TerraConsult

Runfold Central Area

Soil Gas Risk Assessment

Report Ref: 2445/R/012/03

February 2020

Prepared for: SUEZ Recycling and Recovery UK Ltd

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1. INTRODUCTION

1.1 Report Context

1.1.1 The purpose of this report is to provide a qualitative soil gas risk assessment to support an application to restore the centre of the wider Runfold Quarry complex operated by SUEZ Recycling and Recovery UK Ltd referenced to in the report as Runfold Central Area.

1.1.2 This report is provided to support the environmental permit application for a recovery activity but will also be used to discharge condition 6 of planning permission reference WA/2018/0016 which requires: *A Soil Gas Risk Assessment report including the risks and consequences of surcharging any gassing ground waste present with new fill.*

1.1.3 The purpose of the waste recovery activity is to restore Runfold Central Area to agricultural pasture mandated by planning permission referenced WA/2018/0016 with specific reference to the approved restoration contours detailed on attached SUEZ drawing referenced Rsp-CONT-0518-02: *Central Area Proposed Low Level Restoration Contours.* There is insufficient material available on site to support the scheme and it is proposed to import suitable waste materials to complete the works.

1.1.4 This Soil Gas Risk Assessment has been prepared to address the potential gas risk from the placement of inert waste as part of the proposed recovery activity.

2. SITE DATA REVIEW

2.1 Reference Information

2.1.1 Section 2 of this report has been compiled with reference to supporting documents produced as listed below. These give a description of the historical waste source term, ground conditions beneath and around the Site and details of the landfill engineering. A summary of the previous site investigations is provided in TerraConsult factual report on the Runfold Central Area referenced 2445/R/004/03 (July 2019) submitted under a separate cover.

- Wilson Bailey Partnership Ltd. Runfold Landfill Site Ground Investigation Report (Ref: J09113, 30 May 2009);
- TerraConsult Ltd. Proposed In Vessel Composting Facility, Runfold. Phase I Desk Study Report (Ref: 1201/01 Issue 3, January 2010).
- TerraConsult Ltd. Proposed In Vessel Composting Facility, Runfold. Phase II Site Investigation Report (Ref: 1201/02 Issue 1, March 2010).
- TerraConsult Ltd. Proposed Inert Recovery Permit, Runfold Central Area. Phase II Site Investigation Report (Ref: 2445/R/004 Issue 3, July 2019).

2.2 Site Location

2.2.1 The proposed Runfold Central Area recovery site (the Site) is located approximately 2.5 km to the east of Farnham. It sits within the wider Runfold Quarry complex which is an area characterised by historical mineral extraction and subsequent restoration by landfilling. The proposed area to be included in the Runfold Central Area restoration scheme is shown on drawing referenced 2445/8/018: Boundary Layout.

2.2.2 The quarried areas have been progressively restored by landfilling with a range of different waste types and containment engineering specifications. The landfilling history at and around the Site is summarised in Table 1 and shown on drawing referenced 2445/8/001. Waste disposal within the Central Area of Runfold Quarry was first permitted in 1969 under a Tipping Licence which allowed landfilling of naturally occurring excavation material, builder's rubbish, brick and hardcore, clinker and ashes. It is understood the Tipping Licence was renewed on a yearly basis subject to compliance with the licence conditions i.e. ensuring (amongst other aspects) that inert or similar wastes only were accepted. The operations progressed eastwards to the areas known variously as 'Hogs Back Landfill' or 'Playing Field' and 'Top Field', the Tipping Licence was replaced by a Waste Disposal Licence (WDL) WA/11/502, issued on 2 March 1978, which authorised the deposit of inert, industrial, commercial and asbestos wastes.

2.2.3 The Hogs Back Landfill Site licensed area was later extended to include an area to the southeast known as 'Old Hogs Back' and became Waste Management Licence (WML) WML83115 which was subsequently converted to Environmental Permit referenced EPR/VP3193EQ/V007.

Table 1: Landfilling History

Area	Reference	Issue Date	Type of Waste	Controls
Hogs Back Landfill includes: West and southern parts of Runfold Central Area Playing Field and Top Field to east	Consent for the Controlled Tipping of Refuse, issued by Surrey County Council on a yearly basis – no reference	1969	Excavated materials, builders waste and clinker and ashes	None

Area	Reference	Issue Date	Type of Waste	Controls
Old Hogs Back Landfill As of February '87, also including the area to the southeast of Central Area	11/502, superceded by EAWML/83115 superseded by EPR/VP3193EQ	1978	From March '78: Naturally excavated materials and brick and concrete From November '79: Commercial and industrial wastes, including asbestos	Engineering controls and active landfill gas extraction
Runfold Landfill Area B	EPR/CP3990EN	2001	Biodegradable non-hazardous waste	Engineering controls, active gas and leachate management
Runfold Landfill Area A	EPR/SP3131GC	2017	Non-hazardous soils and inert soils	Engineering controls, leachate management may be required
Runfold Landfill Area C				
Runfold North	EPR/AB3801MG		Inert	None
Central Area (west)	EPR/401034	2014	Treatment of waste to produce soil	In accordance with standard rules requirements

2.2.4 It is understood that an insitu sand and gravel feature remains between the Central Area and Areas A and C, and Area B. Landfilling activities ceased in the Runfold Central Area in the 1970s, and have also ceased in Area A to the west; Area B to the south; and, the main Hogsback Landfill to the east and the Old Hogs Back landfill to the southeast (which have the same permit as the Central Area deposits). Landfilling operations continue in Area C to the south west.

2.2.5 Partial landfilling in the Central Area has left a void which is proposed to be restored to approved levels as part of the recovery activity. The base of the void was previously occupied by a Tarmac mortar batching plant and other areas of this site used for inert waste recycling operation by Collards and material stockpile storage. The Tarmac plant, buildings and hardstanding have since been removed as has the plant associated with the waste treatment activities. Stockpiles and bunds consisting of processed waste or engineering materials (not associated with Tarmac) are still located around the wider Runfold Central Area site.

2.2.6 The Central Area was once connected to the quarry to the north of site via a conveyor tunnel under Guildford Road. This became Runfold North Landfill and the quarry void was restored with inert waste. The tunnel under Guildford Road and the cutting down into it from the Central Area remain.

2.2.7 The degree of any restoration activities within Central Area is uncertain as the area has been subject to a range of uses since the material was placed in the 1970s. This includes various haul roads, footpaths, stockpiling of engineering and waste aggregate materials, construction of buildings and concrete / other hardstanding, carrying out waste treatment activities (the Collards processing plant was formerly located to the west extent of the Central Area), and construction of perimeter bunds. Repeated tracking of vehicles and loading by material will have caused localised compaction of the ground, and any residual low permeability material, roads or slabs reduced the permeability of the waste at its surface.

2.2.8 Semi-mature woodland and other vegetation has become established on the flanks of the Central Area void, around the pond to the north and along the public footpath which cuts

through the site. These vegetated areas reflect parts of site which have not been subject to disturbance associated with the activities described above.

2.3 Current Site Description

2.3.1 Runfold Central Area measures approximately 250 m east to west (at its widest) by 470 m north to south. The site is a former sand extraction pit, the majority of which was subsequently used for landfilling of mainly excavation and demolition wastes. The Site is currently occupied by a number of buildings and areas of hard standing that remain in use as part of the operation of the adjacent areas of the site, although they are being progressively demolished and removed in preparation for final restoration of the site.

2.3.2 An inert waste treatment activity was carried out independently by Collards Ltd (permit referenced EPR/01034) in the narrow (north to south) western part of the Site which is now a flat partially vegetated surface. The north of the Site has an office complex, weighbridge, wheel wash and wash down area.

2.3.3 The north western corner of the site which abuts Guildford Road to its north is occupied by a pond which sits in the base of the original deep excavation. The steep banks of this void are all heavily vegetated up to surrounding ground level with trees and shrubs. A public footpath bisects the Site north to south. This runs down the eastern fringe of the pond area, across the internal site access road to Area A and down to the site's southwest corner.

2.4 Proposed Recovery Activity

Existing Topography

2.4.1 The proposed Runfold Central Area recovery site (the Site) will occupy an area of approximately 7 Ha. It will be located in an area of partially filled, former quarry void within the wider 60 Ha Runfold complex of landfills. The topography of the Site is best characterised as a shallow gradient sloping down north to south towards the low point at its centre. The lowest area of the Site is the base of the former quarry void at the southern extent of the Site. (approximately 70 mAOD) This is anticipated to represent the base of the original quarry void in this area.

2.4.2 The east, south and western sides of the Site low point are fringed by steep embankments which rise up to ground levels of approximately 82 mAOD to the east, 83 mAOD to the south and 77 mAOD to the west. The ground adjacent to the void is characterised by haul roads or stockpiles of material. The void is surrounded by historic landfills. Hogs Back to the east, Old Hogs Back to the southeast, Area B to the South, Area C to the south west and Area A to the West. The gas compound associated with the Old Hogs Back Landfill and Area B landfill is located in the southeast corner of the proposed Site boundary. The haul roads run north and west from this location, and also down in to the Central Area void.

2.4.3 The embankments in the south and east of the Site are much steeper in gradient than the western embankments due to the position of the haul roads. Ground levels west of the Site (beyond the shed and haul road) level-out and are intersected by a footpath and the low bunds which surround the former waste processing area operated by Collards to the west of Site. The main void to the south of Site was formerly occupied by a Tarmac aggregate batching plant until 2017. This comprised a range of processing buildings together with temporary office buildings, aggregate storage bays and areas of concrete surfaced hard standing. Tarmac batched specialist mortars from the Site rather than bitumen coated products. A site investigation carried out by TerraConsult January (2019c) confirmed a shallow layer of made ground (commensurate with sub-base for the plant hard-standing rather than waste fill) overlying the natural insitu sands.

Recovery Landform Topography

2.4.4 The majority of the recovery material will be placed in the main void in the Central Area. At its deepest, waste infill will be approximately 13 m deep based on the current 70 mAOD base level of the void. On completion of infilling, the surface profile of placed material will slope downward from a maximum height of 83 mAOD at the south of site, to 77 mAOD at the pond to the north. The former tunnel cutting to the northeast of the Central Area site will be filled to match current ground levels (around 82 mAOD) and slope downward to the southwest to 77 mAOD.

Waste Deposits

2.4.5 The Site has been subject to a number of Phase I desk studies and Phase II Environmental and Geotechnical Investigations. A Phase II Site Investigation undertaken by Wilson Bailey Partnership in May 2009 saw the installation of thirteen cable percussion boreholes. Made Ground was encountered within each of the boreholes which was consistent with the former site use as a landfill for inert waste / demolition waste. The depth to the base of the Made Ground was proved in each of the boreholes to depths of between 0.2 m and 10.0 m below ground level, with the variation of the depth to the base being generally consistent with the variation of the ground level across the site. The Made Ground was found to be predominantly clayey but locally sandy with highly variable minor constituents including gravel, demolition rubble, topsoil, timber, wood and plastic.

2.4.6 A 2010 Phase II Site Investigation undertaken in January 2010 saw the drilling of nine boreholes (IVC101-IVC109) to depths of up to 12 m below ground level (mbgl) and the installation of gas / groundwater monitoring wells in seven of the boreholes (IVC101-IVC107). Made Ground was found to be present across the site to depths of up to 10 m. Thicknesses were generally greater in the southern and western areas of the site. The Made Ground was generally similar to that described in the Wilson & Bailey report (May 2009). Typically the Made Ground varied from a clayey, ashy, sandy gravel of brick, concrete, sandstone flint and chalk with occasional wood and metal fragments to sandy, gravelly clay with similar gravel components.

2.4.7 The primary waste types authorised for deposit under the licence for the Central Area at the time it was being filled were excavated materials, builders waste and clinker and ashes. Commercial and industrial wastes were also being deposited from 1979 onwards, by which time filling was in the playing field and top field areas. Clinical wastes were excluded from the site however provision for disposal of asbestos waste was made in the licence from 1979. Site investigations carried out across the site in 2009 and 2010 (boreholes indicated by grey icons on accompanying drawing referenced 2445/5/007: Site Investigation Plan) and in 2019 (boreholes indicated by purple icons) confirmed the composition of the in-situ waste deposits. The boreholes established varying depths of Made Ground comprising primarily of clay, sand, stones, brick and concrete rubble (alone and in combination); with incidental components of topsoil, wood, and other organic material at limited locations. Based on this information the waste deposited under the permit in the Central Area does not appear to contain a significant biodegradable component. This reduces the landfilled wastes potential to produce biogenic landfill gas or leachate in significant quantities.

Proposed Waste Types

2.4.8 The quantity of material required to complete the restoration scheme is 165,903 m^3. Using a conversion factor of 1.8 tonnes to 1 m^3, 298,625 tonnes of suitable material will be required. The maximum thickness of fill to be imported will be 9 to 13 metres which will overlay the shallowest thickness (and in some places the absence) of in-situ waste material. The profile of restoration material will be deepest in the centre of the Central Area site where Made Ground deposits are shallow or absent. The main component of the

existing landfilled wastes will be subject to a much smaller loading of recovery material. Excluding the tonnage proposed and its position within a permitted landfill boundary, the recovery activity would have meet the location and operation requirements of a standard rules recovery permit (SR 2015 No.39)The proposed waste types to be used in the recovery activity will comprise of material accepted under EWC codes permitted by SR 2015 No.39. The proposed waste types for bulk fill are listed in Table 2 and waste types for the restoration layer in Table 3. Material placed in the bulk fill will have negligible potential to produce gas or leachate. Some residual Total Organic Carbon (TOC) is expected but this will tend to comprise of "hard" organic compounds such as resins and lignins which do not give rise to significant landfill gas production and these will be limited to less than 3% in accordance with inert WAC criteria.

Table 2: List of Acceptable Waste Types for Bulk Fill

EWC	EWC Description	Notes
01 01 02	Wastes from mineral non-metalliferous excavation	1
01 04 08	Waste gravel and crushed rocks other than those mentioned in 01 04 07	1 & 2
01 04 09	Waste sand and clays	1 & 2
17 05 04	Soil and stones other than those mentioned in 17 05 03 (not including topsoil and peat)	1, 2, 3 & 4
20 02 02	Soil and Stones	1, 2, 3 & 4

Table 3: List of Acceptable Waste Types for Restoration

EWC	EWC Description	Notes
01 04 09	Waste sand and clays	1 & 2
17 05 04	Soil and stones other than those mentioned in 17 05 03	1, 2, 3 & 4
20 02 02	Soil and Stones	1, 2, 3 & 4

Notes

1. These wastes are taken from appropriate standard rules or in accordance with the risk assessments provided by this permit application.
2. These wastes are referenced from the Agency's restoration briefing note on restoration.
3. These wastes will be the primary restoration material.
4. Restricted to topsoil, peat, subsoil and stones only

2.5 Engineering and Gas Control

2.5.1 It is understood the Site does not have an engineered basal or sidewall liner and historic wastes were placed directly in the void created from sand and gravel excavation. It is also understood no engineered cap was placed above the wastes, with restoration soils only placed on the wastes to the east.

2.6 Geology

2.6.1 The site is situated on the northern limb of the North Downs anticline and a feature known as the Hogs Back, present immediately to the north of the Guildford Road. The topographic 'Hogs Back' feature is formed as a result of the faulted monocline structure, with the east-west trending thrust fault.

2.6.2 The site is located to the south of the Hogs Back and is known as the Hog's Back Sand Pit. These beds comprise cross-bedded, fine to medium quartzose and mainly unconsolidated sands and gravels with seams of pebbles, clay and ironstone. The Folkestone Beds overlie Sandgate Formation which consist of consolidated fine to coarse grained sandstone, of a poorly sorted nature which are glauconitic and ferruginous with some clay beds. Below the Sandgate Formation lie the Hythe Beds and Atherfield Clay at the base of the Lower Greensand succession.

2.6.3 Gault Clay overlies the Folkestone Beds to the north of the A31 but is not present in the vicinity of the site. Previous local investigations indicate that the Folkestone Beds, Sandgate Beds and Gault Clay dip to the north at about 6 degrees and steepen to the north of the A31 to approximately 12 degrees.

2.6.4 The exploratory investigation carried out by TR Geological Services in 1993 took place on the western area of Area A of the Runfold South site prior to quarrying and landfilling (approximately 300 m to the west of the site) and involved the drilling of 12 boreholes and the digging of 34 trial pits in order to assess the mineral reserves for the extension of the quarry. The geology underlying the site is not expected to vary significantly from that reported here.

2.6.5 The previous investigation by TR Geological Services reported the following sequence:

- the younger and uppermost beds to the north contain white / yellow coarse sand in excess of 30 m, interbedded with a thin layer of clayey grit dipping at an angle of 7° to the north;
- 15m of fine sand interbedded with 10m of silty clayey sand;
- underlying beds to the south are yellow orange and brown in colour and contain fine to medium & coarse grained sands;
- a sandy clayey horizon marks the base of the Folkstone Beds; and,
- Sandgate Beds contained dark brown fine to coarse grained clayey sand.
- The Sandgate Beds, consisting of sand with clay and occasional clayey sandy laminae, underlie the Folkestone Beds.

2.7 External Ground Gas Sources

2.7.1 A history of the regulatory permissions for landfilling in place at or adjacent to the Central Area is in Table 1. The Area B non-hazardous waste landfill to the south of the Central Area was capped in 2012 and restored in 2013. Landfilling of non-hazardous low biodegradable wastes with an organic content of no greater than 10% in Area A was completed and the site capped and restored in 2018. Extraction of sand from Area C started in 2010 and finished in 2016. Restoration of the void by landfilling with similar wastes to Area A is ongoing in Area C, with operations expected to be completed by the end of 2020.

2.7.2 It is evident that the land immediately surrounding the Central Area has been subject to significant landfilling operations. These landfills benefit from varying levels of containment from older ‘dilute-and-attenuate’ methods to fully engineered cells. Subject to effectiveness of gas controls and the source term, these areas of landfill outside of the Central Area site boundary are a potential source of migrating landfill gas, however they are subject to the regulatory controls imposed in their respective Permits including management and monitoring of the landfill gas.

2.8 Hydrology

2.8.1 The River Wey flows in a north to south direction to the west of Area A, approximately 300 m to the west of the Central Area. The River Wey has two sources; one in West Sussex and one in Hampshire. The ‘North Branch’ of the Wey flows from Alton in Hampshire and the ‘South Branch’ from Blackdown in West Sussex. The two branches converge at Tilford in Surrey and flow into the Thames at Weybridge.

2.8.2 An existing pond is located in the north of the site near the main site entrance.

2.9 Hydrogeology

Groundwater Levels

2.9.1 The groundwater in the Folkestone Beds is reported as confined where the Gault Clay to the north of the A31, overlies the Folkestone Beds. Where the Folkestone Beds outcrop at the surface, the groundwater appears to be effectively unconfined, although the presence of clay horizons may cause the groundwater to behave in a confined manner in some areas.

2.9.2 A study of the hydrogeology in the vicinity of the site was published by Southern Water's Water Resources Division in 1988 ('The Compilation of Folkestone Beds Groundwater Contour Maps for the Western Hogs Back Area, Surrey, Internal Report CIR 163, April 1988'). This study considered groundwater levels in the Folkestone Beds between May 1981 and May 1987, and the following conclusions are summarised below:

- A groundwater ridge exists that extends eastwards from the northern area of the Princess Royal complex (Runfold North Landfill) through the Homefield Pit situated 1km east of the Runfold North;
- The piezometric head had declined in the confined aquifer possibly due to abstraction at Tongham;
- A second groundwater ridge was present following the principal flow direction such that groundwater in the southeast of the site flowed south and southeastwards, whilst groundwater in the west of the site flowed southwestwards towards the River Wey;
- The Folkestone Beds Aquifer appeared to show dual or multi-layer characteristics with the clay beds acting as aquicludes;
- The groundwater contour map indicated levels of between 60 and 65 mOD in the vicinity of the Runfold South Sandpit (Princess Royal Sand pit) with a general flow towards the south-southwest; and
- Although the 1987 map showed groundwater contours had been locally modified by quarrying operations, the overall pattern of flow remained largely unchanged.

2.9.3 A discussion of current groundwater levels is in the separate groundwater risk assessment report. There is currently expected to be a minimum 5 m thickness of unsaturated natural ground beneath the Central Area.

3. CONCEPTUAL SITE MODEL

3.1 Summary

3.1.1 Consolidation of information relating to the landfill gas source term, potential migration pathways and receptor information enables construction of a Conceptual Site Model (CSM) to assess the likely impact of the landfill site on the environment and human health. This CSM concerns the risk associated with ground gas specifically and the overall objective of this report is to assess whether the placement of inert materials on the in-situ waste deposits may liberate ground gas.

3.1.2 The overall risk is based on an evidence-based, qualitative assessment of the risk associated with the landfill gas source term, the likelihood of landfill gas reaching a receptor via the identified pathway (including an assessment of gas monitoring data to determine if this has actually occurred), and the relative sensitivity of the receptor to landfill gas migration. A list of receptors is provided in Table 4.

3.1.3 A Source-Pathway-Receptor philosophy is used to establish whether gas emissions from the proposed site pose a risk to the surrounding environment. Section 2 has been used to inform the Source-Pathway-Receptor model subject of this assessment.

3.2 Landfill Gas Source Term (Existing Deposits)

3.2.1 Monitoring carried out in 2009 / 2010 at site investigation boreholes installed in 2009 / 2010 showed positive readings for methane in all boreholes. High levels of methane were detected in boreholes IVC101 and IVC5 with positive flow readings. Gas data taken from the January 2019 Site Investigation boreholes shows a reduction in methane concentration and no flow. The Made Ground deposits along the western edge of the Site comprise clayey soil. It is likely the installation of the boreholes liberated the gas which was previously undisturbed.

3.2.2 Boreholes IVC2, IVC3, IVC5, IVC101, IVC102, IVC106 and IVC107 recorded positive for Volatile Organic Compounds (VOCs) in 2009 / 2010. IVC101 recorded the highest VOC concentrations and concentrations of Tentatively Identified Compounds (TICs). It is considered likely that the gas results indicate that the Made Ground at this location may be hydrocarbon impacted. Low levels of VOCs were measured within IVC106 and IVC107. However all groundwater samples recorded hydrocarbons, VOCs and Semivolatile organic Compounds (SVOCs) below the laboratory limit of detection.

3.2.3 The existing waste fill material may be a potential source of methane and carbon dioxide ground gas. Previous gas readings from the in-waste boreholes drilled in 2010 reported very high concentrations of methane to the west of site with potentially high gas flows (e.g. IVC3, IVC5, IVC101, IVC102, IVC103, IVC104). Gas readings taken from 5 in-waste gas wells (BH18/01 to BH18/05) installed in January 2019 reported methane above 1 %v/v in all in-waste / Made Ground points except BH18/01. The maximum reading was 21.9 %v/v in BH18/02. Methane concentrations up to 14.8 % v/v were also noted in BH18/03 (shallow) with a slightly lower concentration of 6.9 %v/v recorded in the sub-waste installation. Methane concentrations in the other in-waste points were comparable with concentrations typically ranging between 5 and 12 %v/v. The maximum carbon dioxide concentration recorded was 13.5 %v/v in BH18/04. Negligible flow was detected at all points, with the highest gas flow rate recorded in IVC107 at 0.2 l/hr. This would suggest a reduction in the ground gas source term within the in-situ waste deposits.

3.2.4 To support the gas assessment soil samples were taken on installation of the Phase II Site investigation boreholes in 2010 and 2019. The soil composition was determined through

soil sampling during the Phase II Site Investigations. The soils were analysed for a range of contaminants including Total Organic Carbon (TOC) to provide an indication of organic content of soils. TOC recorded across the Site in samples taken in 2010 and 2019 was recorded at a maximum of 1.7 % and 1.9% respectively. TOC analytical technique however does not accurately reflect the organic component of a soil that is readily biodegradable. The method first involves quantification of the proportion of inorganic carbon in the material by acidification. A separate sample of the same material is then subject to high temperature combustion and catalytic oxidation with quantification of the organic carbon by measurement of the liberated carbon dioxide. The inorganic proportion is accounted for in subsequent calculations prior to the TOC value being reported. The TOC testing will not give an indication of the readily biodegradable potential of the material nor can it be used to determine how much gas will be produced. The TOC test is therefore likely to be an over-estimate of the gassing potential of the waste and should not be considered in isolation.

3.2.5 A CL:AIRE research bulletin[1] also discussed TOC in natural soils. It describes the prevalence of large complex organic compounds (stabilised organic matter) such as resins, lignins, waxes or heavy molecular weight hydrocarbons which few microbes can degrade. Other more degradable compounds are bound up in the soil structure and cannot be reached by microbes. These compounds can be exposed during ground disturbance and could explain initial high concentrations of methane recorded from boreholes after they have been recently drilled. These concentrations subsequently reduce to negligible values which are more reflective of the low gas generation potential ground they were installed into.

3.2.6 It is notable that the highest gas readings and flows are associated with the borehole locations which have their response zones within the Made Ground. The three boreholes which have their response zones within the underlying sand strata only (IVC105d, IVC106 and IVC107) show low methane and carbon dioxide concentrations as compared with other locations. IVC107 however did exhibit a relatively high carbon dioxide concentration (12.7%) on one occasion possibly indicating some influence from an offsite source. It is considered however that there may still be some offsite influence on the ground gas concentrations measured in the Made Ground boreholes as the granular nature of the Made Ground would allow the transmission of gas that had originated offsite. The Made Ground encountered in the boreholes is not considered to have a sufficiently high organic content that would be required to produce the concentrations and volumes of gas measured. Again, this may show that the measured gas had originated offsite.

3.2.7 This site was permitted to accept a range of waste types which was limited to construction and demolition wastes with little to no putrescible waste. The Site is considered unlikely to have produced sufficient volumes of landfill gas to warrant an active gas management system and any landfill gas present is likely to be in decline due to the significant time between cease of deposit in the 1970s.

3.3 Restoration Materials

3.3.1 In contrast to the pre-Landfill Directive inert wastes accepted in Runfold Central Area the proposed waste recovery scheme will propose all wastes to be brought to site to comply with the Landfill Directive Waste Acceptance Criteria (WAC) for inert landfill sites. Due to the nature of the inert waste there is considered to be no potential impacts resulting from landfill gas generation. Gas management and collection is not required as it is unlikely that

[1] CL:AIRE (2012). A Pragmatic Approach to Ground Gas Risk Assessment. CL:AIRE Research Bulletin RB17. November 2012.

methane is produced. Strict waste acceptance procedures will be in place to ensure that only Landfill Directive WAC inert wastes are accepted as part of the recovery activity and as such only negligible level of organic material could be present in the waste accepted resulting in the risk for the production of landfill gas being minimal.

Potential Impact from Settlement

3.3.2 The settlement assessment conservatively assumed that all existing waste deposits up to a depth of 10 m will be loaded with 5 m of recovery material. In reality this will not be the case as areas with the deepest waste deposits will require less than 5 m of recovery material. It was calculated that the most likely degree of settlement will be 0.3 m in a 10 m column of waste. This value reduces with depth of underlying waste even if the 5 m load remains the same. The main period of settlement is expected to have completed after 12 months.

3.3.3 A reduction in waste volume of 0.3 m infers a compression of pore space in the underlying material and displacement of whatever liquid or gas is present in the pore space i.e. 0.3 m^3 / m^2 of waste (if 10 m thick). There is an unsaturated zone between the base of the Central Area wastes and the underlying groundwater. In the unlikely event that the unsaturated wastes were to release gas from the pore space, the volume is expected to be insignificant.

3.3.4 The existing waste surface least likely to have been affected by site operations are the steep vegetated slopes. The flatter areas of the Site are likely to have been tracked by vehicles or loaded / capped with stockpiled materials. These surfaces of flatter areas of site are likely to have been compacted or capped with other materials. If in the unlikely event gas was liberated by settlement the quantities will be insignificant.

3.4 Pathways

3.4.1 Runfold Central Area comprises a large void which has been partially restored with waste deposits. An in-situ sand and gravel feature remains between the Central Area and Areas A and C and Area B.

3.4.2 Runfold Central Area is surrounded by areas of extensive historic landfilling including to the north, east, south and west of the site. The geology beneath and surrounding the Runfold Central Area are predominantly the Folkestone Formation sands and gravels. The unsaturated sand beneath and adjacent to the site and the Made Ground is the most likely pathway for the movement of ground gas or potential landfill gas emissions.

3.4.3 Infilling may obstruct existing gas emission surfaces e.g. in void. This may reduce ability of site to vent gas. However, the large surface area of sand surrounding the site will remain the same.

3.4.4 The Central Area was once connected to the quarry to the north of site via a conveyor tunnel under Guildford Road. The quarry void to the north became Runfold North Landfill and the quarry void was restored with inert waste. The tunnel under Guildford Road and the large cutting down into it from the Central Area remain. This may present a discrete pathway for gas movement from the existing waste deposits to the north or vice versa once the cutting has been infilled as part of the recovery activity. Neither the inert landfill waste deposits to the north or the material used to infill the cutting are considered to be sensitive to ground gas movement.

Man-made Subsurface Pathway

3.4.5 The landfill gas compound which serves Runfold Landfill Area B to the south and the Old Hogsback Landfill to the southeast is located at the southeast corner of the Central Area. Buried services connect this to the mains supply on the road to the north. These services run along the haul road on the eastern boundary and also connect the workshop in the centre of site and also the weighbridge and offices to the north. Although not considered significant in scale, the pipe bedding surrounding the services may present a discrete infiltration pathway through which gas could migrate.

3.4.6 SUEZ provided a plan detailing the location of all known on-site services within the proposed 2019 Central Area site investigation. This showed water and electricity services associated with the workshop, gas compound and leachate tank. There are evidently electric and water connections from the site entrance to the water pump in the northwest pond, the wheelwash, the now removed cabins in the northwest corner of the Collard treatment area and the area near the shed located west of the Central Area main void.

3.4.7 A LineSearchBeforeUDig report was requested in December 2018 and identified only a low pressure main that runs along the far side of Guildford Road to the north.

3.5 Receptors

3.5.1 There are a number of potentially sensitive receptors located within the vicinity of the Runfold Central Area as detailed in Table 4. The receptors are measured from the edge of the waste mass within the Runfold Central Area rather than the site boundary. Moor Park Farm is located approximately 250 m to the west of the site. The closest is the Princess Royal Hotel and Pub located approximately 50 m to the northwest of the Site and the residential property located 30 m to the north east of conveyor tunnel aspect of the scheme.

3.5.2 The receptors located within 250 m of the Site likely to be sensitive to lateral landfill gas are summarised in Table 4 below and shown on drawing referenced 2445/5/001.

Table 4: Sensitive Receptors within 500m of Runfold Central Area Restoration

No.	Receptor	Category	Distance (m)	Direction from Site	Frequency Downwind (%)
1	Barfield School	School	230	E	2.6
2	Playing Field	Field	10	NE	17
3	Residential Properties off Crooksbury Road	Residential	420	E	2.6
4	Woodland	Habitat	345	SE	2.2
5	Residential Properties off Compton Way	Residential	450	SSE	2.2
6			370	S	3.5
7			210	SSW	5.5
8	Residential Properties off Moor Park Lane including Moor Park Farm	Residential	250	SW	3.5
9			305	W	4.7
10	Moor Park Lane	Road	305	SW to W	3.5 to 4.7
11	Ancient Woodland	Habitat	470	WSW	3.6
12	River Wey	Habitat	410	SW to W	3.5 to 4.7
13	Residential Properties off Moor Park Lane (north)	Residential	210	W	4.7
14	Ancient Woodland	Habitat	360	W	4.7
15	Residential Properties off Guildford Road	Residential	150	NW	5.1
16	Residential Properties off Hurlands Close	Residential	430	NW	5.1
17	The Princess Royal	Pub / Hotel	80 (from entrance)	W	5.1
			185 (main activity)	N	6.8
18	Guildford Road	Road	0 (from entrance)	E to W	2.6 to 4.7

No.	Receptor	Category	Distance (m)	Direction from Site	Frequency Downwind (%)
			<10 (main activity)	NW to NE	5.1 to 17
19	A31	Road	310 (from entrance)	E to W	2.6 to 4.7
			175 (main activity)	NW to NE	5.1 to 17
20	House off Guildford Road	Residential	55 (from entrance)	E	2.6
			30 (main activity)	NE	17
21	Fields to north of A31	Agricultural	210	N	3.5
22	Farm building north of A31	Agricultural	284	N	6.8
23	Equestrian Centre	Leisure	445	N	6.8
24	Farm buildings	Agricultural	460	NE	17
25	Public footpath leading to North Downs Way	Leisure	<5	All	All

3.5.3 Receptors located to the east, south and west are adjacent to landfills as part of the wider Runfold Complex therefore it is considered they are unlikely to be at risk from gas emissions from Runfold Central Area. The receptors located to the south west are situated topographically lower than Runfold Central Area at approximately 60 m AOD. This reduces the potential for a gas migration pathway to form. The receptors considered to be most at risk from any potential gas migration are located to the north of the Site.

4. SOIL GAS RISK ASSESSMENT

4.1 The Nature of the Landfill Gas Risk Assessment

4.1.1 This risk assessment takes a qualitative approach to assess the impact of recovery activity comprising the deposit of waste at the Runfold Central Area on likely liberation of gas from in-situ waste deposits and the potential for the gas to migrate and impact sensitive receptors.

4.2 Proposed Assessment Scenarios

4.2.1 Due to the low biodegradable content of the waste a qualitative screening exercise has been developed to assess the risk from landfill gas utilising a source-pathway-receptor approach. The permitted wastes proposed to be accepted as part of the recovery activity in the Central Area comprise inert wastes only with low organic content and negligible biodegradability. This will be enforced by rigorous waste pre-acceptance procedures, ensuring a low risk source term, resulting in negligible volumes of gas and leachate generation within the waste mass. The risk screening will encompass the potential liberation of gas in the in-situ waste deposits after loading.

4.2.2 The Environment Agency guidance[2] states that biodegradable fraction (mainly cellulose and hemicellulose) is the portion of the waste which will undergo microbiological degradation to produce gas and liquids, although not all of this will be available for degradation. Inert landfills by their nature will have a minimal organic (biodegradable) content to the waste. Section 4.4.1 of the above guidance references the degree to which waste composition can influence the generation of significant volumes of landfill gas. It states that a site that contains 75 % or more inorganic wastes will produce minimal volumes of landfill gas (although this may still represent an environmental impact).

4.2.3 Consequently risk assessment of sites which have accepted or will accept a low proportion of organic wastes is not expected to extend beyond the risk screening stage. The guidance recommends that the emphasis of a risk assessment be placed on rigorous waste acceptance procedures to control the nature of the wastes accepted to the site.

4.2.4 The types of waste deposited historically are expected to have limited biodegradable fractions and the waste types to be deposited under a recovery permit will be limited to inert wastes only.

4.2.5 As such, a risk screening and hazard identification approach has been adopted to provide an assessment of potential impacts on local environment, health and amenity by:

- developing an understanding of Runfold Central Area in its environmental setting (the conceptual model), including the identification of the possible sources of a risk, the pathways and the potential receptors; and,
- consideration of the sensitivity of receptors in the vicinity of Runfold Central Area as identified in Section 3.4.

4.3 Landfill Gas Generation

4.3.1 Peak gas production usually tends to occur within 5 to 7 years after the wastes have been deposited. No new landfill gas is likely to be produced at the Site due to the length of time since the waste was deposited. The waste deposits have been in-situ for approximately 40

[2] Environment Agency (2004). LFTGN03: Guidance on the Management of Landfill Gas.

– 50 years therefore likely gas emissions are considered to be in exponential decline with any potential gas within the deposits having vented. The waste types to be deposited as part of the recovery activity are limited to inert materials only and therefore have negligible gassing potential. Any landfill gas generated at the Runfold Central Area is considered to be limited to gas that may be liberated from the pore spaces within the waste deposits as a result of the placement of soils.

4.3.2 Primary settlement at Runfold Central Area will be through the physical compression of the in-situ waste deposits through the application of load (i.e. in response to placement of overlying layers of inert waste). The Settlement Report identifies that the thickest waste generally corresponds with the more clayey material. The soils will consolidate under the extra loading imposed by the additional fill thickness. The amount of settlement and therefore compression will vary according to the type of insitu material i.e. Clayey or sandy Made Ground), the depth of this material and the loading placed upon it by the material used for the restoration scheme. The deepest in-situ waste deposits will receive the lowest relative loading of restoration materials.

4.3.3 Settlement in the sand/gravel in-situ waste deposits will be immediate during the placement of fill. Any potential gas within the pore spaces will be displaced and would simply vent to atmosphere and disperse, taking the shortest pathway which would be upwards through the fill. Settlement in the clayey soil in-situ waste deposits is expected to take approximately a year however the clayey soil deposits are unlikely to hold any significant quantity of gas therefore any potential displacement of gas would be negligible resulting in a negligible increase in flow.

4.3.4 The amount of gas present within the in-situ waste deposits is considered to be low. However to allow the estimation of potential landfill gas generation through loading of the in-situ waste deposits the area of Runfold Central Area (60,000 m^2) has been taken and multiplied by the average expected settlement across the Site (300 mm) taken from the Settlement Report (Ref: 2445/R/08/03) Taking the maximum methane concentration recorded at the Site at 21.9%, the limited amount of settlement predicted and the fact that loading will be progressive throughout whole period of the restoration means that any methane gas flow is considered to be negligible.

4.3.5 It is considered despite the overly conservative landfill gas generation calculation the Site is unlikely to pose any risk to sensitive receptors due to the low quantity of gas in the in-situ waste deposits. The potential gas generated is below the threshold for any requirements for active gas control.

4.3.6 The ground gas risk assessment conducted by TerraConsult in 2010, determined that Characteristic Situation 4 (CS4) ground gas conditions apply to the site due to elevated methane and associated flow rates[3]. Based on the 2019 gas data the Gas Screening Value (GSV) when using the maximum gas well concentration of 21.9% and the maximum gas well flow rate of 0.2 litres/hour is 0.048 litres/hour. Using this GSV the Site would be considered Characteristic Situation 1 (CS1) very low risk based solely on GSV or Characteristic Situation 2 (CS2) low risk when considering the methane is typically above 1%.

[3] Wilson *et al.* (CIRIA C665, December 2007) *"Assessing Risks Posed by Hazardous Ground Gases for Buildings."*

4.4 Risks to the Environment and Human Health

Landfill Gas Emissions.

4.4.1 The data recorded from the similar sites indicates that the gas volumes are a very conservative estimate of landfill gas production representing a worst-case scenario. It is likely that gas production has rapidly declined to a level where Runfold Central Area may fulfil the criteria for permit surrender (as set out in Environment Agency document Ref 5.02: *The Surrender of Permits for the Permanent Deposit of Waste. September 2012*).

4.4.2 The amount of landfill gas considered to be liberated as a result of loading is estimated to be very low. As detailed in Section 4.3 any gas within the sandy in-situ waste deposits is likely to be liberated immediately and will vent and disperse via the shortest pathway which will be upward through the placed soils. It is considered that the pressure change will equilibrate quickly. Gas within the clayey in-situ waste deposits is considered to be very low to negligible as it is considered highly unlikely there will be any significant quantity of gas within the clay. The amount of landfill gas reaching any of the potentially sensitive receptors is unlikely to be significant as Runfold Central Area is considered to produce negligible amounts of landfill gas.

4.4.3 The closest domestic dwellings and the hotel are <50 m distance from the northern edge of the site. Guilford Road runs between the domestic dwellings and the site. Based on the negligible amount of gas production it is considered that the predicted likely concentrations of surface emissions at the site boundary will be negligible. It is concluded that landfill gas from the Central Area does not pose a significant risk to the surrounding environment specifically the receptors identified in Section 3.5.

Atmospheric Dispersion and Odour

4.4.4 The negligible volumes of landfill gas produced are not considered to give rise to any significant contribution to the effects of global warming or ozone depletion. Assessment of the potential for an odour nuisance is more subjective. Due to the nature of the waste types to be deposited comprising inert material with low biodegradable content odour generation will be negligible as they will not contain materials or compounds that are likely to give risk to odour.

Sub-Surface Lateral Migration and Vegetation Stress

4.4.5 Sub-surface landfill gas migration beyond the boundary of a site can give rise to a number of potential risks, including explosion, asphyxiation, toxicity, and vegetation damage. Should the fugitive gas then be liberated to atmosphere, there are the additional risks of odour nuisance and contributions to global warming. Lateral migration has not been considered as a significant risk due to the negligible gas production estimated for Runfold Central Area however the Site is located within an area of historic landfilling. The Site has partial vegetative cover from natural regeneration, particularly on the flanks. There is no vegetative stress evident within the Central Area.

Landfill Gas Completion Criteria

4.4.6 Gas production rates in Runfold Central Area will be insufficient to support any active extraction or treatment.

Residual Gas Potential

4.4.7 A site's potential for future gas generation can be assessed via an analysis of the solid wastes remaining in the landform, with the results expressed as the biological methane potential (BMP). However due to the type of waste to be deposited in Runfold Central Area the biological methane potential is negligible.

Gas Concentrations and Flow Rates

4.4.8 Environment Agency guidance document 'Landfill (EPR 5.02) and other permanent deposits of waste; How to surrender your environmental permit (version 2, 13th December 2012) provides criteria for assessing landfill completion based upon the results of monitoring of gas concentrations or flow rates. This gives three scenarios when the landfill gas surrender criteria for landfill can be met.

Scenario 1:
in-waste gas methane concentration of ≤1.5 % v/v and carbon dioxide of ≤5 % v/v (minimum 12 data sets over 2 consecutive years)

Scenario 2:
in-waste gas methane concentration of ≤5 % v/v and carbon dioxide of ≤10 % v/v (minimum 12 data sets over 2 consecutive years) and Qhgs* is <0.7 l/hr and the flow in any borehole is ≤ 70 l/hr

Scenario 3
in-waste gas methane concentration of ≥5 % v/v and carbon dioxide of ≥10 % v/v (minimum 24 data sets over 2 consecutive years) and Qhgs* is <0.7 l/hr and the flow in any borehole is ≤ 70 l/hr
*Qhgs: Site Characteristic hazardous gas flow rates as defined by BS 8485:2015.

4.4.9 It is proposed that such assessment criteria are considered in a site-specific context within a Completion Risk Assessment for the site which will be submitted to the Agency at an appropriate point in the site's lifecycle.

4.5 Summary

4.5.1 The in-situ deposits have some limited potential to generate landfill gas however due to the time since deposit it is likely the gas source term is in decline. There are other sources of elevated methane or carbon dioxide in the immediate vicinity of the Site associated with the wider historic landfilling activities. The landfills benefit from varying levels of containment from older 'dilute-and-attenuate' methods to fully engineered cells and therefore are likely to be a source of migrating gas. However individual landfill controls including extraction are in operation in the surrounding Sites and the regulatory controls imposed in the respective Permits include management and monitoring of the landfill gas.

5. SOIL GAS MANAGEMENT PLAN

5.1 Control Measures

5.1.1 Based on the qualitative assessment the predicted volume of landfill gas likely to be liberated from the in-situ waste deposits is considered to be negligible. Any potential liberated landfill gas from the sandy in-situ waste deposits is likely to be vented immediately upward. The predicted volume of landfill gas produced by the site is considered negligible and significantly lower than the indicative threshold level of 50 m^3hr^{-1} suggested by Agency guidance where active gas control and treatment (flaring and utilisation) would be required. The nature of the in-situ waste deposits (low permeability soils and construction and demolition wastes) and the fact the Site was operated under the principle of dilute and disperse will also make it very difficult to extract gas from the site as it is not contained.

5.1.2 The main control on the production on gas is by ensuring that the waste received at the site contains low proportions of biodegradable materials. Additional controls on the deposit of wastes that contain odorous substances will prevent any potential odour nuisance. These would include exclusion of such wastes or rapid covering during placement.

5.1.3 Notwithstanding this, measures will be implemented to ensure that the landfill gas production is monitored to confirm the basis of the qualitative risk model. As a precautionary measure, the site design provides for the installation of retro-drilled in-waste gas monitoring points and additional gas monitoring boreholes around the perimeter of the site.

5.2 Monitoring and Sampling Plan

5.2.1 This gas risk assessment has concluded that the risk associated with landfill gas emissions from the existing site, during the recovery activity works and on their completion is likely to be low due to the:

- age of the existing waste deposits
- their inherent low gas generation potential as inert waste (TOC <3%)
- low quantities of gas currently being produced as demonstrated by in-waste gas monitoring
- inert nature of the wastes to be used in the restoration activity
- negligible impact of loading exiting waste deposits in terms of gas displacement; and,
- low sensitivity receptors surrounding the majority of the site (landfills with some human occupation) or lack of pathway to the more distant receptors.

5.2.2 A programme of landfill gas monitoring will be undertaken in, adjacent to and beneath the existing waste deposits. The locations of internal and external landfill gas monitoring points are shown on the accompanying Site Investigation Plan drawing ref. 2445/5/007. In-waste gas monitoring points will also be retro-drilled into the waste used for the restoration activity on completion.. The depth of this material will determine the practicability of installing an effective gas monitoring borehole. The restoration material will need to be at least 4 m deep to account for an effective surface seal above the response zone. This will limit the location of any restoration fill monitoring points to the central portion of the current void and potentially in the conveyor cutting.

5.2.3 All of the gas monitoring boreholes installed in January 2019 are in or directly beneath the waste and will likely show the influence of landfill gas. The existing waste deposits will be

sampled using the 5 boreholes installed in January 2019 around the north, west and southern perimeter of the site. The in-waste gas monitoring regime is detailed in Table 5. Three existing points external to the waste deposits have been added to the restoration gas monitoring regime. Two of the January 2019 boreholes were installed with deeper installations to sample the underlying groundwater. Subject to the level of saturation of the natural ground, ground gas can potentially be measured in the deeper boreholes. The external gas monitoring regime is detailed in Table 6.

Table 5. In-Waste Gas Monitoring Regime

Monitoring Point	Monitoring Frequency (on installation)		Parameter
	Pre-Operational / Operational	Post-Operational	
BH18/01 (Shallow), BH18/02, BH18/03 (Shallow), BH18/04 and BH18/05 Retro-installed wells installed into restoration infill	Monthly	Monthly (for 24 months then quarterly)	Methane, Carbon Dioxide, Oxygen and Gas Balance (% v/v), Carbon Monoxide, Hydrogen Sulphide (ppm), Gas Flow (l/hr), Relative pressure (mBar), Atmospheric Pressure (mBar) Water level and base level (mbgl as mAOD)

Table 6. External Gas Monitoring Regime

Monitoring Point	Monitoring Frequency		Parameter
	Pre-Operational Operational	Post-Operational	
BH701, BH705, IVC107, BH18/01 (Sub waste) and BH18/03 (Sub waste)	Monthly	Monthly (for 24 months then quarterly)	Methane, Carbon Dioxide, Oxygen and Gas Balance (% v/v), Carbon Monoxide, Hydrogen Sulphide (ppm), Gas Flow (l/hr), Relative pressure (mBar), Atmospheric Pressure (mBar) Water level and base level (mbgl as mAOD)

5.3 Landfill Gas Assessment Criteria

5.3.1 Environmental permit referenced EPR/SP3131GC/V003 for the Area A and C Landfill Site contains a methane compliance limit of 1 %v/v for perimeter borehole BH701 and BH705 (in addition to other locations). A review of gas monitoring data for the period January 2018 to June 2019 indicates this compliance limit has not been exceeded. It is not proposed to amend any existing compliance limits or assessment levels as part of this proposal.

5.3.2 A limited period of gas monitoring was carried out at IVC107 which is the only remaining borehole from the 2010 site investigation. No methane was detected and carbon dioxide was recorded up to 8.1 %v/v. Given the borehole's proximity to the existing waste deposits it is reasonable to assume the ground gas in the vicinity will be influenced by the landfills. As with BH18/01 and BH18/03, this borehole is located well within the confines of the Central Area and close to unlined waste deposits. It would be impractical to set methane and carbon dioxide compliance limits at these points as they do not represent conditions at the perimeter of the site or adjacent to sensitive receptors. It is therefore proposed to carry out ongoing trend analysis of gas concentrations and flow at these locations to detect significant changes to the ground gas regime.

5.3.3 In-waste gas monitoring data indicates low quantities of landfill gas are being produced by the existing waste deposits. The restoration fill material will consist of inert waste and it also is unlikely to produce significant quantities of landfill gas. It is not proposed to set

compliance limits for the existing in-waste monitoring boreholes but monitor gas quality and flow trends as the restoration activity progresses. On completion of the infill programme, the Operator will install monitoring boreholes into the restoration fill material. This will be sampled in accordance with Table 4 above. It is expected that the quantities of gas produced by this material will be sufficiently low to meet the permit surrender criteria for permanent deposits of waste. The programme of monitoring instigated (24 monthly samples at each point) will serve to collect the required data to support this aspect of the permit surrender process. The assessment criteria will be as detailed in Environment Agency Guidance[4].

5.4 Contingency Action Plan

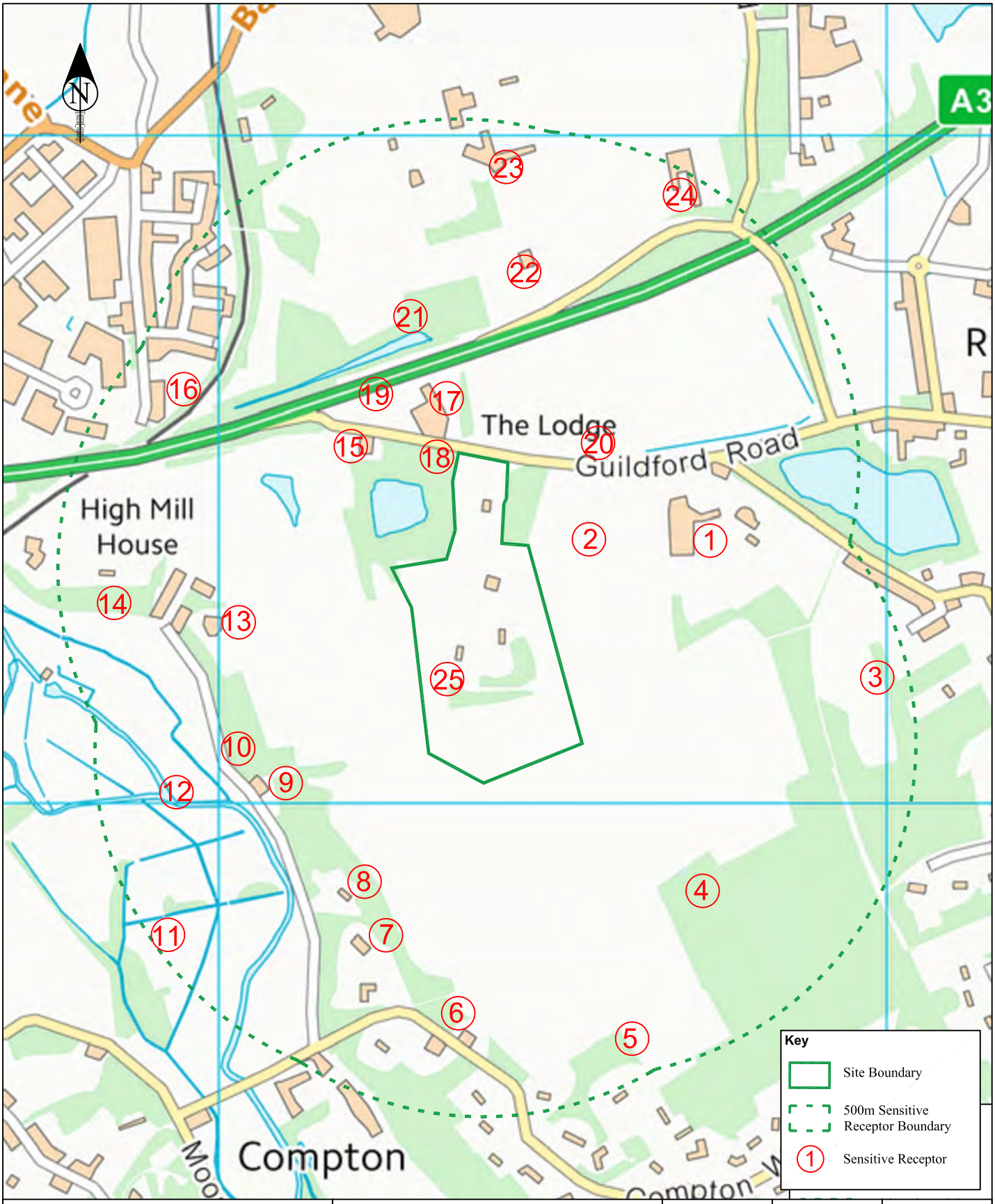
5.4.1 Exceedance of the existing permit compliance limits will initiate a response from the Operator in accordance with Section 4 of the Runfold Area A & C Landfill Site Monitoring Management Plan (December 2016) which is replicated in Table 7. This plan has been deemed fit for purpose for the management of significantly larger non-hazardous waste landfill sites and is considered appropriate to apply to the lower risk Central Area restoration scheme.

Table 7 External Gas Contingency Action Plan

Contingency Action	Response Time	Responsibility
Internally Record (exceedance of methane action level and/or carbon dioxide action level) **Inform the Agency** (exceedance of methane compliance limit or in the event of a moderate risk being calculated only)	24 hours	Environment Assistant to inform Site Manager or SHEQ Advisor to record
Confirm calibration and QA procedures for equipment used	48 hours	Environment Assistant
Repeat monitoring in breached point and those adjacent to it	1 week	Environment Assistant
Initiate measures to control migration in accordance with Gas Management Plan	2 weeks	Site Manager
Review the risk and agree further actions with the Agency	1 month	Site Manager/SHEQ Advisor/Manager

[4] *Landfill (EPR 5.02) and other permanent deposits of waste: how to surrender your environmental permit*

DRAWINGS



TerraConsult

Bold Business Centre, Bold Lane, Sutton, St Helens WA9 4TX

Client

suez environnement

Site

Runfold Central Area Restoration

Title

Sensitive Receptor Plan

Scale	NTS	@ A4
Drawing No.	2445.005.01	
Rev	Date	Description
File	2445.005.01 Sensitive Receptor Plan.dwg	
Date	11/18	Engineer EG
Drawn	KMB	Checked PR

Key

- 2019 Monitoring Borehole locations
- IVC - Original Borehole Locations
- Retained Monitoring Locations
- 2019 Trial Pit Locations

TerraConsult

Bold Business Centre, Bold Lane, Sutton, St Helens WA9 4TX

Client: SUEZ Recycling and recovery UK

Site: **Runfold Landfill Site**

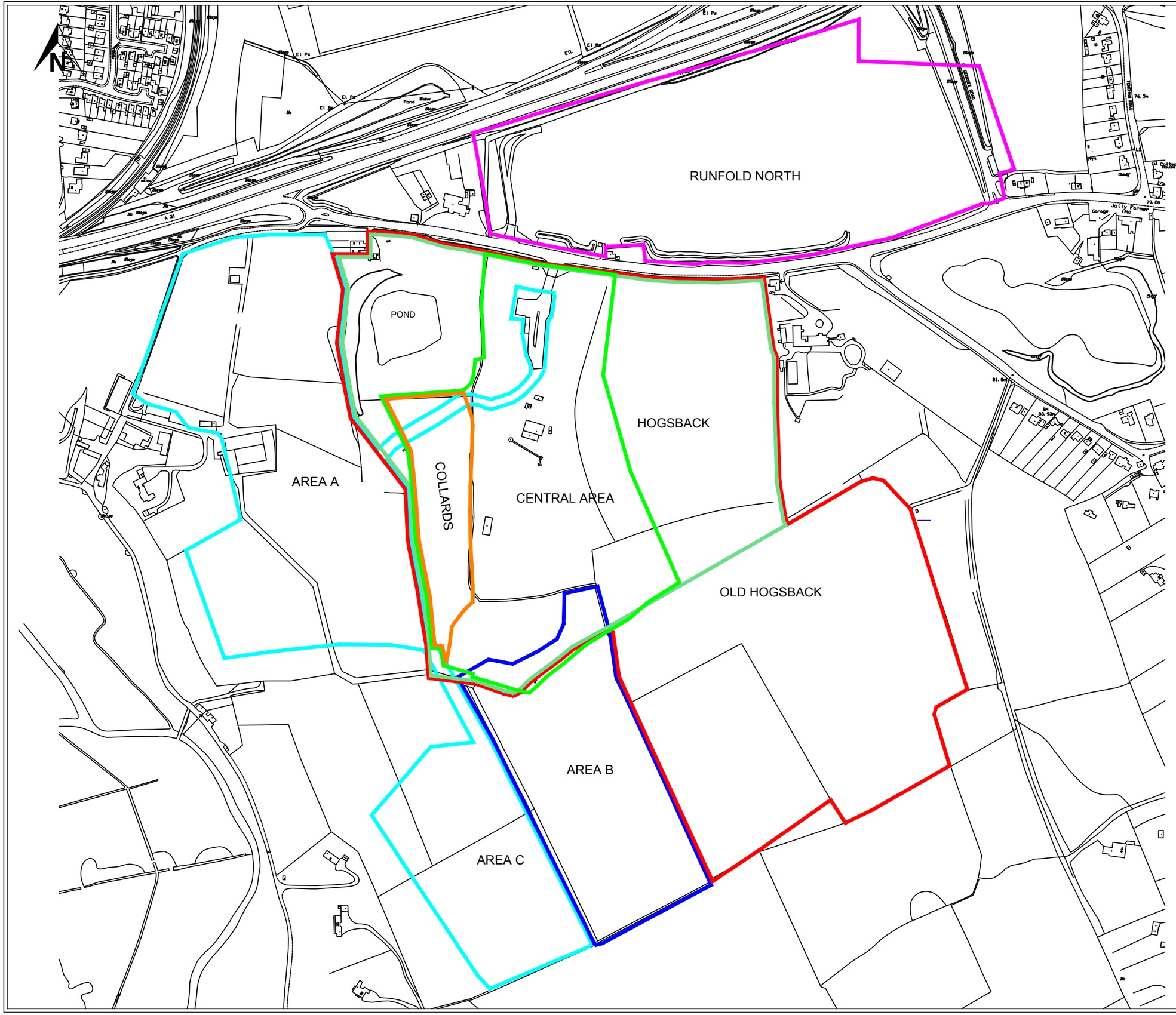
Title: **Site Investigation Plan**

Scale	NTS	@ A3
Drawing No.	2445/5/007	

Rev	Date	Description
A	02/19	Stockpile Sample Locations Adde
B	04/19	As Built Survey

File	24455004 Proposed SI Plan		
Date	04/19	Engineer	PR
Drawn	OS	Checked	PR

\\server\data\Jobs\2445- SITA -Runfold ROMP\8 - Drawings\Drawings\Series 5 - Recovery Permit



Notes

- Area A & C Permit Boundary
- Proposed Central Area Boundary
- Old Hogsback Permit Boundary
- Runfold North Permit Boundary
- Area B Landfill Boundary
- Former Collards Permit Boundary
- Hogsback Landfill Area

TerraConsult

Bold Business Centre, Bold Lane, Sutton, St Helens WA9 4TX

Client: SUEZ Recycling and recovery UK

Site
Runfold Central Area

Title
Adjacent Permit Boundaries

Scale	1:4,000	@ A3
Drawing No.	2445/8/001	
Rev	Date	Description
File	2445.8.001 Boundary Layout Plan	
Date	01/20	Engineer GH
Drawn	PP GH	Checked PR