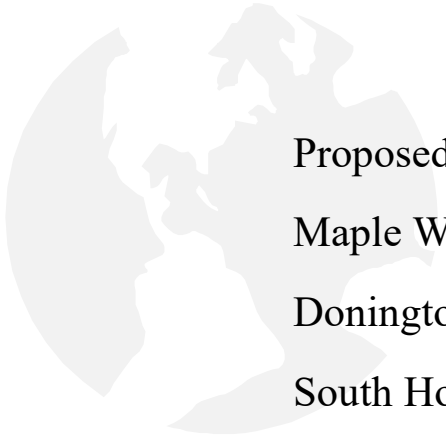


T. L. P. Ground Investigations.

Phase 1 Desk Study



Proposed Residential Development,
Maple Way,
Donington,
South Holland,
Lincolnshire.

6th December 2021.

T. L. P. Ground Investigations.

Proposed Residential Development, Maple Way, Donington, South Holland, Lincolnshire.

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T. L. P. Ground Investigations Ltd.

Phase 1 Desk Study

Site: Proposed Residential Development, Maple Way, Donington, South Holland, Lincolnshire.

Client: Brown Builders Ltd.

Contact: Adam Mayer.

Date: 06.12. 2021.

1.0 INTRODUCTION

1.1 General

Following the instructions of Brown Builders Ltd., an environmental assessment was carried out at a site situated east of Maple Way, Donington, Lincolnshire where a new residential housing development is proposed. The brief for the investigation was to undertake a preliminary 'Phase 1 Desk Study' in general accordance with the Model procedures for the Management of Land Contamination (CLR11), the relevant planning practice guidance (Land Affected by Contamination) and the Development of Land Affected by Contamination (Yorkshire and Lincolnshire Pollution Advisory Group) and the requirements of BS10175(2011)-Code of Practice for the Investigation of Potentially Contaminated Sites.

The objective of the study was to:-

- Provide information on the past activities at the site and in the immediate surrounding area which may have impacted on its contamination status.
- Identify potential sources of contamination, likely pathways and receptors of such contamination and any other features which may have constraints on the proposed development.
- Provide information on the geology, hydrogeology and hydrology of the site.
- To develop an initial conceptual site model of the nature and extent of potential contamination.
- To provide recommendations for a Phase 2 intrusive site investigation, if it was considered appropriate.

The **Desk Study** involved: -

- A walkover inspection and general visual appraisal of the site.

- An examination of archive TLP sources and contemporary / historical Ordnance Survey Maps.
- A review of other surveys undertaken in the near vicinity, together with data published by the British Geological Survey.
- A review of the site's, hydrology and hydrogeology.
- An environmental data search, using information held in databases of the Environment Agency, British Geological Survey, Ordnance Survey, English Nature and The Coal Authority etc.

1.2 Current & Proposed Site Use

The site of the proposed new residential development currently comprises a large residential garden area. The site is split into two areas to the north and south of an existing detached residential dwelling to the east of Maple Way.

The proposed new development will involve the construction of seven new residential bungalows. Six located to the south of the existing detached dwelling and one to the north on an area currently in use as a vegetable garden.

2.0 SITE DESCRIPTION

The site is located on land to the east of Maple Way, Donington, South Holland, Lincolnshire. The proposed development site has an approximate area of 0.55 Ha and is centred at National Grid Reference 520917, 335457. The site is currently accessible through the driveway at the eastern end of Maple Way, which is secured with an electrically operated gate, or from Goxhill Avenue (a side road off High Street), which leads directly to the northern part of the site.

The area of proposed development is split into two separate areas. The larger southern part of the site where six, detached bungalows are to be constructed and a smaller area of ground in the northern part of the site where a single detached bungalow is proposed.

Southern Site Area

The southern part of the site comprises a large open lawn area, which has, for many years been used as a domestic garden. In the north western corner of the lawn is a small, pre-fabricated electricity sub-station, situated close to the site entrance on Maple Way. A number of semi-mature tree specimens are located along the eastern boundary of the site, the majority of which are beyond the boundary fence. A small number of semi-mature trees are also situated along the southern site boundary. The southern garden is secured by a collection of timber fences and is located within a predominantly residential setting with residential properties located to the south and west of the site. Narrow footpaths extend around the southern and eastern site boundaries and to the east is a recreational park and play area.

Northern Site Area

The northern and southern areas of the site area separated by an existing detached, two-storey dwelling. To the north of the house is a parking area surfaced with gravel chippings and to the north is a medium sized older 'out building' of traditional brick construction with a pitched roof surfaced with clay tiles which is to be demolished in order to make way for the proposed new residential development. To the north of the outbuilding is a medium sized vegetable garden and poly tunnel. This part of the garden can be accessed via a gravel track leading southwards from Goxhill Avenue.

At the time of the walkover inspection of the site and the immediate surrounding areas, no staining was observed on the site surface and there was no olfactory evidence of contamination.

3.0 SITE HISTORY

In order to help establish whether any previous uses of the site or activities in the surrounding area may have impacted on the contamination status of the site, historical and contemporary Ordnance Survey Maps of the area have been consulted ranging from circa 1887 to 2021.

In the earliest complete extract from 1889, the sites of proposed development form part of an estate or small holding associated with a collection four medium sized structures present between the two areas of the proposed development. At this time the site appears to be accessible from a track leading northwards from Town Dam Lane. The extract depicts the southern part of the site predominantly comprising an orchard and the northern part as undeveloped, apart from a track leading northwards towards a small Gas Works. Apart from the Gas Works located a short distance to the north of the 'Northern Site', the only other commercial land uses in the areas surrounding the site are a number of Breweries, Windmill, Police Station and Inns. The remaining areas surrounding the site comprise agricultural land and orchards. The extract depicts a narrow water courses extending along the eastern and parts of the western and southern boundaries of the site. This drainage channel is interconnected to the drainage channels in the areas surrounding the site. A small pond is indicated in the adjacent field to the west with other small ponds noted further afield. A larger pond is indicated approximately 200m east of the site and this is still present today.

In the extracts from 1905 one of the smaller structures between the two sites is shown to have been removed. Otherwise the areas of proposed development remain unchanged. The Windmill to the east is depicted as 'disused'.

In the next available (partial) extract from 1938, the central and northern part of the site remains unchanged. Although the structures are still present, the former Gas Works located a short distance north of the 'Northern site' is not labelled as such. Areas to the east and west of the site remain largely agricultural in nature.

In the partial extract from 1948, the southern part of the site is still depicted as an 'orchard'. The extract indicates the presence of new residential housing to the southeast and southwest of the site. In the wider area beyond 250m to the southeast, the Donington Brick and Tile Works is depicted.

In the extract from 1956, no significant changes are noted at the site. A new, elongated outbuilding is depicted in the northern part of the proposed development. A small structure is also indicated a short distance to the southwest of the southwest corner of the site.

In the partial extract from 1966, the site is not depicted. More substantial residential development is indicated to the southeast of the site, a store is indicated to the northeast and a Primary School to the southeast.

In the next available extract from 1973, the southern part of the site is no longer depicted as an 'orchard' and appears as an open garden area. Between the two sites, new structures are indicated, in a square arrangement. The former small pond, once situated to the west of the site is no longer indicated. In the wider area, redevelopment of the structures along Goxhill Avenue is depicted and the structures associated with the former Gas Works appear to have been removed. Slightly further to the north of the site, an electricity sub-station is indicated. A footpath is now shown extending around the southern and eastern site boundaries and a new residential development is indicated to the southwest.

In the extract from 1981, the drain running along parts of the southern boundary is no longer indicated. No other significant changes are noted at the site. Further residential development is indicated to the southeast and southwest / west of the site. A Telephone Exchange is now depicted along High Street to the north of the site.

The extract from 1988, no significant changes are noted on the proposed development sites. The collection of structures in the central part of the site have now been removed and replaced with a single, larger dwelling. Further residential development is indicated to the east and west of the

site. To the northeast of the site, the former store has been significantly enlarged and is now designated as a Depot. Drains are no longer depicted along the eastern or western site boundaries. In the extract from 2005, no significant changes are noted at the site or in the immediate surrounding areas.

In the aerial photographs from 1999 onwards (Google earth images), the site remains in use as a domestic garden with the northern part of the site being used as a vegetable garden with poly tunnel. On the extract from 2007, a small electricity sub-station is noted in the western part of the site adjacent to Maple Way. The area immediately to the east of the site has been remodelled into a public park and children's playground with a network of footpaths amongst green space.

In the aerial photograph from 2015, a new detached residential dwelling is depicted immediately to the north of the site. On the aerial photograph from 2018, a new driveway is indicated in the southern part of the site leading onto the site from the eastern end of Maple Way. No further changes are noted in the final images from 2018 to 2020.

4.0 GEOLOGY HYDROLOGY AND HYDROGEOLOGY

Maps published by British Geological Survey indicate that the superficial deposits beneath the site would comprise Tidal Flat Deposits of clay and silt. The solid geology beneath the site is represented by the Oxford Clay Formation, which is of Callovian age. The maximum permeability of the superficial deposits is designated as 'low' and that of the underlying bedrock also as 'low'. No geological faults or linear features have been identified within 250m of the site.

The Groundsure data report indicates that the only surface ground workings within 250m of the site is a pond situated 184m to 191m east of the site, which is still present. The historical extracts also indicate that a small pond was once situated a short distance to the west of the site. Historical extracts indicate that this pond was subsequently in-filled during the 1970's. In the wider areas, the Donington Brick & Tile Works situated 376m southeast of the site was also excavated for clay and shale.

The superficial deposits overlying the site are designated as an Unproductive aquifer. The underlying solid / bedrock geology is also designated as an Unproductive Aquifer. These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

According to the EA, there are no groundwater abstractions within 2000m of the study site. No potable water abstractions have been identified within 2000m of the site. The nearest surface water abstraction is situated 1759m southeast of the site where water is obtained from the Marlode Drain for direct spray irrigation. The site is not situated within 500m of a groundwater source protection zone (SPZ).

The Groundsure report indicates 8 No. OS MasterMap Water Network Entries within 500m of the study site. The nearest of these is described as an inland river not influenced by normal tidal action, situated 21m east of the site. The site is located within the Black Sluice IDB WFD Surface Water body. In 2016, this stretch received an overall quality rating of 'moderate'.

According to the EA RoFRaS database, the site lies within an area with a 'medium' flood risk from rivers and the sea. There are no flood defences located within 250m of the study site and the site is not located within an area benefitting from flood defences. The site is not situated within 250m of an area used for flood storage.

According to the Ambient Risk Analytics, the site lies in an area with a '1 in 100 year 0.10m-0.30m' risk to surface water flooding and a 'negligible' potential to be susceptible to groundwater flooding.

5.0 ENVIRONMENTAL SEARCHES

Information gathered from environmental searches is contained within the enclosed Groundsure report produced by Emapsite, Report No EMS-742978_966777. The salient details of the report are as follows: -

5.1 Environmental Permits, Incidents and Registers

There are four records of Part A2 and Part B Licensed Pollutant Releases identified for two locations within 500m. The nearest of these is situated 146m east of the site allowing timber manufacture. No enforcements have been notified on the permit.

There are three licensed discharge consents located within 500m of the site. The nearest of these, was located 45m east of the site at Mill Lane Factory allowing surface water to be discharged into an unknown tributary. All three entries are recorded as being revoked.

There is a record of a List 2 dangerous substance site located 125m southeast of the site. This allows the use of pH.

There is a record of a pollution incident, which occurred at a distance of 239m north of the site on 3.04.2002. The incident involved the release of smoke. The incident is deemed to have had no impact to land or water and minor impact to air.

5.2 Landfill and other Waste Sites

There are no records of active or historical landfill sites, treatment or transfer sites located within 500m of the study site.

5.3 Current & Historical Land Uses

There are only 13 No. current potentially contaminative industrial sites situated within 250m of the study site. The nearest of these is an electricity sub-station situated 105m north of the site (although one has also been identified on site). A fuel filling station operated by Murco was situated 377m southeast of the site but is now designated as obsolete.

There are no records of high pressure gas transmission pipelines or high voltage underground electricity transmission cables within 500m of the study site.

There are 71 No. historical potentially contaminative industrial sites situated within 250m of the study site. Within 100m of the site, these include Gas Works on site and 17m north, Gasometer and unspecified tank 38m north, unspecified tank 56m east and an electricity Sub-Station 100m north. Of these the former Gas Works is deemed to be the most significant.

5.4 Designated Environmentally Sensitive Areas

No environmentally sensitive sites are situated within 2000m of the site. The site is not located within an existing nitrate vulnerable zone.

5.5 Natural Hazards Findings

According to the Groundsure report, the site lies within an area with a moderate hazard rating from subsidence caused by running sand, compressible deposits, a low hazard rating from subsidence caused by shrink swell clay, a very low hazard rating from subsidence caused by landslides and a negligible hazard rating from subsidence caused by collapsible deposits and soluble rocks.

The site is not located within an area that may have been affected by Coal Mining. The site is not located within 75m of a brine affected area.

The HPA indicates that the site is not located in a Radon Affected Area as less than 1% of homes, are anticipated to be above the Action Level for homes of 200Bqm⁻³. The Groundsure

Report indicates that no radon protective measures are necessary at the site for buildings or extensions to existing ones as described in publication BR211 by the Building Research Establishment.

More detailed information on environmental issues and contemporary trade directory entries can be obtained by consulting the enclosed Groundsure Report.

5.6 Land Use Summary

- According to historical mapping, from the end of the nineteenth century the site was already in use as a possible small holding with a medium sized orchard occupying the southern part of the site. Narrow water courses flowed around the southern, eastern and part of the western site boundaries. The structures located between the two areas of proposed development were modified throughout the 20th Century and during the 1980's; these were demolished and replaced with a detached residential dwelling. During the 1950's an elongated out building was added to the northern development area. In recent years a small electricity sub-station has been added to the site adjacent to the entrance onto Maple Way.
- Historically, the areas surrounding the site were used primarily for agricultural purposes. However, even at the end of the 19th Century, a small Gas Works with small gasometer was present just to the north of the smaller 'Northern Site' site. Further north a number of commercial premises were also present along the main High Street including breweries, Inns and a Police Station. During the 1930's, the Gas Works appears to have been decommissioned. During the latter half of the 20th Century, the areas surrounding the site were primarily developed for residential housing with a store / depot located to the east and school to the south. An area of recreational park is now located to the east of the site.
- The shallow drainage ditches that once flowed along the site boundaries are no longer present and the former pond located a short distance to the west was overbuilt with residential housing. The larger pond located approximately 200m east of the site is still present today.

6.0 PRELIMINARY CONCEPTUAL SITE MODEL

Guidance published by the Department of the Environment, Transport and Regions (DETR Circular 02/2000) indicates that before the Local Authority can make a judgement that any land appears to be 'contaminated land', on the basis 'that significant harm is being caused, or there is a significant possibility of such harm being caused', the authority must identify a significant pollution linkage. This means that each of the following has been identified:-

- a contaminant (Source)
- a relevant receptor and
- a pathway

Regarding this relationship (source-pathway-receptor SPR), if any of the three elements are not present, there is no risk and therefore land cannot be classified as statutory 'contaminated land'.

With respect to 'controlled waters', before determining that pollution of controlled waters is being, or is likely to be, caused, the Local Authority should be satisfied that a substance is continuing to enter controlled waters or is likely to enter controlled waters.

6.1 Potential Sources of Contamination

- From an examination of the sites history, the main potential sources of 'on site' contamination would appear to be limited to minor contamination possibly associated

with the former use of the site as agricultural land and its use as a residential garden. It is also possible that some minor contamination was deposited on the site during the construction / demolition of the structures that have occupied the area between the two development sites, the activities which may have taken place elongated structure in the northern part of the site and the small electricity sub-station in the western part of the site. Burning processes may also have taken place on certain parts of the site. A number of drainage ditches have flowed along various site boundaries in the historical past, which may represent potential sources of mobile contamination.

- The areas surrounding the site have been used predominantly as agricultural land / orchards. However the small Gas Works once located just to the north of the 'Northern site' may constitute a potential source of contamination that may have migrated onto this part of the site. A small pond, once situated a short distance to the west of the site was overbuilt with residential houses in the late 1980's and is not considered to be a credible source of harmful ground gas that could impact on the study site.
- The Groundsure Report identified shallow drainage ditches along the southern, eastern and western site boundaries with part of a drain passing through the southern part of the site. Whilst these are no longer present, given the predominantly agriculture nature of the land use in the surrounding area during their existence they are unlikely to have been a significant source of mobile contamination that could have impacted on the study site.
- Weathering of the natural geological stratum can occasionally cause enrichment of certain metals in the near surface strata, however, this is considered unlikely bearing in mind the information given in the 'Groundsure' report which in 'Section 20' (Estimated Background Soil Chemistry) shows very low anticipated levels of Arsenic, Cadmium, Chromium, Nickel and Lead.

Potential Contaminants

The potential contaminants that might be associated with the past uses of the site have been tabulated below:-

- Metals, metalloids and asbestos associated with the construction and demolition of structures which have occupied parts of the site and the possible presence of 'disturbed/made ground' that may be present over parts of the site surface. It is possible that some minor contamination may have been released from the structures located between the areas of proposed development. The possible migration of contamination from commercial activities that have taken place nearby, in particular the small Gas Works once located just to the north of the site.
- Polycyclic Aromatic Hydrocarbons (PAH's) derived from the incomplete combustion of organic materials, i.e. from bonfires or stubble burning that may have taken place at the site in the historical past.
- Possible Total Petroleum Hydrocarbon (TPH's) contamination emanating from accidental leaks or spillages from the use of agricultural equipment, plant and equipment.
- Possible release of PCB's associated with the small electricity sub-station in the western part of the site.

Table 1

Table 1 - Summarises the potential contaminative land uses on and in the vicinity of the site showing potential sources with associated contaminants.

Sources							
Sources Description	Contaminants Associated with Source						
	Metals	PAH	TPH/BTEX	Asbestos	PCB	Landfill Gas	TPH Vapours
<u>On Site</u>							
Contamination resulting from the use of the site as agricultural land and residential garden and the use of agricultural plant and equipment. Contamination that may have been generated through the construction and historical demolition of structures that occupy the site and the areas between the sites of proposed development. Possible contamination created during the installation of the electricity sub-station located on the site. Contamination that may have migrated onto the site from the drainage ditches that once flowed along the various site boundaries.	✓	✓	✓	✓	✓		✓
The possible presence of deposits of made ground that may exist beneath parts of the site surface.	✓	✓	✓	✓			✓
Burning processes that have taken place within the site boundaries.	✓	✓					
Residual contamination from natural weathering of geological strata.	✓						
<u>Off Site</u>							
Possible contamination that has migrated onto the site from the nearby commercial areas (Gas Works) and possible 'fall out' from construction and demolition of the structures that surround parts of the site (Residential).	✓	✓	✓	✓			✓
Contamination that may have migrated onto the site via the shallow water course, which once extended along the various site boundaries.	✓	✓					

Table 1 - Summarises the potential contaminative land uses on and in the vicinity of the site showing potential sources with associated contaminants.

Key for Table 1

Metals

Includes - Metals and metalloids (Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Arsenic, Boron, Selenium and inorganic chemicals such as Cyanide)

PAH

Includes – EA16 – Acenaphthene, Acenaphthylene, Anthracene, Benzo[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[g,h,i]perylene, Benzo[k]fluoranthene, Chrysene, Dibenzo[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, Naphthalene, Phenanthrene, Pyrene.

6.2 Potential Receptors

Potential receptors for any contamination at the site have been identified as: -

- Any shallow groundwater within the superficial deposits overlying the site.
- The Unproductive Aquifers underlying the site.
- The nearby drainage ditches which are interconnected to a network of shallow drainage channels in the nearby areas. Any nearby ponds / lagoons, drains or water courses situated in nearby areas are also considered to represent potential receptors.
- Ground workers involved in any redevelopment of the site.

- Flora and Fauna.
- Future occupiers of the site.
- The properties located adjacent to the site boundaries.
- The fabric of the structures to be constructed at the site.

6.3 Potential Pathways

- The historical shallow drainage ditches which once extended along the various site boundaries are considered to represent potential pathways via which soluble / dissolved contaminants could have migrated onto the site in the past.
- Any groundwater underlying the site may represent a pathway via which water-soluble contamination may migrate laterally or vertically.
- Highly permeable strata at shallow depth, which has little ability to attenuate diffuse source pollutants.
- Any drainage ditches, service conduits or land drains and any permeable natural deposits beneath the site may represent pathways via which contamination, if present, may be able to migrate.
- The trafficking of plant and machinery across the site in the historical past or during construction of the nearby new residential properties.
- Dermal absorption, ingestion and inhalation represent pathways via which ground workers during redevelopment works at the site and future occupiers, may become exposed to contaminated soil, groundwater, dust or vapours.

Table 2

Pathways		Receptors	
<u>Human Health</u>		<u>Human Health</u>	
Dermal Contact with soil	✓	End users and construction workers	✓
Ingestion of soil	✓	End users and construction workers	✓
Inhalation of Contaminated Dust and Harmful Gasses	✓	End users and construction workers	✓
Ingestion of site grown vegetables	✓	End users	✓
Ingestion of water from affected service pipes	✓	End users	✓
<u>Buildings</u>		<u>Buildings</u>	
Mobile water soluble sulphates	✓	Concrete foundations	✓
<u>Controlled Waters</u>		<u>Controlled Waters</u>	
Lateral and vertical migration	✓	Surface water receptors & shallow / deeper groundwater regime	✓
Infiltration	✓	Surface water receptors & shallow / deeper groundwater regime	✓

Table 2 - details the potential pathways with receptors identified for any contaminants that may be present in the ground at the site during and following the proposed development.

Preliminary Conceptual Site Model - CIRIA C552 Risk Assessment Matrix

Potential Source	Potential Pathway	Potential Receptor	Probability	Consequence	Risk Classification
Contamination resulting from the use of the site as agricultural land and residential garden and the use of agricultural plant and equipment. Contamination that may have been generated through the construction and historical demolition of structures that occupy the site and the areas between the sites of proposed development. Possible contamination created during the installation of the electricity sub-station located on the site. Contamination that may have migrated onto the site from the drainage ditches that once flowed along the various site boundaries. The possible presence of deposits of made ground that may exist beneath parts of the site surface. Burning processes that have taken place within the site boundaries. Residual contamination from natural weathering of geological strata. Possible contamination that has migrated onto the site from the nearby commercial areas (Gas Works) and possible ‘fall out’ from construction and demolition of the structures that surround parts of the site (Residential). Potential Contaminants Include – PAH, TPH, B-TX, metals, semi-metals, PCB, asbestos and TPH vapours.	Ingestion, inhalation (dust) and dermal contact	Construction Workers	Low likelihood	Medium	Moderate / Low - Previous uses of site suggest that there is limited potential for contamination to be present at the study site. Exposure to any contamination would be temporary. Risks could be mitigated by the use of appropriate PPE and good hygiene practices. Dust suppression techniques and covered wagons during earth works would also reduce the potential for the release of potentially contaminated airborne particulates. Chemical analysis of the near surface soils may be necessary to determine the nature and extent of any contamination in the near surface soils and establish the risk to ground / site-workers during development.
		End users	Low likelihood	Medium	Moderate / Low – Previous uses of site suggest that there is limited potential for contamination to be present at the study site. The proposed development is of residential nature which is considered to be the most sensitive land use. The proposed new dwelling will incorporate individual private garden areas where produce could be grown for human consumption and these will represent the most sensitive areas where future occupiers could potentially come into contact with the near surface soils. Chemical analysis of the near surface soils will be necessary to determine the nature and extent of any contamination and establish if any remediation measures are necessary to render the site suitable for the proposed residential end use.
	Migration of gas / vapours through voids into confined spaces	Construction Workers During Excavation	Low likelihood	Medium	Moderate / Low –The Groundsure Report has not identified any specific areas of potentially in-filled ground or landfill sites in the areas surrounding the site which could be considered to be of sufficient size to represent a credible source of harmful ground gas generation such as methane and carbon dioxide. The small in-filled pond to the west of the site is not considered of sufficient size to be considered a credible source of land gas generation also the area was redeveloped into residential housing during the 1980’s. It is considered likely that any residual risks posed by this feature were mitigated before the construction of the

					housing estate commenced. If hydrocarbons are identified within the near surface soils, then there could be a risk from hydrocarbon vapours emissions. Construction workers should be made aware of these risks and provided with appropriate PPE. Samples should be submitted for testing to quantify the risk.
		End users	Low likelihood	Medium	Moderate / Low –The Groundsure Report has not identified any specific areas of potentially in-filled ground or landfill sites in the areas surrounding the site which could be considered to be of sufficient size to represent a credible source of harmful ground gas generation such as methane and carbon dioxide. The small in-filled pond to the west of the site is not considered of sufficient size to be considered a credible source of land gas generation also the area was redeveloped into residential housing during the 1980's. It is considered likely that any residual risks posed by this feature were mitigated before the construction of the housing estate commenced. If hydrocarbons are identified within the near surface soils, then there could be a risk from hydrocarbon vapours emissions. This being the case, hydrocarbon vapour retarding barriers may need to be incorporated into any future buildings. Samples should be submitted for testing to quantify the risk and ascertain the need for any further monitoring.
	Migration of Radon into buildings	End users	Unlikely	Medium	Low – The site is not located within a radon affected area as less than 1% of properties within the specified search area recorded above the action level. The Groundsure report indicates that <u>no radon protection measures are required for new buildings or extensions to those already existing.</u>
	Plant uptake	Landscaping Plants	Low likelihood	Minor	Very Low – Previous uses of site suggest limited potential for contamination to be present. Grass, border plants and vegetables within landscaped and vegetable patch areas appear to be flourishing during the time of walkover survey. The private garden areas would represent the most sensitive areas of the proposed new development where end users could potentially come into contact with potentially contaminated soils.
	Chemical Attack	Water Supply Pipes	Low likelihood	Mild	Low – Previous uses of site suggest limited potential for contamination to be present at this

					site. Nevertheless, soil analysis is likely to be required by the local water company to determine the risk to potable water supply pipes (WIR Testing).
	Chemical Attack	Underground Structures	Low likelihood	Mild	Low – The potential for sulphate attack at this site has not been assessed. Testing is recommended.
	Vertical Migration	Groundwater in superficial deposits (Tidal Flat Deposits / Unproductive Aquifer)	Low Likelihood	Medium	Moderate / Low - Previous uses of site suggest limited potential for contamination to be present at this site. BGS records indicate that the near surface soils are likely to be represented by deposits of silt and clay which are unlikely to be highly permeable. These cohesive soils would be capable of attenuating diffuse source pollutants should contamination be revealed. The Oxford Clay is classified as an unproductive aquifer but is, nevertheless, likely to be protected from any stubborn diffuse source pollutants by the overlying low permeability silts and clays. The site is not located within 500m of a groundwater SPZ and no groundwater abstractions have been identified within 2000m of the site.
		Groundwater (Bedrock – Oxford Clay Formation Principal Aquifer)	Unlikely	Medium	Low - Previous uses of site suggest limited potential for contamination to be present at this site. BGS records indicate that the near surface soils are likely to be represented by deposits of silt and clay which are unlikely to be permeable. These cohesive soils would be capable of attenuating diffuse source pollutants should contamination be revealed. The Oxford Clay is classified as an unproductive aquifer but is, nevertheless, likely to be protected from any stubborn diffuse source pollutants by the overlying low permeability silts and clays. The site is not located within 500m of a groundwater SPZ and no groundwater abstractions have been identified within 2000m of the site.
	Lateral Migration in groundwater or surface water	Surface Water (Off Site Drainage)	Low likelihood	Medium	Moderate / Low – The Groundsure Report and onsite observations indicate that shallow drainage ditches were once present along several site boundaries and also passing through the southern part of the site. However, bearing in mind agricultural nature of the areas surrounding the site, these ditches are unlikely to represent conduits via which significant mobile contamination could have been transported on to or off the site. The nearest active surface water abstraction is situated 1759m southeast of the site where water is obtained from the Marlode Drain

					for direct spray irrigation. At such a distance this receptor is unlikely to be considered at risk from the study site.
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7.0 RISK OVERVIEW

The desk study and site observations have led to the conclusion that there is potential for minor contamination to be present at the site. From a review of the information gathered in this preliminary appraisal, it is considered that the site poses a ‘Moderate to Low’ environmental risk, i.e. it is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely than any such harm would be severe, or if any harm were to occur, it is likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine any liability.

8.0 RECOMMENDATIONS FOR FURTHER INVESTIGATION

- It is recommended that a limited exploratory ground investigation in the form of a Phase II Intrusive Survey is undertaken. The purpose of the investigation would be to obtain information on geotechnical and contamination issues to assist with the design and construction of the proposed commercial development and to identify whether mitigation measures or remediation is required to make the site suitable for its proposed ‘Residential’ end use.
- Information on contamination is also likely to be required as part of the planning process for the proposed development of the site. The contamination survey should provide analysis for contaminants likely to be associated with the historical uses of the site and activities in the immediate surrounding area. These would include metals, semi-metals and general contaminants as well as some characterized total petroleum hydrocarbons, BTEX contaminants, speciated poly-aromatic hydrocarbons (EPA16), asbestos and PCB’s.
- If the topsoil on site is being considered for reuse in the new development, then BS3882 compliance testing may be relevant to demonstrate its suitability subject to additional contamination criteria. If proven to be of sufficient quality and low contamination status it could have some material saving on the development.

If geotechnical information is required then it is recommended that the geotechnical and contaminated land investigations are combined to reduce costs associated with undertaking these works separately.

The objectives of the exploratory site investigation would be to:

- Confirm the stratigraphy beneath the site.
- Confirm the presence and depth of any shallow groundwater.
- Establish the relative permeability of the near surface stratum.
- Assess the contamination status of the near surface soils.
- Identify levels of TPH in the near surface soils / groundwater to ascertain the risk of potential TPH vapours.

- Revise the preliminary conceptual site model and the risks associated with any identified contamination.

An intrusive investigation should include the following:-

- A borehole sampling survey focusing on obtaining samples of the near surface natural soils and / or deposits of ‘made ground’ and (where possible) groundwater beneath the general site area. It is recommended that sampling covers the most sensitive areas of the site following redevelopment, i.e. any proposed landscaped areas where future users of the site are more likely to come into contact with potential contamination. Once the investigation has identified the nature of the deposits existing beneath the site, representative samples should be tested for an appropriate suite of contaminants to establish the nature and extent of any contamination. Samples of any groundwater encountered should be obtained and selected samples analysed for a similar range of contaminants as the soil samples.
- *In situ* and laboratory testing to identify any geotechnical restraints on the proposed development.

8.1 Other Considerations

There are several other areas of research beyond the scope of this report that may or may not be applicable to the site. These factors are generally identified within specific planning conditions and can include:

- **Archaeology** – Should the site be situated on or within an area of archaeological sensitivity, the advisor to the relevant local authority should be consulted.
- **Ecology** – There may be a requirement for a detailed ecological report, dependent on the type or size of the development.
- **Underground Services** – These should be fully investigated prior to any redevelopment.

TLP Ground Investigations Ltd

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Reviewed by S. P. Trattles

Ref. RT/BBL/MWD/12/2021

Site Location Plan

Residential Development, Maple Way, Donington



Site Location Plan

Residential Development, Maple Way, Donington



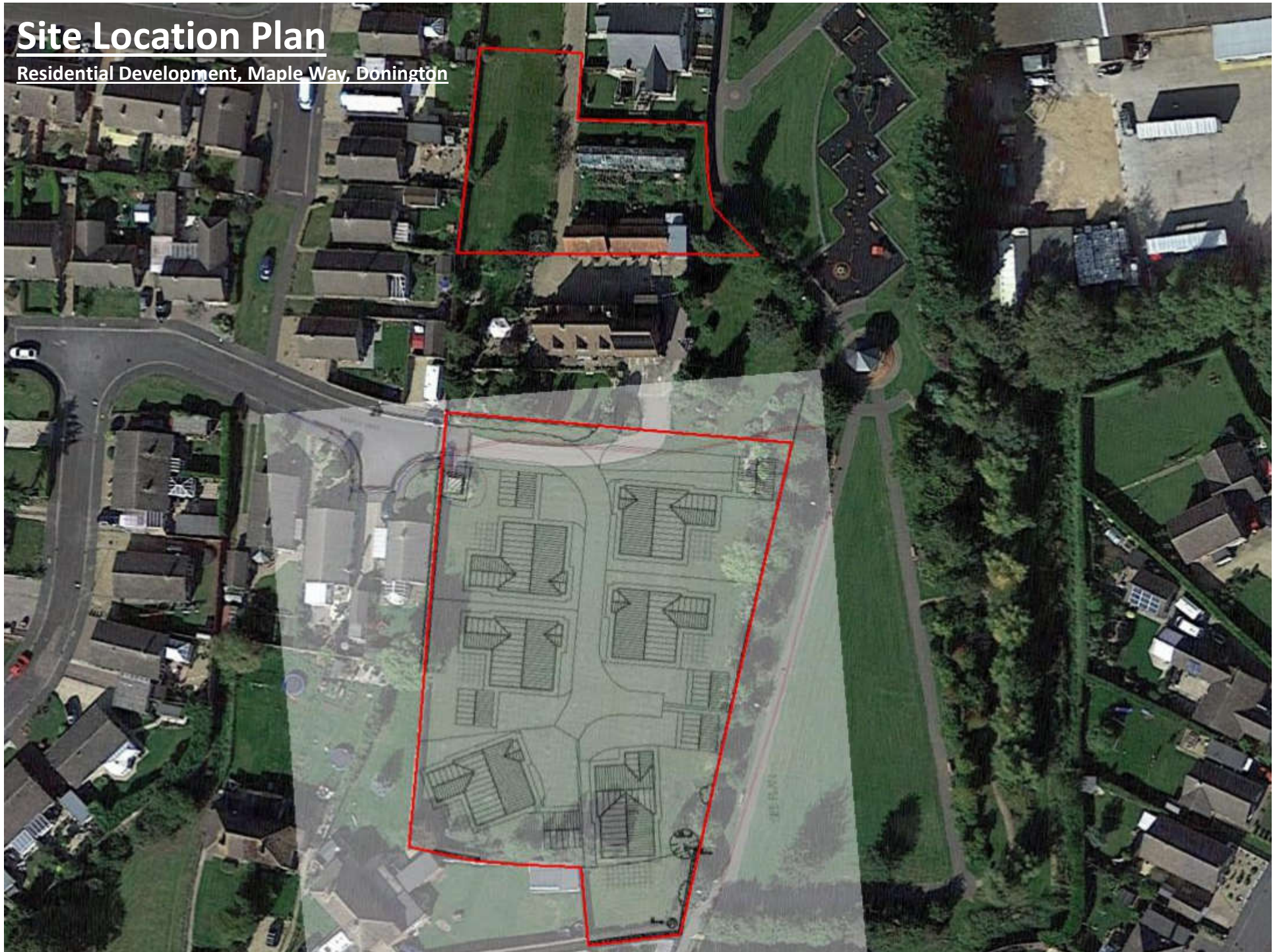
Site Location Plan

Residential Development, Maple Way, Donington



Site Location Plan

Residential Development, Maple Way, Donington



Photographic Log

Residential Development, Maple Way, Donington



View from northern part of larger southern site looking south



View from southern part of larger southern site looking north

Photographic Log

Residential Development, Maple Way, Donington



View from north eastern part of larger southern site looking north towards existing two storey house (to be retained)



Sub station in northwestern corner of larger southern site.



Older out-building to the north of the house. (to be demolished) – looking northwest

Photographic Log

Residential Development, Maple Way, Donington



View of smaller development site to the north behind the out-building (to be demolished) – looking southeast



View from western part of smaller (northern) development area - looking east