01- 01 dated 24 November 2016.

Area 2 covers 26 Ha, the proposed groundwater monitoring boreholes using just the 4

Cont/d..

boreholes is inadequate and additional coverage is required. Please see LFTGN02 Technical guidance for monitoring landfill leachate, groundwater and surface water at permitted landfill sites https://www.gov.uk/government/publications/monitoring-of-landfill-leachate-groundwater-and-surface-water-lftgn-02 for further guidance about groundwater monitoring borehole spacing downgradient of landfill sites.

The proposed frequent is also insufficient. Due to the location of the proposed activity and the groundwater sensitivity, we would normally expect to see a groundwater monitoring programme to encompass:

- at least monthly for 3-6 months (to establish baseline) before construction;
- monthly monitoring during the proposed activity
- monthly for first 6 months post-construction works then potentially quarterly for the next 2 rounds with a review at end of 12 months post- construction to see if further groundwater monitoring is required.

Please contact me if you have any queries

Yours sincerely

Mr Kai Mitchell
Sustainable Places Planning Advisor

Tel: 0203 0259074
E-mail HNLSustainablePlaces@environment-agency.gov.uk

End

CAPITA

Capita Property and Infrastructure Limited
Oak House
Reeds Crescent
Watford
Hertfordshire
WD24 4QP

Tel +44 (0)1923 817537

www.capitaproperty.co.uk