

Proposed Plant Based Protein Extraction Facility. Land south of Rangell Gate, Low Fulney, Spalding, Lincolnshire, PE12 6EW

Phase 1 Desk Study

Report on behalf of Naylor Farms

September 2021

Final Report

R21058

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EXECUTIVE SUMMARY

SITE INFORMATION & SETTING	**Purpose of this report**	Phase 1 Desk Study
	Client	Naylor Farms
	Site name	Land at Naylors Farm, Rangell Gate, Low Fulney, Spalding, Lincolnshire
	Site Location	The site is located directly east of the A16 road and to the west of Rangell Gate (the B1165 road) and lies within the former hamlet of Low Fulney. The site is located within an area populated with industrial and agricultural related buildings. approximately 2km east of Spalding Town Centre and is situated within a predominantly rural area. Coronation Channel lies approximately 250m to the east of the site. The approximate National Grid Reference is 526380, 322440.
	Current Site Description	The site comprises a large field that is used to grow cabbages for Naylor Farms. The far north-western corner of the site is developed and comprises two small farm sheds.
	Proposed Development	The proposed development comprises a new Plant Based Protein Extraction Facility which will contain a large warehouse-style building divided into three processing plants. Associated yard areas for vehicle movement and loading will be present to the west of the building. Staff welfare facilities, staff and visitor car parking and an access route from the southern site of Low Road will be created on site. The remainder of the site will remain as arable land
PHASE 1 (DESK STUDY)	**Site History**	Most of the site comprised undeveloped land divided into fields in the 1880s. The Bourn & Lynn Joint Railway bisected the southern end of the site and Fulney Cottage which comprised a residential property, a pond and two small outbuildings was labelled within the north-western site corner. By 1904, the railway had been renamed the Midland & Great Northern Joint Railway. By 1951, the railway line was no longer labelled and had been dismantled by 1968. By 1977, Fulney Cottage was no longer labelled and had been cleared. Two barns were present at the north-west of the site. By 2021, the site was occupied by open land and was cultivated for growing crops. The barns on site remained in-situ.
	Unexploded Ordnance	The Zetica UXO map indicates that the site and immediate vicinity is in an area with a low bomb risk.
	Geology, Mining and Radon	No Worked or Made Ground is recorded within a 500m of the site within the Envirocheck Report. The site is reportedly underlain by Alluvium Superficial Deposits which comprise unconsolidated and variable Clay, Silt and Sand. The bedrock on site is the Kellaways Formation and the Oxford Clay Formation (Undifferentiated) which comprises Mudstone, Siltstone and Sandstone. No mining records, man-made or natural cavities or BGS mineral sites are recorded within 1km. The site is in a lower probability radon area (where less than 1% of the homes are estimated to be at or above the Action Level).
	Ground Stability	The Envirocheck Report has identified a moderate risk of compressible ground and running sand on site.
	Hydrogeology, Hydrology and Flood Risk	The site is underlain by Unproductive Strata, relating to both the Alluvium Superficial Deposits and the Kellaways Formation and the Oxford Clay Formation (Undifferentiated) bedrock. The site is not located within a Groundwater Source Protection Zone (SPZ) and there are no Groundwater SPZs located within 1km. There are no groundwater abstractions recorded within 900m.

		There are no discharge consents listed on site. One consent is recorded within 100m, listed 66m south-east and relates to final / treated effluent (sewage discharges from a residential property) into Kellet Gate Dyke. No Integrated Pollution Prevention and Controls (IPPC) are recorded within 725m and no Local Authority Pollution Prevention Controls (LAPPC) are recorded within 300m. The nearest surface water feature is recorded on site and relates to a series of land drains. There are no surface water abstractions within 450m of the site. There is one pollution incident to controlled waters recorded within the Envirocheck Report within 275m of the site. The incident occurred in 1992, approximately 30m north-east at Small Fen Drain. The incident was recorded as a Category 3 (minor) incident and no details of the pollutant were provided. The site and surrounding area are listed as being within Flood Zone 3a, an area which benefits from flood defences. There is no recorded risk from groundwater flooding on site. Specialist flood risk advice should be sought with regards to drainage and flooding.
	Geotechnical Hazards	The preliminary ground model has identified the following geotechnical hazards: • Excessive settlement (creep and inundation settlement or differential settlement of any Made Ground on site) could occur; • Moderate risk of compressible ground and running sands; and • Potential for surface water flooding to occur on site and within the surrounding area.
	Possible Contaminant linkages	The plausible contaminant linkages identified for the site are considered as potentially unacceptable risks in line with guidelines published in CLR11 and additional risk assessment may be required. The risks are **Low**.
ASSESSMENT CONSIDERATIONS	**Conclusions**	Based on historic land use and the current use of the site and the nature of the proposed development, the overall risk from land contamination is **Low**. It is considered highly unlikely that the site would be classified as Contaminated Land under Part 2a of the EPA 1990.
	Further Work	Based on the available data, there is not considered to be a requirement for a geo-environmental ground investigation to confirm the risks to receptors at the site. This is due to the absence of viable contaminant source, pathway, and receptor linkages. Should evidence of contamination be encountered during ground works on site, then a ground investigation is likely to be required on site. An asbestos survey will need to be carried out on the two existing barn buildings on site that will require demolition. Any ACMs removed prior to demolition in line with current guidance and good practice measures.

This Executive Summary forms part of Grange GeoConsulting Limited report number R21058/001 (Issue 1) and should not be used as a separate document.

1.0 INTRODUCTION

1.1 Terms of Reference

Consideration is being given by the Client, Naylor Farms, to the development of the Land at Naylors Farm, Rangell Gate, Low Fulney in Spalding, Lincolnshire. The site currently comprises a large arable field that is currently used to grow cabbages for Naylor Farms. The far north-western corner of the site is developed and comprises two small farm sheds.

The site is located directly east of the A16 road and to the west of Rangell Gate (the B1165 road) and lies within the former hamlet of Low Fulney. The site is located within an area populated with industrial and agricultural related buildings. approximately 2km east of Spalding Town Centre and is situated within a predominantly rural area. Coronation Channel lies approximately 250m to the east of the site. The approximate National Grid Reference is 526380, 322440 and the postcode is PE12 6EW. A Site Location Plan (Drawing R21058-DWG1) is provided in Appendix A.

A series of allotment gardens lie to the east of Rangell Gate and a nursery comprising a series of greenhouses lies to the west of the site. A series of commercial units lie to the south-east of the site, mainly comprising food producers, nurseries, and warehouses. Notable businesses include Flamingo Plants, Butters Factory Shop, Wyeplants Ltd, Chris Eley Produce Ltd and David Bowman Ltd. A vehicle repair shop, operated by Mick Cawley Motor Engineering Ltd, Spalding Taxis and Spalding Dance School are also present adjacent to the food producers.

1.2 Proposed Development Scheme

The proposed development comprises a new Plant Based Protein Extraction Facility which will contain a large warehouse-style building divided into three processing plants. Associated yard areas (both tarmac and gravel hardstanding) for vehicle movement and loading will be present to the west of the buildings. Staff welfare facilities, staff and visitor car parking and an access route from the southern side of Low Road will be created on site. A filtration pond is proposed at the east of the site adjacent to Rangell Gate.

A Proposed Development Plan (Drawing R21058-DWG2) is presented in Appendix A.

1.3 Objectives

The overall objective was to carry out a Desk Study and Preliminary Risk Assessment of the site to inform the client of the ground conditions and any potential environmental or ground-related risks associated with the development opportunity.

1.4 Scope of Works

Authorisation to proceed with this report was given by Naylor Farms in August 2021 via email. The scope of works, as outlined in the Grange Geoconsulting Limited proposal dated the 2nd August 2021, addressed to James Kirk, is summarised below:

- A site walkover undertaken by a qualified environmental consultant from Grange GeoConsulting Ltd;
- A review of topographical, geological and hydrogeological maps;
- A review of historical site maps to identify any former potentially contaminative uses of the site and the areas immediately surrounding it, and an assessment of the potential contaminants associated with those uses;
- Purchase and review of a Landmark Information Group Envirocheck Report for the site to identify any former flooding events, local landfill sites, pollution incidents etc. which may have had the potential to impact the site;
- Formulation of a Conceptual Site Model including the clear and tabulated identification of potential pollution linkages;
- A Qualitative Risk Assessment;
- A review of the geological conditions, and their potential effects on design and possible impacts during construction; and
- The compilation of the findings within a Phase 1 Desk Study Report.

1.5 Provided Information

The following has been provided to Grange GeoConsulting Consulting Ltd by Naylors Farms Ltd for use in the preparation of this report:

- Proposed Location Plan for Plant Based Protein Extraction Facility (drawing reference: 3899_S01 dated Sept 2021) produced by P&R Architects Ltd; and
- Proposed Site Plan for Plant Based Protein Extraction Facility (drawing reference: 3899_P01 dated Sept 2021) produced by P&R Architects Ltd.

1.6 Limitations

This report is based upon information obtained from third party sources, together with observations from the site walkover. The third-party data has been accepted at face value and has not been independently verified. Grange GeoConsulting Limited can therefore give no warranty, representation, or assurance as to the accuracy or completeness of such information.

This report has been prepared for the sole internal use and reliance of the client, Naylor Farms, and shall not be relied upon by other parties without the express written authority of Grange GeoConsulting Limited. If an unauthorised third party comes into possession of this report, then they rely on it at their own risk.

2.0 PHASE 1 DESK STUDY

Several desk study sources have been used to assemble the following information, including a Landmark Information Group Envirocheck Report for the site (reference: 283119991_1_1) and is presented in Appendix C. Other available public information, including Google Earth has been utilised. A site walkover has also been undertaken to supplement this desk-based review.

2.1 Site Referencing

Table 2.1: Site Referencing Information

Item	Brief description
Site name	Land south of Rangell Gate, Low Fulney, Spalding, Lincolnshire
Site location	The site is located directly east of the A16 road and west of Rangell Gate (the B1165 road) and lies within Low Fulney. The site lies approximately 2.5km east of Spalding and is situated within a predominantly rural area. The approximate National Grid Reference is 526380, 322440 and the postcode is PE12 6EW. A Site Location Plan is provided in Appendix A (Drawing R21058-DWG1).

2.2 Site Description and Walkover Survey

A walkover survey was undertaken on the 5th August 2021 to confirm the findings of the desk study and identify any potential hazards and receptors. Photographs taken during the site walkover are presented in Appendix B. A description of the current site conditions is summarised in Table 2.2.

Table 2.2: Site Description

Item	Brief description
Site access	The site is accessed via a track at the north-western end of the site and via various tracks from Rangell Gate.
Land area	Approximately 2.85 hectares.
Elevation and topography	The site is generally flat and level.
Site boundaries	The site is bound to on all three sides by roadways and is surrounded by agricultural land and allotment gardens / nurseries with sporadic residential properties and commercial land uses within the wider area.
Geomorphic features	There was no evidence of erosion or mass movement on or near the site.

Item	Brief description
Present land use	Most of the site area is occupied by open and undeveloped land used to grow cabbages. The plants are spaced in neat rows across the site and were at variable stages of growth. Tracks for vehicles between the crops were noted. Sporadic areas of grass around the site perimeter, adjacent to the roadways and site boundaries were observed during the site walkover.  The agricultural barn buildings / sheds located within the north-western site appeared to have been in-situ for many decades and were dilapidated and did not appear to be in use. The doors of one of the two buildings were locked during the walkover and no windows were present, as such, the contents of this building (if any) could not be confirmed. An old car, farm machinery, a water tank, loose plastics, and wooden pallets were observed within one of the barns, which was open on two sides. The roofs of the buildings appeared to comprise corrugated cement and appeared to be Asbestos-Containing Materials (ACMs). What appeared to be a disused / unused fuel storage tank was present between the buildings. A ladder was propped up against the tank. The tank was not secured in position.   

Item	Brief description
	A container of ´Motif´ was seen on site - described on labelling as ´a herbicide for the control of annual and perennial grass and broad-leaved weeds before sowing or planting of all crops´. Labelling indicated that the herbicide is degraded by micro-organisms / microbes within the soil. 
Vegetation	The site was occupied by rows of cabbages during the site walkover with some bare soil and areas of grass. Some weeds and scrub vegetation were noted around the buildings on site. No invasive weeds were noted to be present during the site walkover.
Evidence of contamination	A container of herbicide was observed on site. The roofs of the two barn buildings on site were considered to contain Asbestos and due to the age of the structures, the potential for further ACMs within the fixtures, fittings and fabric of the buildings was considered likely. What appeared to be an empty tank was present on site. No visual or olfactory evidence of spillages or fly tipping was observed on site.
Surrounding land	The surrounding land is in a rural area which lies to the east of Spalding. A series of allotment gardens lie to the east of Rangell Gate and a nursery comprising a series of greenhouses lies to the north-west of the site. Various commercial units lie to the south-east of the site, mainly comprising food producers, nurseries, and warehouses. A vehicle repair shop, Spalding Taxis and Spalding Dance School are also present adjacent to the food producers.

2.3 Site History

Detailed maps and aerial photographs of the site and surrounding area dated 1887 to 2021 (at scales of 1:2,500, 1:10,000 and 1:10,560), provided as part of the Envirocheck Report for the site, have been reviewed. This has been undertaken to identify any former land uses at the site and within the surrounding area that may have geotechnical or geo-environmental implications for the proposed development. The findings are summarised in Table 2.3. Google Earth and other sources of publicly available information have also been reviewed to support this assessment.

Table 2.3: Key Features from Historical Mapping

Map date and Scale	Key on-site features	Key off-site features

Map date and Scale	Key on-site features	Key off-site features
1887 to 1889 (1:2,500 and 1:10,560)	Most of the site comprised undeveloped land divided into fields in the 1880s. The Bourn & Lynn Joint Railway bisected the southern end of the site, crossing the fields from east to west. Fulney Cottage which comprised a residential property, a pond and two small outbuildings, was labelled within the north-western site corner.	A residential property labelled Red House was present directly north. The surrounding area was rural in nature and contained sporadic residential properties and farms.
1904 to 1906 (1:2,500 and 1:10,560)	By 1904, the railway line on site had been renamed the Midland & Great Northern Joint Railway.	By 1904, the area directly east of the site was labelled as allotment gardens, extending over 150m from the site boundary. No further changes were noted in the surrounding area.
1931 to 1938 (1:2,500 and 1:10,560)	No changes were noted on site.	Additional sporadic residential properties had been constructed in the wider area.
1951 to 1952 (1:10,560)	By 1951, the railway line crossing the site was no longer labelled.	The railway line extending off site remained but was no longer labelled. No further significant changes were noted nearby.
1968 to 1969 (1:2,500, 1:10,000 and 1:10,560)	By 1968, the former railway line on site was labelled as dismantled. Various drains were shown on site and along the site boundaries. The pond within Fulney Cottage was no longer labelled and the buildings on site appeared to have been amalgamated.	A small refuse tip was labelled 15m west of the site. A nursery was labelled directly south-east. An additional nursery, which included four buildings and two stores was shown from 100m south. A further small nursery was labelled 60m to the north. A large nursery was labelled directly west. A series of infrastructure works had taken place in the wider area with several large drainage channels present, including Coronation Channel 250m west.
1977 to 1989 (1:2,500 and 1:10,000)	By 1977, Fulney Cottage was no longer labelled and appeared to have been cleared. Two barns were present on site, accessed from Low Road to the north.	By 1987, the nursery to the west contained a series of moveable greenhouses and growing sheds. Additional outbuildings were also labelled within the nursery. Additional residential properties had been constructed in the nearby area.
1991 to 1996	By 1991, the dismantled railway was shown as a track on site.	By 1991, a large commercial unit had been constructed 150m east. The nursery to the south had expanded and additional greenhouses and associated buildings were shown.
1999 aerial photograph	The site was occupied by open land and was cultivated for growing crops.	Several nurseries with greenhouses were shown in the immediate area. The remaining area comprised open land cultivated for crops and some residential properties.
2000 to 2006 (1:10,000)	No changes on site were noted.	An additional nursery was shown directly south of the site and included a series of greenhouses and a warehouse, assumed to be

Map date and Scale	Key on-site features	Key off-site features
		used for produce processing. Additional commercial units were present from over 100m to the south-east of the site but this time.
2021 (1:10,000)	No changes on site were noted.	Lower Fulney Estate was labelled directly south, and south-east of the site and two large buildings had been constructed from 15m south, replacing the former nursery and associated building. The former nursery from 60m south had been replaced by large commercial buildings (assumed to be warehouses). A wider series of nurseries and associated buildings were shown in the wider area over 250m from the site.

2.4 Unexploded Ordnance

In general accordance with the CIRIA report C681 (Stone *et al* 2009) a non-UXO specialist screening exercise has been carried out for the site as detailed below.

The Zetica UXB map (Spalding) indicates that the site and immediate vicinity is in an area with a low bomb risk (further action to mitigate the risk is considered prudent by Zetica, although not essential). This is likely to be due to the site´s location in a rural area, and distance from obvious targets including large towns, cities, water courses or heavy industries. A copy of the map is presented in Appendix D.

2.5 Geology

No Worked or Made Ground is recorded within a 500m of the site within the Envirocheck Report. Despite this, some Made Ground associated with existing buildings and the former railway is anticipated on site.

The British Geological Survey (BGS) indicates that the site is underlain by Alluvium Superficial Deposits. These deposits are unconsolidated and variable and comprise Clay, Silt and Sand. They were formed up to 2 million years ago during the Quaternary Period in a local environment dominated by rivers.

The bedrock at the site comprises the Kellaways Formation and the Oxford Clay Formation (Undifferentiated). The stratum comprises Mudstone, Siltstone and Sandstone and was formed approximately 156 to 165 million years ago during the Jurassic Period, in a local environment previously dominated by shallow seas.

According to BGS records, one BGS borehole record is shown within the south-eastern corner of the site, directly west of Rangell Gate. The borehole (borehole reference: TF22SE65) was advanced to a depth of 4m bgl in 1937 and was associated with Spalding Grammar School to record groundwater levels. No geological information was provided within the record. An associated borehole (borehole reference: TF22SE64) was recorded to the east of the site at the north-east corner of Fulney Farm adjacent to the level crossing and was advanced to 3.7m bgl in 1937. The borehole was also associated

with Spalding Grammar School and no geological information was provided. No further boreholes were listed within a 250m radius of the site.

2.6 Mining and Mineral Extraction

The site is not located within a coal mining area. There are no BGS recorded mineral sites, natural or other man-made cavities listed in the Envirocheck Report located within a 1km radius of the site.

2.7 Ground Stability

The potential ground stability hazards associated with the geology at the site, as outlined in the Envirocheck Report, have been summarised below:

- Collapsible Ground – No Hazard
- Compressible Ground – **Moderate**
- Ground Dissolution – No Hazard
- Landslide Ground Instability – Very Low
- Running Sand – **Moderate**
- Shrinking or Swelling Clay – Low

2.8 Soil Chemistry

A review of the BGS soil chemistry, included within the Envirocheck Report, has undertaken, and is summarised in Table 2.4.

Table 2.4: Soil Chemistry

Soil Chemistry	Average Concentrations (mg/kg)
Arsenic	<15 mg/kg
Cadmium	<1.8 mg/kg
Chromium	60 to 90 mg/kg
Lead	<100 mg/kg
Nickel	15 to 30 mg/kg

2.9 Radon

The Indicative Atlas of Radon for England and Wales and the Envirocheck Report indicate the site is in a lower probability radon area (where less than 1% of the homes are estimated to be at or above the Action Level). Consequently, the BGS and the Building Research Establishment Radon Guidance Document indicate that no radon protective measures for buildings are required in this area.

2.10 Hydrogeology

The site is listed within the Envirocheck Report as being underlain by Unproductive Strata, relating to both the Alluvium Superficial Deposits and the Kellaways Formation and the Oxford Clay Formation (Undifferentiated) bedrock. Unproductive Strata are described by the Environment Agency as rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The site is not located within a Groundwater Source Protection Zone (SPZ) and there are no Groundwater SPZs located within 1km of the site.

There are no groundwater abstractions listed within 900m of the site boundary.

2.11 Hydrology and Flood Risk

There are no discharge consents listed on site. One consent is recorded within a 100m radius. The closest consent is listed 66m to the south-east of the site at Bramble Lodge. The consent relates to final / treated effluent (sewage discharges from a residential property) into Kellet Gate Dyke. The consent became effective in 1998 and remains active. Three additional consents for the release of final / treated effluent (sewage discharges from residential properties) to both surface water and to land via a soakaway are recorded within 200m of the site. Various additional consents for the release of final / treated effluent (sewage discharges) to surface water and land from farms and associated operations are also recorded between 100m and 200m from the site.

There is one prosecution relating to controlled waters recorded within the Envirocheck Report within 850m of the site, listed 297m to the south-east of the site boundary at Childers South Grove (Fulney Nurseries). The defendant was found guilty of causing flower nutrient chemical mix to enter a watercourse via a surface water drain in March 2007. A fine was issued (prosecution reference: Wra91/S85(1)&(6)).

No prosecutions relating to authorised processes are recorded within 850m of the site.

No Integrated Pollution Prevention and Controls (IPPC) are recorded within 725m of the site boundary and no Local Authority Pollution Prevention Controls (LAPPC) are recorded within 300m of the site.

The nearest surface water to the site boundary is recorded on site and relates to a series of land drains that cross the site. The drains on site form part of a large drainage network within the wider area.

There is one pollution incident to controlled waters recorded within the Envirocheck Report within a 275m radius of the site. The incident occurred in January 1992, approximately 30m to the north-east of the site at Small Fen Drain. The incident was recorded as a Category 3 (minor) incident and no details of the pollutant were provided.

No substantiated pollution incident register entries are listed within 500m of the site.

The closest surface water abstraction to the site is listed 453m to the south-west of the site boundary at Coronation Channel. Surface water is abstracted by the Lincolnshire Wildlife Trust for make-up or top up water. The permit was issued in 2007 and remains active. Further surface water abstractions are recorded over 500m from the site.

The site and surrounding area are listed as being within Flood Zone 3a, an area which benefits from flood defences. There is no recorded risk from groundwater flooding on site. No further consideration of flood risk is undertaken in this report. Specialist flood risk advice should be sought with regards to drainage and flooding.

2.12 Waste Management and Hazardous Substances

There are no licensed waste management facilities, registered waste transfer sites or registered waste treatment or disposal sites, current or historic landfill sites recorded within 950m of the site. There are no records relating to the storage of radioactive materials, no explosive sites, and no hazardous substances registered within 1km.

No areas of potentially infilled land (non-water) are present within 800m of the site. These are various entries relating to areas of potentially infilled land (water) within 1km of the site, the closest of which are recorded between 139m and 149m to the north of the site. These entries are shown on historical mapping for the area dated 1958 and relate to a small infilled pond.

2.13 Contemporary Trade Directories

The closest trade directory to the site is the recorded within the Envirocheck Report 81m to the north of the site and relates to a car dealers known as UK Vehicle Brokers, recorded at Denver House on Fulney Lane South. The business is listed as inactive.

The closest active entry is recorded 280m to the east of the site and relates to Lunns Haulage Ltd (road haulage services). Two inactive entries are recorded 187m north of the site and 269m east and relate to a textile workshop and garage services.

No petrol filling stations are recorded within 650m of the site boundary.

2.14 Sensitive Land Use

The site is not located within a Nitrate Vulnerable Zone (NVZ). The closest NVZ to the site lies 204m to the west of the site boundary and relates to the River Welland / surface water) NVZ.

No areas of ancient woodland and no areas of adopted greenbelt are listed within are recorded within 1km of the site. No areas of local nature reserves, Sites of Special Scientific Interest (SSSI), national parks or Areas of Outstanding Natural Beauty (AONB) are located within 1km of the site.

3.0 PRELIMINARY RISK ASSESSMENT AND EXPOSURE MODEL

A Conceptual Model represents the possible relationships between potential contaminant sources, pathways, and receptors in line with the Statutory Guidance to Part 2a of the Environmental Protection Act 1990. The following Preliminary Risk Assessment is based on the results of the Desk Study and the site walkover.

3.1 Potential Contamination Sources and Contaminants of Concern

On-Site

Several potential on site sources of contamination have been identified.

It should be noted that the dismantled railway line on site has been discounted as a potential contamination source as no works are proposed in this area of the site. This area of the site is currently used to grow cabbages and will remain unchanged as part of the proposed development scheme. Only the northern area of the site will be developed, and this potential source is not considered to pose a risk due to its location, nature and distance from the proposed development area.

- The existing two barn buildings present on site and the materials stored within and adjacent to them, including the empty tank and container of herbicide on site pose a potential risk to the site. The existing buildings within the north-west of the site were considered during the site walkover to contain ACMs within the roofing materials due to the age of these buildings, dating back to before 1977. There is also the potential for further ACMs within the fixtures, fittings, and fabrics of the buildings. The buildings and associated materials and tank will be cleared from site prior to development. The following contaminants could potentially pose a risk to the site: Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), herbicides, Asbestos, pH and heavy metals.

- The presence of a nominal thickness of Made Ground is anticipated within the north-western corner of the site due to this area of the site previously having been developed. No further Made Ground is anticipated on site, except for a potential minimal amount along the course of the former railway line, though this is not considered to pose a risk to the proposed development of the site (as detailed above). A least one phase of construction and demolition, including alterations / upgrades appears to have taken place at in the north west corner of the site. Any Made Ground present on site could date back to before the 1880s and the former and current site uses may have impacted the site soils. The type and intensity of any agricultural activities that took place cannot be determined based on the available information but there is the potential for the application of herbicides, fertilisers, or pesticides to have resulted in contamination. The potential contaminants of concern from the Made Ground include hydrocarbons including PAHs, TPH, Asbestos, heavy metals, pH, herbicides, pesticides, and fertilisers.

Off-Site

The following potential off-site contaminant sources identified near the site are outlined below. No further nearby land uses were considered to pose a risk to the site and the proposed development.

- Allotment gardens have been present to the east of the site since the early 20th Century. Since the late-1960s, the surrounding area has been dominated by nurseries in all directions. Additional land uses include a vehicle repair shop from 80m to the south-east of the southern site boundary and various warehouses. A former refuse tip was also labelled 15m west of the site, but this appears to have been temporarily used during the time at which the railway line was dismantled and removed shortly after. No records of any landfilling or raising are recorded within the Envirocheck Report in this location. There is a limited potential for these nearby land uses to impact the area of the site that is to be redeveloped. The following contaminants could potentially pose a risk to the site: PAHs, TPH, Asbestos, heavy metals, and pH.

3.2 Potential Pathways

The potential pathways identified for the site include the following:

- Direct human contact
- Inhalation
- Ingestion
- Direct contact with aggressive ground conditions
- Leaching and migration via surface water (overland flow and surface water run-off)

3.3 Potential Receptors

The potential receptors identified for the site include the following:

- Site end users (commercial workers and site visitors)
- Groundworkers (construction and future maintenance workers)
- Building materials (buried concrete and underground services)
- Controlled waters: Surface water (drainage ditches and wider drainage network, Coronation Channel, and overland flow)

3.4 Summary of Potential Contaminant Linkages

Table 3.2 lists the plausible contaminant linkages identified for the site. These are considered as potentially unacceptable risks in line with guidelines published in CLR 11, and additional risk assessment may be required. Linkages have been assessed in

general accordance with guidance provided in the CIRIA Report C552 (Rudland *et al* 2001) but with the addition of a 'no linkage' category as detailed in Table 3.1.

It should be noted that whilst the risk assessment process undertaken in this report may identify potential risks to groundworkers (construction and future maintenance workers), consideration of occupational health and safety issues is beyond the scope of this report and needs to be considered separately in the Construction Phase Health and Safety Plan.

Table 3.1: Risk Assessment Process

	Consequence			
	Severe	**Medium**	**Mild**	**Minor**
High Likelihood	Very high risk	High risk	Moderate risk	Low risk
Likely	High risk	Moderate risk	Low risk	Very low risk
Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
Unlikely	Low risk	Very low risk	Very low risk	Very low risk
No Linkage	No risk			

Table 3.2: Preliminary Exposure Model – Source Pathway Receptor Contaminant Linkages

Source(s)	Possible Pathway(s)	Receptor(s)	Probability	Consequence	Risk	Comments
Existing barn buildings, any associated Made Ground and operations / material storage COC: TPH, PAHs, herbicides, Asbestos, pH and heavy metals.	Direct human contact Inhalation Ingestion Leaching and migration via surface water	Site end users Ground workers Building materials Surface water	Unlikely	Medium	Low	The existing two barn buildings on site and the materials stored within and adjacent to them, including the empty tank and container of herbicide on site pose a potential risk to the site. The existing buildings within the north-west of the site were considered during the site walkover to contain ACMs within the roofing materials due to the age of these buildings, dating back to before 1977. There is also the potential for further ACMs within the fixtures, fittings, and fabrics of the buildings. The buildings and associated materials and tank will be cleared from site prior to development. The presence of a nominal thickness of Made Ground is anticipated within the north-western site corner. A least one phase of construction and demolition, including alterations / upgrades appears to have taken place. Any Made Ground present on site could date back to before the 1880s and the former and current site uses may have impacted the site soils. The type and intensity of any agricultural activities that took place cannot be determined based on the available information but there is the potential for the application of herbicides, fertilisers, or pesticides to have resulted in contamination. Due to the nature and location of the proposed development, which will comprise buildings and hard standing surfaces there are limited potential exposure pathways. It is considered that the risks to groundworkers will be mitigated through appropriate Health & Safety precautions, including dust suppression during the demolition and construction phases. Low-permeability geological strata exist beneath the site (Unproductive Strata). Leaching and run-off to controlled waters will be limited due to the presence of building footprints and hard standing within the development. Although there is a potential flood risk, it is considered that any risks will be mitigated as part of the drainage design for the site.

Source(s)	Possible Pathway(s)	Receptor(s)	Probability	Consequence	Risk	Comments
Nearby off-site produce and growing operations (including allotments, nurseries and processing) and commercial units COC: PAHs, TPH, Asbestos, heavy metals and pH.	Direct human contact Inhalation Ingestion Leaching and migration via surface water	Site end users Ground workers Building materials Surface water	Unlikely	Mild	Very Low	Allotment gardens have been present to the east of the site since the early 20th Century. Since the late-1960s, the surrounding area has been dominated by nurseries in all directions. Additional land uses include a vehicle repair shop from 80m to the south-east of the southern site boundary and various warehouses. A former refuse tip was also labelled 15m west of the site, but this appears to have been temporarily used during the time at which the railway line was dismantled and removed shortly after. No records of any landfilling or raising are recorded within the Envirocheck Report in this location. No evidence of contamination from off-site was observed during the site walkover. There is a limited potential for these nearby land uses to impact the area of the site that is to be redeveloped. This is due to the nature and location of the proposed development, which will comprise buildings and hard standing surfaces and the limited potential exposure pathways. It is considered that the risks to groundworkers will be mitigated through appropriate Health & Safety precautions, including dust suppression during the demolition and construction phases. This is also attributed to the presence of low-permeability geological strata beneath the site (Unproductive Strata). Leaching and run-off to controlled waters will be limited due to the presence of building footprints and hard standing within the development. Although there is a potential flood risk, it is considered that any risks will be mitigated as part of the drainage design for the site.

4.0 GEOTECHNICAL HAZARD IDENTIFICATION

The Preliminary Ground Model has been used to develop a list of potential geotechnical hazards to inform the required scope of intrusive investigation works. The geotechnical hazards are listed below:

- Excessive settlement (creep and inundation settlement or differential settlement of any Made Ground on site) could occur;
- Moderate risk of compressible ground and running sands associated with the underlying Alluvium and Kellaways Formation and Oxford Clay Formation (Undifferentiated); and
- Potential for surface water flooding to occur on site and within the surrounding area.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Risk Evaluation

Based on historic land uses and its current operational use, and the nature of the proposed development, the overall risk from land contamination at the site is **Low** but would need to be confirmed by appropriate ground investigation, testing and assessment of the results of the future ground investigation.

It is considered that it is highly unlikely that the site would be classified as Contaminated Land under Part 2a of the EPA 1990.

Table 3.2 provides a summary of the geo-environmental risks identified and the overall risk associated with the site has been designated using qualitative judgement using the risk categories provided in Table 5.1.

Table 5.1: Assessed Overall Risk Categories for the Site from Land Contamination

Risk Category	Definition
Very High Risk	A significant contaminant linkage, including actual evidence of significant harm or significant possibility and significant harm, is clearly identifiable at the site (e.g. from visual or documentary evidence) under current conditions, with potential for legal and/or financial consequences for the site owner or other Responsible Person. Remediation advisable based on acute impacts being likely. Immediate action should be considered.
High Risk	A contaminant linkage is identifiable at the site under current and future use conditions. Although likely, there is no obvious actual evidence of significant harm or significant possibility and significant harm under current conditions. Extent of risk is therefore subject to confirmation by investigation and risk assessment, and most likely to be deemed significant. Realisation of the risk is likely to present a substantial liability to the site owner or other Responsible Person. Remediation required for redevelopment and may also be required under Part 2A for existing receptors.
Moderate Risk	A contaminant linkage is identifiable at the site under current and future use conditions. However, it is not likely to be a significant linkage under current conditions. It is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Actual extent of risk subject to confirmation by additional investigation and risk assessment and most likely to lie between no possibility of harm (under current conditions) and significant possibility of significant harm (under conditions created by new use). Remediation may be required for redevelopment.
Low Risk	Potential pathways and receptors exist but history of contaminative use or site conditions indicates that contamination is likely to be of limited extent and below the level of possibility of harm. It is unlikely that the site owner or other Responsible Person would face substantial liabilities from such a risk. Precautionary investigations and risk assessment advisable on change of use. Any subsequent remedial works are likely to be relatively limited.
Very Low Risk	No contaminant linkage likely to exist under current or future conditions, but this cannot be completely discounted. If harm is realised, it is likely at worst to be mild or minor. Site not capable of being determined under Part 2A (in accordance with PPS23) where the Local Authority inspects the site. No

Risk Category	Definition
	further action recommended.
No Risk	No contaminant linkage exists.

5.2 RECOMMENDATIONS FOR FURTHER WORK

Based on the available data, there is not considered to be a requirement for a geo-environmental ground investigation to confirm the risks to receptors at the site. This is due to the absence of viable contaminant source, pathway, and receptor linkages. The proposed development is commercial in nature and will comprise hardstanding and building footprints eliminating human health exposure pathways. Any exposure pathways during ground works will be managed by good practice measures.

Should evidence of contamination be encountered during ground works on site, then a ground investigation is likely to be required on site.

An asbestos survey will need to be carried out on the two existing barn buildings on site that will require demolition. Any ACMs removed prior to demolition in line with current guidance and good practice measures.

6.0 REFERENCES

MILES, J. C. H., APPLETON, J. D., REES, D. M., GREEN, B. M. R., ADLAM. K. A. M. and MYRES. A. H. 2007. Indicative Atlas of Radon in England and Wales. Health Protection Agency and British Geological Survey. Report HPA-RPD-033.

RUDLAND, D. J., LANCEFIELD, R. M. and MAYELL, P. N. 2001. Contaminated land risk assessment. A guide to good practice. *CIRIA Report C552*. CIRIA, London. 158 pp.

SCIVYER, C. 2007. Radon: Guidance on protective measures for new buildings, extensions, conversions and refurbishment (2007 edition). Building Research Establishment Report BR 211. BRE, Garston.

STONE, K., MURRAY, A., COOKE, S., FORAN, J. and GOODERHAM, L. 2009. Unexploded ordnance (UXO), a guide to the construction industry. *CIRIA Report C681*. CIRIA, London. 141 pp.

APPENDICES

Appendix A DRAWINGS

Appendix B SITE WALKOVER PHOTOGRAPHS

Appendix C DESK STUDY RESEARCH INFORMATION

Appendix D ZETICA UXO MAP

Appendix A

DRAWINGS



Grange Geo

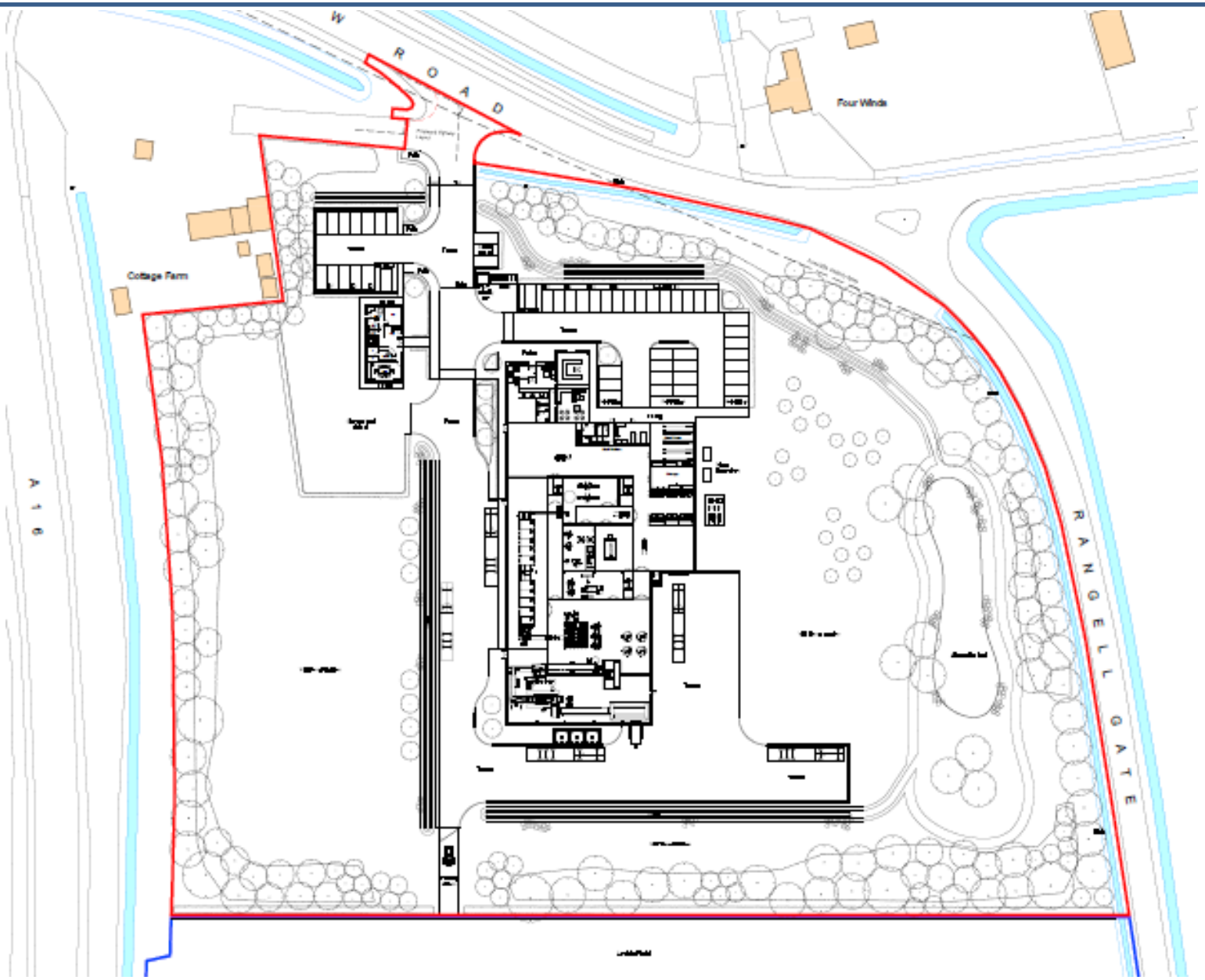
Land at Naylors Farm, Rangell Gate

Site Location Plan

Client: Naylors Farm

Date: September 2021

Drawing R21058-01



Grange Geo

Land at Naylors Farm, Rangell Gate

Proposed Development Plan

Client: Naylors Farms

Date: September 2021

Drawing R21058-02