

**APPENDIX A**

**ILLUSTRATIVE MASTERPLAN FOR THE PROPOSED DEVELOPMENTS IN THE  
NUTFIELD GREEN PARK AREA.**





Adjacent Properties and Boundaries are shown for illustrative purposes only and have not been surveyed unless otherwise stated.

All areas shown are approximate and should be verified before forming the basis of a decision.

Do not scale other than for Planning Application purposes.

All dimensions must be checked by the contractor before commencing work on site.

No deviation from this drawing will be permitted without the prior written consent of the Architect.

The copyright of this drawing remains with the Architect and may not be reproduced in any form without prior written consent.

Ground Floor Slabs, Foundations, Sub-Structures, etc. All work below ground level is shown provisionally. Inspection of ground condition is essential prior to work commencing.

Reassessment is essential when the ground conditions are apparent, and redesign may be necessary in the light of soil conditions found. The responsibility for establishing the soil and sub-soil conditions rests with the contractor.

- Site Boundary
- Proposed Residential Development
- Proposed Integrated Retirement Community
- Accessible Open Space to include BNG Enhancements
- Existing Trees / Woodlands Retained
- Proposed Areas of Native Planting
- Proposed SUDs - Sustainable Drainage Areas [Indicative Location]
- Landform
- Indicative Play Area Locations
- Existing Play Facilities
- Retained Existing PRoW [Public Right of Ways]
- Proposed upgraded PRoW to Ped/Cycle route
- Proposed upgraded footpath to Ped/Cycle connection route
- Proposed Ped/Cycle link on Site
- Integrated Cycle on-street provision
- Proposed Ped/Cycle link through Development
- New Pedestrian link on Site
- Vehicle access

The Masterplan is for illustrative purposes only and not a parameter or planning control plan.

Rev	Date	Description	Initials
PROJECT		Nutfield Green Park	
TITLE:		Illustrative Masterplan	
SCALE:		1:2500 @A1	
DATE:		10/2023	
DRAWING No:		SK 23	
DRAWN BY:		BPV/LL/AA/ATM	

ADAM ARCHITECTURE

OLD HYDE HOUSE, 75 HYDE STREET  
WINCHESTER, HAMPSHIRE, SO23 7DW  
TELEPHONE: 01962 843843 FACSIMILE: 01962 843303  
www.adamarchitecture.com contact@adamarchitecture.com

LONDON OFFICE: 6 QUEEN SQUARE, WC1N 3AT  
TELEPHONE: 020 7841 0140 FACSIMILE: 01962 843303  
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**APPENDIX B**

**COMMENTS FROM EPG LIMITED ON BEHALF OF TANDRIDGE DISTRICT COUNCIL  
ON THE SCOPE OF THE 2023 SITE INVESTIGATIONS AND ON THE PRELIMINARY  
DRAFT 2023 SITE INVESTIGATION REPORT**

24 February 2023

Nutfield Park (Developments) Limited  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

Ref: J000242

Dear [REDACTED]

### **Nutfield - EPG review of geoenvironmental work**

EPG has been appointed by Nutfield Park (Developments) Limited to review the existing ground information data for a site in Nutfield to identify if a forthcoming proposed site investigation will be sufficient to assess the potential key development constraints for the planning application.

We have been provided with the following documents:

- Landplus/Encia Summary Environmental Risk Report of the North Cockley Landfill - Area B Nutfield Road, Redhill, Surrey, prepared for Evonik Degussa UK Holdings Limited (May 2013)
- Landplus/Encia Summary Environmental Risk Report of Gore Meadow - Area C Nutfield Road, Redhill, Surrey, prepared for Evonik Degussa UK Holdings Limited (May 2013)
- Landplus/Encia Summary Environmental Risk Report of Beechfield Quarry - Area E Nutfield Road, Redhill, Surrey, prepared for Evonik Degussa UK Holdings Limited (May 2013)
- Landplus/Encia Summary Environmental Risk Report of Church Hill – Area F Nutfield Road, Redhill, Surrey, prepared for Evonik Degussa UK Holdings Limited (May 2013)
- EPG (February 2014) North Cockley Landfill, Nutfield Road, Redhill. Permanent Gas Preliminary
- Landmark (November 2019) Envirocheck database search report and historical maps for the 65-hectare site at Nutfield Road.
- Constructive Evaluation (March 2020) Letter on groundwater and gas monitoring for MJCA at Nutfield, Redhill.
- MJCA (2021) Hydrogeological and Hydrological impact assessment including a land contamination assessment for the proposed development at Nutfield Green Park, Nutfield, Surrey (note that report was prepared for a previously proposed development scheme).

### **Background**

The site comprises a relatively large area of undeveloped land (59Ha) which has been subject to multiple development proposals over approximately the past ten years. The site is located at the approximate postcode RH1 4HE and an approximate grid reference 530425, 151017.



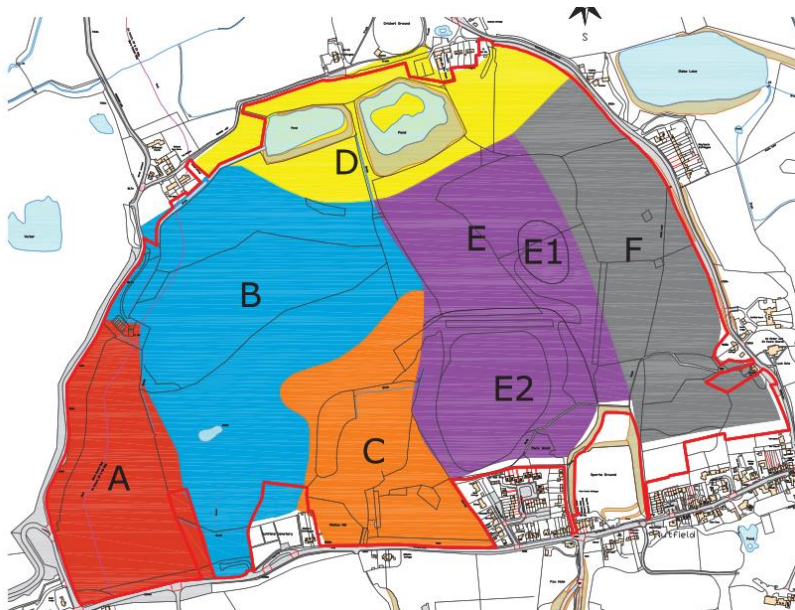
This report relates to the proposed development in the south of the site as shown in the Sketch Masterplan Option 1 provided by the client. The proposed development is subdivided in this report into three distinct zones which will be discussed separately. The site boundary and the development zones are shown in Figure 1 below. There will be associated infrastructure features such as services and roads which will fall outside of the defined development zones, however it is considered that the viability of the proposed development rests on the more sensitive receptors in the form of residential premises.



**Figure 1 – The three zones in the context of the wider site boundary**

Previous site investigation into the wider site undertaken in 2011 was subdivided into multiple areas, as shown in Figure 2 below.

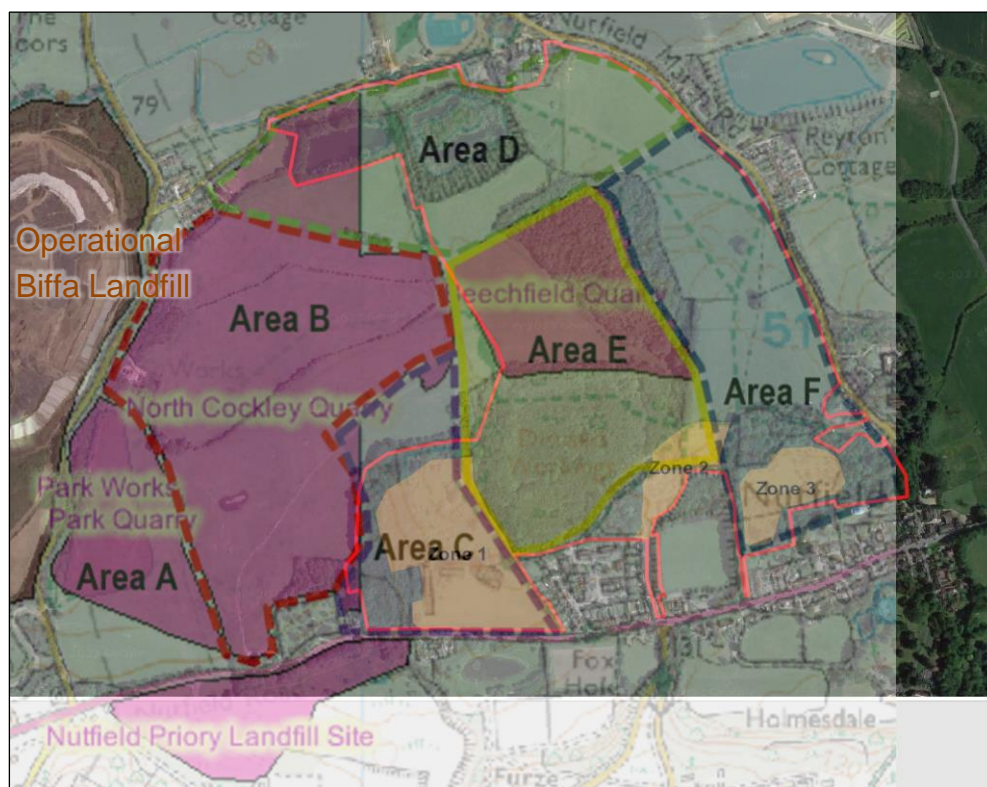




**Figure 2 – Former subdivided areas on site**

Zone 1 is in Area C, Zone 2 is across Area E and Area F and Zone 3 is in Area F. The information collated from the investigations into these areas has been used to directly inform the conceptual models for the three zones.

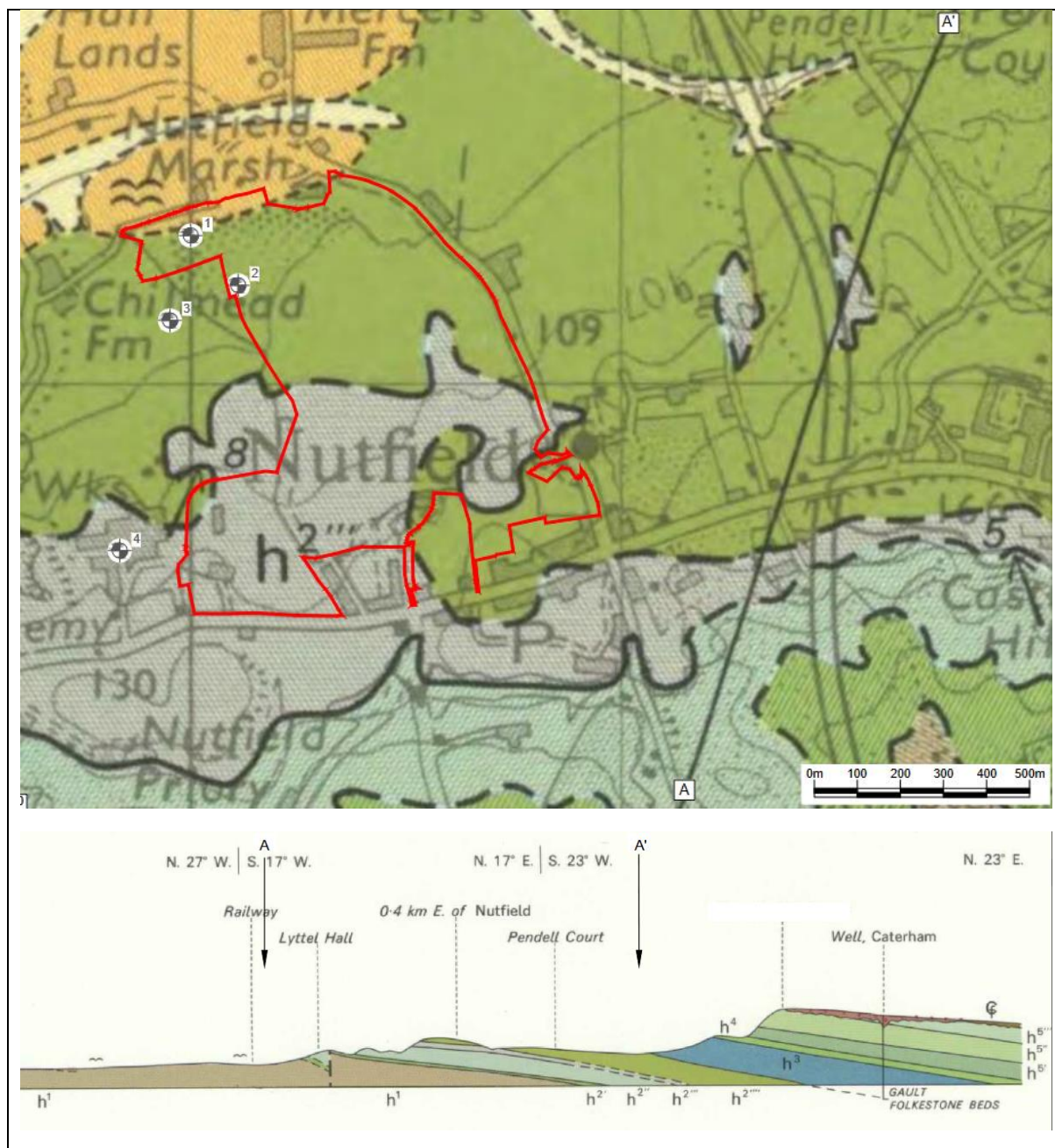
The wider site has a varied history which largely relates to quarrying activities and subsequent infilling. The areas as shown in Figure 2 were determined based on different areas which were quarried and filled at different times and to different extents, as shown below in Figure 3.



**Figure 3 - Site map overlay with development zones, areas and registered landfills**



## Geology & Hydrogeology



**Figure 4 – Geological map and cross-section of the surrounding area**

Superficial deposits are generally absent. The site is underlain by the Lower Greensand, with the Folkestone Formation (green) across the north and southeast (zones 2 & 3) and the underlying Sandgate Formation (grey) across the centre and west.

The Sandgate Formation comprises interbedded sandstone and mudstone and is a Secondary A aquifer. The overlying Folkestone Formation comprises homogenous sandstone and is a principal aquifer where intergranular flow dominates.



The hydraulic gradient at the site is to the north. Therefore, the development zones are generally upgradient of the recorded landfills with the exception of the Nutfield Priory Landfill.

### **North Cockley Quarry Landfill**

Area B in Figure 2 relates to the area of the former North Cockley works and associated quarrying and subsequent landfilling. It is closest to development zone 1, and adjacent to the site. The North Cockley Quarry and Landfill was operated by Laporte Industries Limited and Waste Management Limited. The landfill received primarily domestic, industrial and commercial waste between 1981 and 1990. Park Quarry landfill recorded as operating from 1968 to 1979 by Greater London Council is in Area A to the west, and is in effect continuous with North Cockley Landfill, but is located further from the site so is not considered further within this report.

The Cockley Works was a Fuller's Earth processing site associated with the quarrying activities in the area. The earliest available historical mapping (1870) shows it as a small-scale works with features such as a railway. Significant expansion is shown between 1935 and 1966. Multiple tanks are associated with the works, these are likely to have mostly housed water, acid, and slurries associated with the processing of activating fullers earth<sup>12</sup>. It is also possible that some tanks on the wider site may have been used for fuel storage. It is understood that the Cockley Works was demolished in 1988.

Much of the area previously occupied by the Cockley Works has since been quarried and landfilled and as such there is limited potential for contamination associated with the industrial works to remain or be relevant for potential migration to site.

North Cockley Quarry was excavated to produce sand and Fullers Earth for processing in the Cockley Works. The depth of the landfill waste has previously been investigated by Enica in 2011. The maximum thickness encountered was 13.4m (BH7A near the centre) and the maximum depth was 73.5mOD (BH305, located on the northern boundary). The landfill was operated on a dilute and disperse principle, with no engineered containment measures under the waste mass. Previous investigations have found a consistent layer (1.75m to 2.25m thick) of restoration/capping soils of generally cohesive material and a 1mm geomembrane was noted in a number of locations.

The presence of these capping / restoration soils and membrane is an important consideration when assessing groundwater and gas risks from the landfill to the adjacent development zone. The thickness and cohesive nature of the material will have significantly reduced natural dilution, venting and oxidation of the waste system via atmospheric mixing. The capping / restoration material will also limit infiltration of groundwater, reducing the potential for mobilisation of leachable contaminants. The relatively dry waste will degrade more slowly resulting in gas generation occurring over a longer period of time and at reduced rates when compared with wet waste.

A series of gas extraction boreholes are understood to be present within the North Cockley Landfill site. These boreholes are connected by below ground gas collection pipelines which are designed to extract landfill gas from the waste mass for electricity generation. The gas extraction / energy plant shown in Figure 5 below is operated under license by Arevon Energy Limited. The extraction system will limit the potential for offsite migration of ground

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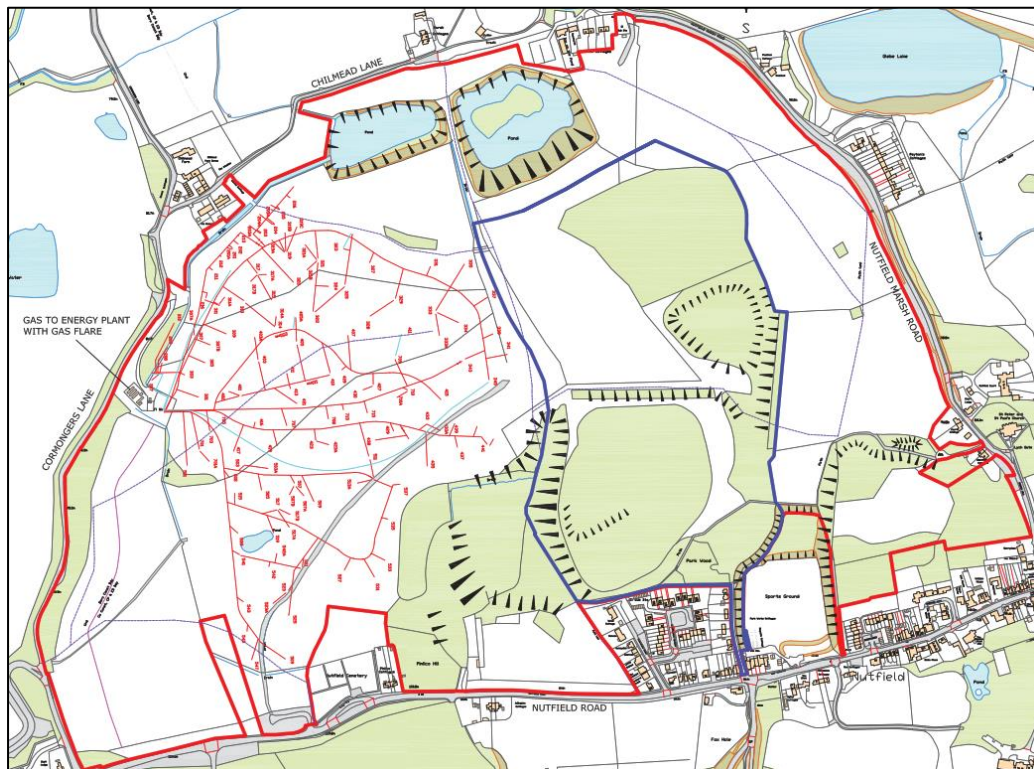
<sup>1</sup> Surface Activation of Fullers Earth (Bentonite Clay) using Organic Acids (A. Khan et al, 2015)

<sup>2</sup> [https://www.gracesguide.co.uk/Fullers\\_Earth\\_Union](https://www.gracesguide.co.uk/Fullers_Earth_Union)



gas while it is in operation, however it is not designed directly for this purpose and the current operating details of the system are unknown.

Assessment of the landfill gas regime in and around North Cockley Landfill by EPG in 2014 concluded that whilst gas concentrations were high within the landfill (up to circa 70% methane and 40% carbon dioxide), associated volumes were low. These observations indicate that diffusive flow is likely to be the main mechanism for migration of methane and carbon dioxide from the landfill toward off-site receptors, although this may be in combination with advective and dissolved phase migration.

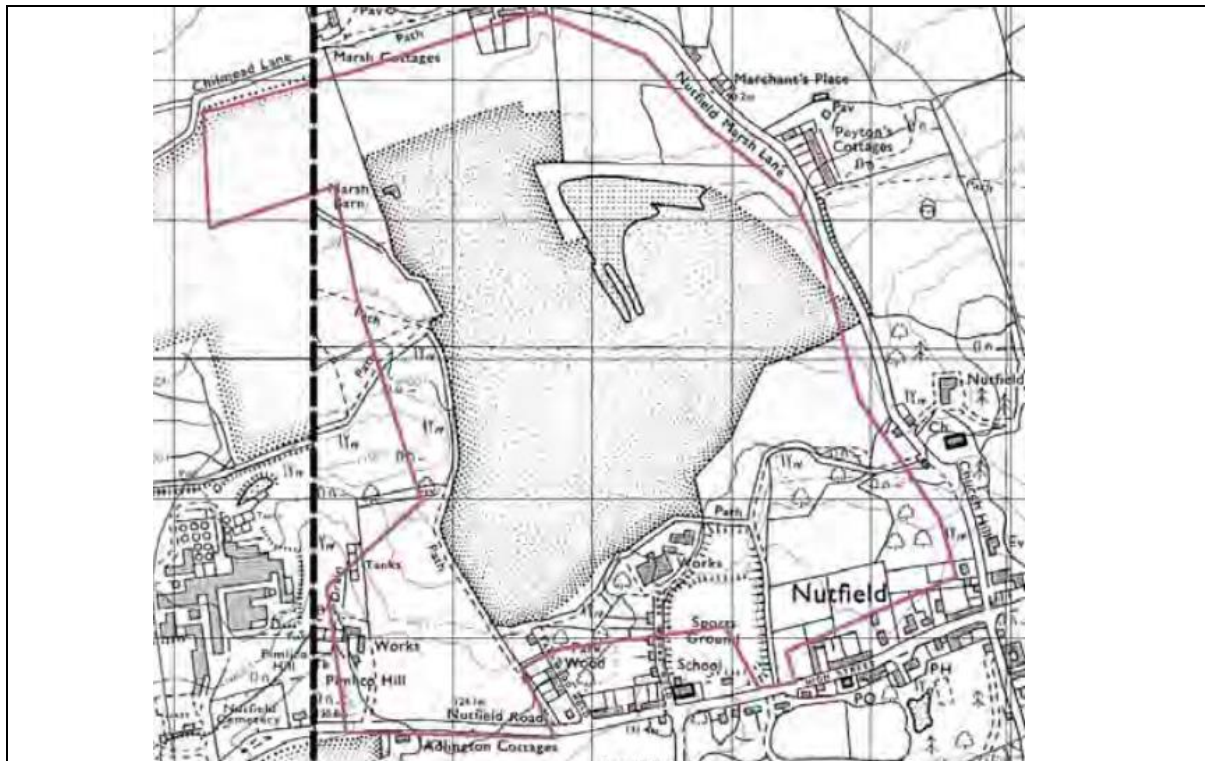


**Figure 5 - Extent of the gas extraction system within North Cockley Quarry Landfill**

### **Beechfield Quarry Landfill**

Beechfield Quarry Landfill is located in Area E close to development zones 2 and 3. The landfill was operational from 1969 to 1984 and accepted inert, industrial, commercial and household wastes, including industrial effluent and treatment sludge, paper / cardboard waste and waste wood / timber. The extent of Beechfield Quarry shown on the 1970 map is shown in Figure 6 below. The registered landfill boundary is smaller than this, as can be seen above in Figure 3. Ground investigation and topographic evidence suggests that the southern part of Beechfield Quarry has not been filled and is a former silt lagoon that has not been backfilled with waste, however, there is some uncertainty and it may have been at least partially filled.





**Figure 6 – 1970 map extract showing Beechfield Quarry in the centre**

### **Church Hill Landfill**

Church Hill Landfill is located in Area F close to development zones 2 and 3. It is effectively continuous with Beechfield Landfill and represents the eastern extent of this feature as shown in Figure 6. The operational dates and types of waste are unknown (pre-dating 1977), as is the lateral extent of the quarrying and subsequent infilling.

### **Nutfield Priory Landfill**

Nutfield Priory Landfill is located south of Nutfield Road adjacent southwest of Zone 1. It was operated under a number of waste disposal licenses by Reigate Borough Council. The site was licensed in July 1978 for the disposal of inert, commercial, industrial and domestic wastes, but was operational prior to this date. It closed in 1981.

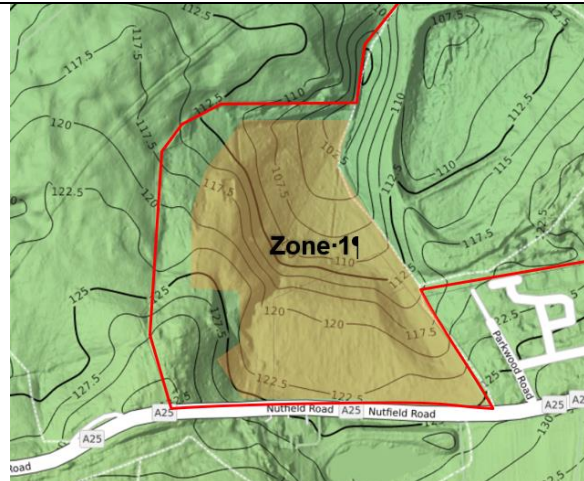
### **Gore Meadow Landfill**

Gore Meadow Landfill is located in Area C adjacent to and potentially extending into Zone 1. It was thought to be operational from 1979 to an unknown date and was licensed for “industrial effluent treatment sludges” according to the record on the Envirocheck report. The Encia Regeneration Ltd report identifies that landfilling took place in the northern parts of Area C only.



## Zone 1

### Site location, description and topography

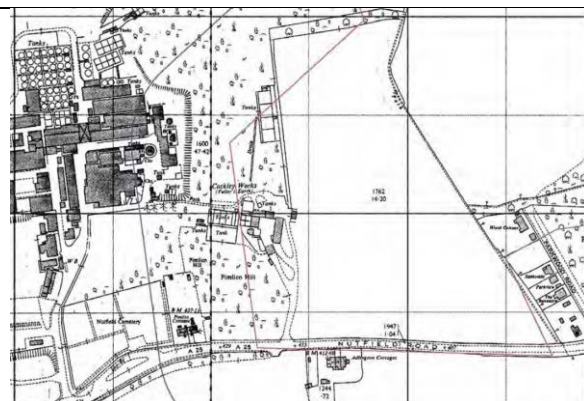


Located in the west of the site within Area C. Referred to as *Gore Meadow* in previous reporting.

Undeveloped with grass, woodland and scrub.

Variable topography, broadly raised in the south and west at approximately 120m AOD, and slopes down to the northeast to around 105m AOD.

### History



Extract from 1966 map

No previous development within the zone with the exception of Cockley Works extending onto site and close to the edge of the proposed development zone from 1966 to 1988, including tanks.

Tanks at the Cockley works are likely to be for water, slurry and acid storage, but may also include fuel storage.


Some evidence of reworked ground surface across the northern half of the zone from 1999 aerial photos.

### Landfills

Gore Meadow landfill	(1979 to unknown) located in north of site.
North Cockley Quarry landfill	(1981 to 1990) adjacent to the west.
Nutfield Priory landfill	(1967 to 1981) adjacent to the southwest.
Beechfield Quarry landfill	(1969 to 1984) adjacent to the northeast.

### Ground conditions



	<p>Made Ground encountered in WS201, WS202, WS203, WS210 in centre west of site. All other holes encountered natural ground of topsoil over weathered bedrock of Sandgate Formation. No exploratory holes in the southern part of the site.</p> <p>Made Ground consisted of reworked natural material, with only occasional anthropogenic inclusions between horizons including brick, concrete and coal. 'Wood with creosote odour' was recorded in WS201.</p> <p>A soft yellow silty clay was encountered in WS201 between 0.3mBGL and 0.4mBGL. This was concluded to be 'Lagoon sediment' linked to the Cockley Works.</p>
<b>Contamination</b>	
<b>Soil</b>	Some arsenic and PAH in Made Ground and shallow soils above residential assessment criteria. May require mitigation in the form of garden cover layers.
<b>Groundwater</b>	Very little data on site. Two samples from BH21 in the southeast of site show little evidence of groundwater contamination.
<b>Ground gas</b>	<p>Gas monitoring on site only at BH21 and BH22 located in the south. They show no evidence of landfill gas migration, but (based on assumed landfill boundaries) they are &gt;50m from any adjacent landfills and &gt;150m from North Cockley landfill.</p> <p>Fifteen rounds of spot monitoring were completed in BH21 and BH22, with 14 visits by Landplus/Encia in 2013 and one visit by MJCA in 2020. Methane was not detected during the gas monitoring in these locations, and mildly elevated carbon dioxide concentrations were infrequently recorded. Flow rates fluctuating between positive and negative indicate air mixing in the soil and barometric pumping as there is a significant depth of unsaturated zone in this location. The conditions are not indicative of gas migration or landfill gas generation and are not unexpected for weathered natural ground.</p> <p>Gas monitoring in the edge of North Cockley landfill at BH8, BH9 and BH10 recorded elevated concentrations of landfill gas, combined with low flow rates. Flow rates might be influenced by the active gas extraction system. More data is required from between the landfill and the development zone to investigate potential gas migration pathways.</p>
<b>Vapours</b>	No information, unlikely to be significant unless the tanks historically located within Zone 1 contained VOCs or SVOCs.
<b>Conceptual site model</b>	



<b>Sources</b>	<p>Three offsite landfills. North Cockley is considered the most likely to represent a potential risk of direct gas migration, however Nutfield Priory Landfill is a similar distance to the south and is hydraulically up gradient. As such there is the potential for the migration of gases dissolved in groundwater.</p> <p>Potential infilling or slurry placement on site, particularly in the north, but there is no evidence of this in existing ground investigation data.</p>
<b>Pathways and receptors</b>	<p>Potential for soil contamination in gardens to pose a risk to residential receptors. Can be mitigated by appropriate materials management and potential cover layers.</p> <p>Permeable geology and principal aquifer located under the site means there is a pathway for groundwater contamination from onsite and offsite sources, if mobile contaminants are found (including dissolved gases).</p> <p>Potential for gas migration from adjacent landfills to impact buildings on site. The most significant risk is considered North Cockley Quarry landfill, but development zone is off-set by at least 30m so reduces risk.</p> <p>Potential for dissolved gas migration from Nutfield Priory Landfill 30m southwest.</p>

### *Key Constraints for Zone 1*

More contaminant testing will be required as current full laboratory reports are not available and the data cannot be relied upon. This is required for both soil and leachate testing.

Former tanks are located on site and it is not known what these were used for. Further investigation is needed of the tanks.

Uncertainty regarding the potential for gas migration from Gore Meadow, Beechfield, Nutfield Priory and North Cockley Landfills, to Zone 1 exists and will need to be addressed to allow for the correct ground gas regime designation for the zone. This is best achieved by perimeter gas monitoring.

Made Ground onsite does not appear to pose a ground gas risk given its apparent composition and gas monitoring undertaken within Zone 1 but further quantification would be beneficial, best achieved by characterisation of the Made Ground via forensic description and TOC testing.

## Zone 2

### Site location, description and topography



Located in the centre south of site within Area E (west) and Area F (east). Referred to as *Park Wood* in previous reporting.

Woodland across the area. Some evidence of former structures including a concrete slab over part of the area, parts of dilapidated structures, rusted empty drums.

Fairly level topography 120mAOD to 125mAOD generally sloping down to the northwest.

### History



Extract from 1935 map

Park Wood to the west and Park Works in the western part of zone 2 are shown on site from earliest available mapping. The Park Works is developed within the footprint of a prior pit, including tanks. The works is associated with Fuller's Earth and is no longer shown from 1992.

There is not much detail given on the maps for activities in the north and east of the zone. There is evidence of some earthworks on the earliest mapping and part of this area might overlap with Beechfield Quarry Landfill.

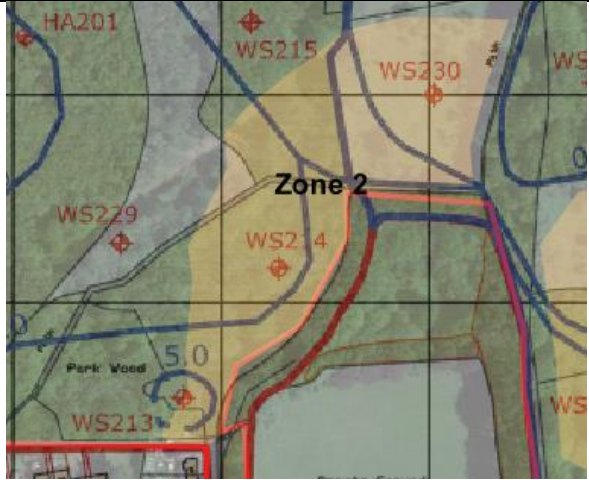
Excavations noted as *Fullers Earth Works* are noted adjacent to the east in 1935.

### Landfills

Beechfield Quarry landfill	(1969 to 1984) located adjacent to the north and potentially on site
Church Hill	Unknown (pre 1977) adjacent to the northeast, likely continuous with Beechfield Quarry.

### Ground conditions



	<p>Only WS213, WS214 and WS230 located in Zone 2. WS215 located close to the site within Beechfield Quarry.</p> <p>Made Ground to base in WS215 (2m) and WS230 (3m) in north and to west of site. Made Ground comprising yellow brown silty clay<sup>3</sup> with some gravel of brick, sandstone, ash and clinker in WS230 above 1.7m. Made Ground including gravel and cobbles of brick, concrete and occasional metal and fabric in WS213 to 4.5m, above pale grey clay.</p> <p>WS214 had shallow sandy clay Made Ground to 1.2m over natural ground of dense grey clayey sand.</p>
<b>Contamination</b>	
<b>Soil</b>	Limited elevated metals and hydrocarbons in Made Ground in WS213, WS214 and WS215.
<b>Groundwater</b>	Two leachability samples recorded low results. Limited data.
<b>Ground gas</b>	No data.
<b>Vapours</b>	No data.
<b>Conceptual site model</b>	
<b>[insert diagram]</b>	
<b>Sources</b>	<p>Beechfield Quarry landfill located close to site and may overlap with site.</p> <p>Potential infilling on site, associated with earthworks around the old Park Works and phases of redevelopment. Also Fuller's Earth excavations in the east and proximity of Beechfield Quarry and Church Hill.</p> <p>Potential contamination associated with Park Works (tank shown on 1935 map).</p>
<b>Pathways and receptors</b>	<p>Potential for soil contamination in gardens to pose a risk to residential receptors. Can potentially be mitigated by appropriate materials management and/or cover layers.</p> <p>Permeable geology and principal aquifer located under the site means there is a pathway for groundwater contamination from onsite and offsite sources, if mobile contaminants are found (including dissolved gases).</p>

<sup>3</sup> Yellow silty clay has previously been interpreted in other locations as a 'Lagoon Sediment' from the fuller's earth works.

	No evidence of significant gas generation sources that are likely to migrate to site, but very limited data. Site is located close to and possibly overlapping with infilled land from 1970s to early 1980s. All backfill will be >40 years old by now so likely low residual gas generation potential. Potential for organic contamination from tanks at works continuing to represent a gas generation source.
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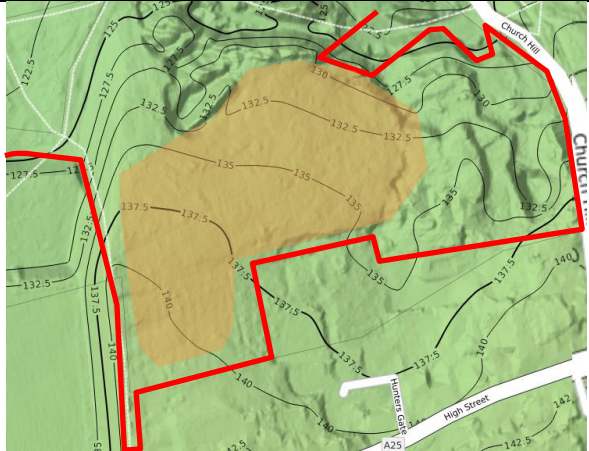
### Key Constraints

As previously discussed, laboratory testing should be considered indicative and should not be relied upon. Further soil and leachate testing are required to fully quantify risks posed by the Made Ground on-site.

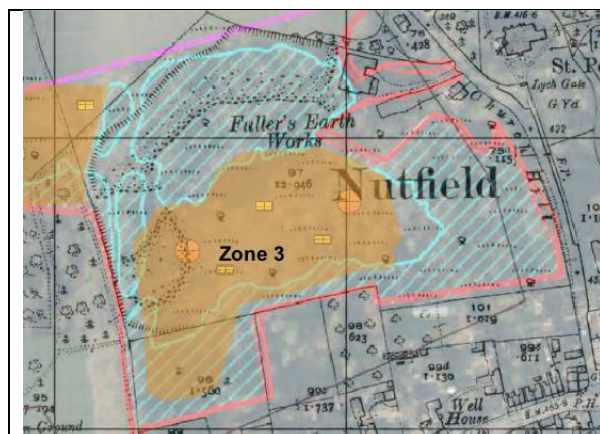
Ground conditions in the northwest of the zone are the least well constrained due to a lack of borehole locations. This is the area that may well overlap with the Beechfield Quarry landfill so should be subject to investigation.

The gas generation potential and contamination status of the Made Ground onsite and from the neighbouring Beechfield and Church Hill landfills requires a better understanding to inform the risk assessment.

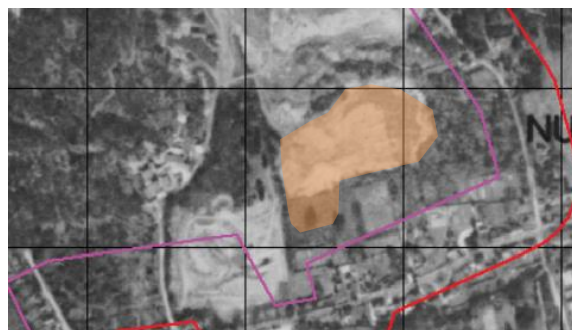
### Zone 3

Site location, description and topography	
	<p>Located in southeast of site within Area F.</p> <p>Perimeter of woodland with a central clearing across most of the proposed development area.</p> <p>Topography 130mAOD to 140mAOD generally sloping down from southwest to the northeast.</p>
History	





Extract from 1935 map



Extract from 1949 aerial photo

Very limited development within Zone 3. Open fields with some evidence of earthworks in early 20<sup>th</sup> century as shown on the 1935 map and 1949 aerial photo.


Building marked as *Fullers Earth Works* located to the north from 1896 to 1960.

Excavations noted as *Fullers Earth Works* are noted on site in the west and adjacent to the north in 1935, and earthworks on site can be seen in 1949 aerial photo.

### Landfills

Beechfield Quarry landfill	(1969 to 1984) located to the northwest.
Church Hill	Unknown (pre 1977) located to the north, likely continuous with Beechfield Quarry.

### Ground conditions

	<p>WS42, WS43, WS232 and WS234 from the 2011 investigation are located within Zone 3.</p> <p>Made Ground was recorded within WS42 and WS43 to the base of the exploratory holes (2.0m and 3.0m respectively).</p> <p>The Made Ground is generally described as a reworked natural material, including 'reworked fullers earth' with occasional anthropogenic material including ash, clinker brick and rubber fragments. No obviously putrescible material is apparent from the logging.</p> <p>No Made Ground was recorded in WS232 or WS234, however the description (mottled Clay with gravel of Sandstone) suggests reworked soils.</p>
<b>Contamination</b>	
<b>Soil</b>	No elevated concentrations recorded for any contaminants. Limited data.
<b>Groundwater</b>	One leachability sample recorded low results. Limited data.
<b>Ground gas</b>	No data.
<b>Vapours</b>	No data.
<b>Conceptual site model</b>	
<b>[insert diagram]</b>	
<b>Sources</b>	<p>Located within 100m of Church Hill and Beechfield Quarry Landfills based on assumed landfill boundaries.</p> <p>Potential infilling on site, associated with Fullers Earth excavations.</p>
<b>Pathways and receptors</b>	<p>Potential for soil contamination in gardens to pose a risk to residential receptors. Can likely be mitigated by appropriate materials management and/or cover layers.</p> <p>Permeable geology and principal aquifer located under the site means there is a pathway for groundwater contamination from onsite and offsite sources, if mobile contaminants are found. However, the site is located up gradient from all significant sources of contamination identified.</p> <p>No evidence of significant gas generation sources that are likely to migrate to site. Site is located on infilled/reworked ground from early 20<sup>th</sup> century (pre-1960) associated with Fullers Earth Works, which is not expected to be a source of bulk contamination or gases.</p>



	<p>The development zone is located close to old landfills dating from 1970s to early 1980s. As the landfills are located downhill and at least 80m from the site (based on assumed landfill boundaries), and given the age of the waste (&gt;40 years) it is not considered likely that sufficient gas generation is currently occurring for it to migrate in significant volumes to within Zone 3.</p>
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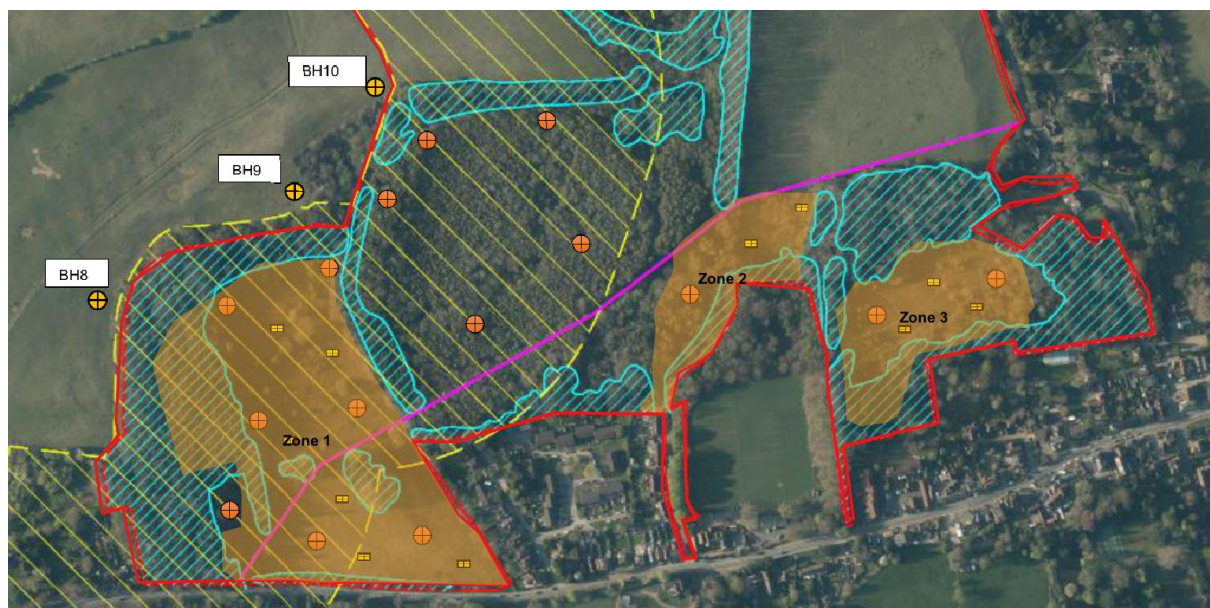
### *Key Constraints*

As previously discussed, laboratory testing from the previous investigation should be considered indicative and should not be relied upon. Further soil and leachability testing are required to fully quantify risks posed by the Made Ground on site.

The gas generation potential of Made Ground onsite and from the nearby landfills requires further investigation to inform the risk assessment.

### **Proposed site investigation**

The scope of site investigation proposed by MJCA at the time of writing this letter is presented in Figure 7 below.



**Figure 7 – Proposed site investigation**

The investigation is a preliminary exploratory investigation with a combination of boreholes and trial pits. It is understood that boreholes are to be cable percussive which will allow for a deeper investigation to find the base of Made Ground where the base was not encountered in previous site investigations. The boreholes and trial pits will allow for sample retrieval to establish a baseline for the soil and contamination status of each zone. Samples will also be taken for TOC testing to inform the gas risk assessment.

The boreholes will allow for gas and groundwater monitoring wells to be installed where there are potential pollutant linkages identified between the landfills, former industrial works and tanks present in or close to the zones.

Trial pitting in Made Ground allows for better observations of the structure of the ground, allowing for estimations of proportions of any waste materials and will make it easier to distinguish reworked and natural deposits.

The general scope of the investigation is considered appropriate for an exploratory phase. EPG have the following recommendations for alterations and optimisations to the scope.

### Zone 1

- Boreholes to be excavated as close to the development zone perimeter as allowable to investigation potential gas and groundwater pollution migration from surrounding North Cockley Quarry, Nutfield Priory and Beechfield Quarry landfills.
- One borehole should be excavated as close as possible to the former tanks located in the northwest of the site. The suggested optimal location is around BNG 530068 150705.
- One borehole should be excavated as close as possible to the Nutfield Priory landfill, i.e. in the southwest corner of the development zone BNG 530107 150478.
- The general coverage of trial pits is considered appropriate.

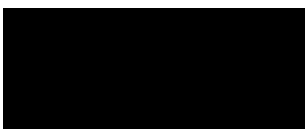
### Zone 2

- The zone has three distinct parts with different history. The southwest is the former Park Works. The northwest is within the Beechfield Quarry footprint and may have been landfilled. The northeast has no evidence of previous filling or development, but may have been subject to early phases of Fuller's Earth works.
- The zone would benefit from more exploratory holes, as existing investigation data is limited.
- Boreholes should be positioned on the north, west and east boundaries as potential gas and groundwater contamination sources (Beechfield Quarry landfill and areas of Fuller's Earth Works) are present adjacent to the zone.
- It would be beneficial to include trial pits within the former Park Works area around existing slabs and former structures and tank bases.

### Zone 3

- Boreholes with SPTs should be extended through the proposed development footprint to prove the depth of Made Ground.
- One borehole should be positioned within the known extent of Fuller's Earth Works in the west of the zone (from the 1935 map) close to BNG 530673 150712.
- If possible trial pits should be extended below 3m to also prove the depth of the Made Ground.

Yours sincerely



, Associate

The Environmental Protection Group Ltd



**From:** [REDACTED] <[REDACTED]@epg-ltd.co.uk>  
**Sent:** 03 March 2023 12:14  
**To:** [REDACTED]  
**Cc:** [REDACTED]  
**Subject:** RE: Nutfield Site Investigation

Hi [REDACTED],

We haven't been provided with earthworks plans to review and my understanding from speaking to James is that there is minimal earthworks proposed with post development levels not all that different from existing ground. Is that what you mean by formation level?

I think the depth of boreholes should certainly prove natural ground as that information was missing from some of the previous windowless sampler boreholes done in the previous investigation, hence the use of cable percussion techniques.

I also understand that a key aim is to install gas monitoring into either deep anthropogenic Made Ground deposits if encountered (not really expected in the development zones) or into natural ground/ reworked natural soils on the site perimeter to intercept gas migration pathways from offsite landfills. The other objective is to intercept groundwater to undertake some quality sampling as the data on groundwater contamination was somewhat lacking from the previous ground investigation. For an exploratory investigation dual purpose response zones for gas and groundwater are expected and should be acceptable.

Note: EPG have not designed the investigation we reviewed the MJCA proposals and provided some feedback. Our own desk-based assessment has provided some confidence that the contaminated land risks associated with the development zones are not likely to be insurmountable, and the proposed investigation will provide some useful additional data and help delineate areas for further detailed investigation.

[REDACTED] will be able to provide further detail on the actual investigation scope, borehole depths and response zones of individual boreholes.

Kind regards

[REDACTED], Associate  
The Environmental Protection Group Ltd

Tel [REDACTED]  
[www.epg-ltd.co.uk](http://www.epg-ltd.co.uk)

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**From:** [REDACTED] <[REDACTED]@tandridge.gov.uk>  
**Sent:** 03 March 2023 11:54  
**To:** [REDACTED] <[REDACTED]@epg-ltd.co.uk>; [REDACTED] <[REDACTED]@molevalley.gov.uk>  
**Cc:** [REDACTED] <[REDACTED]@gmail.com>  
**Subject:** RE: Nutfield Site Investigation

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Hi [REDACTED],

Thanks for the report

How deep are we thinking on the bore holes are we looking to get to the formation level.

Or just a generic depth.

Tel:

Tandridge District Council  
The Council Offices  
8 Station Road East  
Oxted, Surrey  
RH8 0BT  
[www.tandridge.gov.uk](mailto:info@tandridge.gov.uk)

[@tandridge.gov.uk](mailto:info@tandridge.gov.uk)



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**From:** [REDACTED] <[\[REDACTED\]@epg-ltd.co.uk](mailto:[REDACTED]@epg-ltd.co.uk)>

**Sent:** 24 February 2023 16:59

**To:** [REDACTED] <[\[REDACTED\]@molevalley.gov.uk](mailto:[REDACTED]@molevalley.gov.uk)>; [REDACTED] <[\[REDACTED\]@tandridge.gov.uk](mailto:[REDACTED]@tandridge.gov.uk)>

**Cc:** [REDACTED] <[\[REDACTED\]@gmail.com](mailto:[REDACTED]@gmail.com)>

**Subject:** FW: Nutfield Site Investigation

[REDACTED],

Not sure which email address to use, so sending to both!

Please find attached the EPG letter report on the conceptualisation of the Nutfield Park development site and our recommendations regarding the proposed ground investigation.

Would welcome your comments.

Kind regards

[REDACTED], Associate  
The Environmental Protection Group Ltd

Tel [REDACTED]  
[www.epg-ltd.co.uk](http://www.epg-ltd.co.uk)

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**From:** [REDACTED]

**Sent:** 24 February 2023 16:12

**To:** [REDACTED] <[\[REDACTED\]@mjca.co.uk](mailto:[REDACTED]@mjca.co.uk)>; [REDACTED] <[\[REDACTED\]@gmail.com](mailto:[REDACTED]@gmail.com)>

**Cc:** [REDACTED] <[\[REDACTED\]@epg-ltd.co.uk](mailto:[REDACTED]@epg-ltd.co.uk)>

**Subject:** RE: Nutfield Site Investigation

All,

Please see attached the EPG letter report which reviews the site setting based on baseline information and provides comment on the proposed investigation scope.

Any comments please let me know.

Kind regards



██████████

Nutfield Park (Developments) Limited

08 September 2023

Dear ██████,

## **RE: Third party review of geoenvironmental assessments at Nutfield Park**

### **Introduction**

We understand that Nutfield Park (Developments) Limited are proposing to develop a site in Nutfield, Surrey within Tandridge District. Tandridge District Council have requested that an independent third party reviews the geoenvironmental work for the application to provide confidence that the key constraints have been appropriately investigated.

The Environmental Protection Group Ltd (EPG) have been employed to review the MJCA ground investigation information and interpretive report. We have reviewed the information provided in draft format and have the following comments.

### **Overall comments**

Overall EPG are satisfied that suitable exploratory investigations and preliminary assessments have been completed and that the risks can be appropriately mitigated via planning conditions. We look forward to reviewing a detailed strategy from MJCA that describes the scope of further ground investigations and assessments for the development.

We offer the following comments/advice for the benefit of the applicant and MJCA in production of their strategy document and future assessments. Relevant section numbers of the report have been included, although some comments are general, or relevant to multiple sections in the document.

### **Specific comments**

#### **Ground gas investigation and assessment**

5.7 – Elevated carbon dioxide concentrations could be due to natural processes in Made Ground (biological respiration) or could be due to migration of landfill gas and subsequent oxidation. Analysis of the gas composition or continuous monitoring may provide better insight on this point.

5.16 – Analysis of the gas composition at BH1002 may give an indication of the likely source of methane here. Further monitoring may show that the elevated methane was associated with the temporary conditions in a freshly drilled borehole containing low level organic materials, rather than gas migration from landfills. Or could be associated with degrading hydrocarbons rather than putrescible materials.

During detailed investigations and assessments consideration should be given to continuous monitoring techniques on the boundary with North Cockley and Nutfield Priory landfills as this may prove cost effective in terms of characterising the risk definitively and quickly.

During detailed assessment of the ground gas risk the gas migration pathway should be investigated. The cross sections provided are very useful in terms of understanding the topographic separation between the site and the off-site landfill, although levels may change post-development due to the requirement for cut/fill to form the development platform. Permeability testing should be considered (in natural ground on the site boundary that could act as gas migration pathway) this could be a useful parameter for DQRA for gas migration. In place of site-specific permeability testing analysis of PSD tests and soil descriptions could also be used to obtain approximate values. Careful consideration should be given to the potential for preferential pathways on the site boundary that could encourage lateral migration, via faults/fractures, utilities trenches, or highly permeable strata confined by lower permeability deposits.

The detailed ground gas risk assessment for the western area should take into account the effect of the landfill gas extraction system at North Cockley Landfill and the potential for this to be turned off in the future. Efforts should be made by the applicant (or their consultants) to obtain records of the system. Analysis of its effectiveness can then be completed and this aspect incorporated into the assessment.

5.18 - Low gas flow rates in monitoring boreholes at the edge of the landfill could be as result of the extraction system, and that should be considered in the ground gas hazard classification at the boundary.

#### **Human health investigation and assessment**

6.6 – Testing for TPH during future investigations should be via speciated TPH-CWG banding so that results can be compared to specific GAC.

6.9 – Exceedances of GAC for arsenic and beryllium appear to be consistently marginal, and potentially associated with natural geology of the area (ironstone/greensand). Is there a proposal for site-specific tier 2 risk assessment, statistical analysis or additional testing for these parameters (such as bioavailability) during detailed investigations in order to ensure the most sustainable remedial option (i.e. avoiding an unnecessary cover layer system).

Consideration should be given to the methodology for assessment of the Vapour Intrusion pathway for the site. Given the preliminary findings we do not consider it likely to be a significant consideration at the site, and a qualitative assessment is likely to be sufficient. However, recent investigations lack collection of relevant data to inform this (i.e. TPH-CWG tests on soils, PID screening of soil or monitoring wells, BTEX & TPH-CWG and VOC tests on groundwater). These techniques should be considered particularly targeted to potential contaminant sources, i.e. areas of any former works/tanks and in locations with visual cues such as BH1002.

#### **Proposed development implications**

8.17 – Use of vibro stone column foundations may not be suitable for the site, particularly in areas adjacent to landfills, as these can introduce pathways or reservoirs for ground gases to accumulate. This should be considered by the developer as they determine their foundation solution for the site.

8.20 - Due to the sensitivity of the water environment at the site (aquifers in the bedrock). It may be necessary during detailed investigations to obtain leachability testing on potentially contaminated materials. Particularly if these soils are potentially contaminated with metals, and a cut and fill earthworks exercise is proposed that will move materials about and potentially encourage leaching/mobilisation of



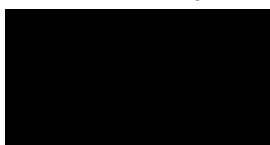
contaminants. Assessment of results from water samples only will not take account of this potential pathway.

### **Closing remarks**

We think that a positive next step would be to arrange a meeting between EPG and MJCA to discuss the strategy for further investigation and assessment. We can then review the proposed scheme of further investigation and provide comment.

Please don't hesitate to get in touch if you wish to discuss anything about these comments.

Yours sincerely

A large black rectangular box redacting the signature of the sender.A small black rectangular box redacting the name of the sender.

Head of Geoenvironmental, The Environmental Protection Group

A small black rectangular box redacting contact information.