

RIDGE

PILING RISK ASSESSMENT

LAND AT BARRINGTON ROAD DURRINGTON-ON-SEA

MCCARTHY STONE

JULY 2024

RIDGE

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LAND AT BARRINGTON ROAD, DURRINGTON-ON-SEA
PILING RISK ASSESSMENT

05 July 2024

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Project No. 5021508

RIDGE

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VERSION CONTROL

VERSION	DATE	DESCRIPTION	REPORT REFERENCE	CREATED	REVIEWED
01	04/07/2024	PRA – First Issue	5021508-RDG-XX-ST-DOC-C-00PRA01	ROL	MS

1. INTRODUCTION

1.1. Instructions

Instructions were received from McCarthy Stone (MCS) to prepare a Piling Risk Assessment (PRA) in relation to the re-development of land located at Barrington Road, Durrington-On-Sea, BN12 4RS (hereafter referred to as the "site").

1.2. Proposed Development

The proposed development comprises erection of part-three part-four storey blocks of 65 age restricted one and two-bedroom apartments , with 11 apartments on the ground floor and 18 apartments on the first, second and third floors. The proposed development will also have a communal lounge, guest suite, management office and mobility scooter store.

Development relates to planning application AWDM/0786/23:

Draft condition 20 states "piling works and use of penetrative methods shall not be carried out unless details and methods, including the management or risks to groundwater/the water environment, and first submitted to and approved in writing by the Local Planning Authority and such works shall be carried out only in accordance with the approved details."

Reason: To ensure the development is satisfactorily drained and to safeguard against risks of pollution controlled water if infiltration is inappropriately used or designed. To accord with policies DM21 & DM22 of the Worthing Local Plan 2020-2036 and the NPFF, 2023

1.3. Site Conditions

The site is centred on Easting 511848 and Northing 103150, situated at approximately 9mAOD (Above Ordnance Datum), located within the centre of Durrington-On-Sea. The site is a rectangular in shape with the longest axis trending east-west and the shortest axis trending north-south. The site measures approximately 81m x 60m, with an area of 0.48ha.

There is an area of mature deciduous and fir trees observed in the northern section of site, including but not limited to willow, conifer, beech and ash.

The site was first used as a Brick Works until 1933 when the ground was re-worked. The site saw majority of it's historical use as part of the Inland Revenue Offices from 1953, which included three tanks to the site's south present between 1967-1968. These offices were still present on site until 2020 when the site was sold to make way for current developments.

1.4. Previous Reports

Previous Ridge reports that have been prepared in relation to redevelopment of the site and are listed below:

- Ridge – Desk Top Study – for MCS (February 2024), report reference 5021508-RDG-XX-ST-DOC-C-00DTS01
- Ridge – Ground Condition Assessment – for MCS – (May 2024), report reference 5021508-RDG-XX-ST-DOC-C-00GCA01

1.5. Objectives

This report provides the context and framework for piling on land affected by contamination and provides justification of the choice of piling methodology for the proposed development and mitigation measures to be adopted (if required).

This report has been prepared to provide information on the following:

- Background on the site setting and contamination
- Summary of the Conceptual Site Model
- Details of the proposed development and the selected foundation methodology
- A Piling Risk Assessment in accordance with Environment Agency Document Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention ref NC/99/73
- Justification of foundation methodology selection and measures required to mitigate any associated risks.

This report has been prepared in relation to the reports outlined above.

1.6. Report Limitations

This report has been prepared in accordance with the instructions received from McCarthy Stone and includes details of the assessment of risk from the use of piled foundations as part of the construction of the proposed building.

The information contained in this report is intended for the use of McCarthy Stone pursuant to the development described above. The assessment of risk and details contained herein may not be appropriate to other development proposals.

2. PHYSICAL SETTING

2.1. Published Geology

The following observations are taken from the British Geological Survey (BGS) Geology of Britain Viewer (2024) and BGS GeoIndex. The reviewed BGS sources indicates that the site is likely underlain by River Terrace Deposits over a Bedrock Geology of Lewes Nodular Chalk Formation.

2.2. Hydrogeology

The site is not located within a Source Protection Zone.

River Terrace Deposits are designated as a Secondary B aquifer. Groundwater within the underlying chalk is designated as a Principal Aquifer.

2.3. Hydrology and Drainage

There are no surface water features within 250m of the site and the site is not within a Zone 2 or Zone 3 floodplain, as defined by the Environment Agency.

3. SITE HISTORY / PREVIOUS INVESTIGATIONS / REMEDIATION

3.1. Site History

The first case of land use on site is recorded in 1909, where it formed part of the Worthing West End Brick Works until 1933 when the ground was re-worked. At this time, there were several nearby industrial land uses such as a kiln, windpump, and large gas holder. The railway station was first seen 67m east in 1938. The site saw most use as part of the Inland Revenue Offices from 1953, which included three tanks to the sites south present between 1967-1968. These offices were still present on site until 2020 when the site was sold to make way for the current developments.

3.2. Previous Investigations

Previous intrusive investigations, Risk assessments and Verification assessments at the site that Ridge of aware of are summarised below.

3.2.1. Ashdown Contamination Risk Assessment (December 2019)

A Geotechnical and Ground Contamination Risk Assessment (report reference R18-13236) was carried out by Ashdown Site Investigation in December 2019, following on from a previous December 2018 issue. This report focused on a larger site area which also included the mixed-use housing development to the south of the care home site.

The general underlying geology of this site was found to be River Terrace Deposits overlying the White Chalk Subgroup. A preliminary risk assessment identified a number of pollutant linkages relating to both proposed end users of the site and controlled waters. The ground investigation found concentrations of heavy metals and PAH compounds in the sites main part, as well as asbestos materials near a facilities maintenance area. Made Ground containing detectable concentrations of cyanide was recorded in a borehole in the north-eastern corner of the western part of the site. Further works were recommended after all buildings, tanks, and below ground infrastructure was removed. A DS-1 Design Sulphate Class and an AC-1s ACEC classification was assumed for the design of concrete in contact with the ground. Ground floors were recommended to be suspended due to the variable thickness of the Made Ground and the presence of soils of medium volume change potential. The results of infiltration tests indicated that the coarse-grained River Terrace Deposits possessed good infiltration characteristics, whereas the fine-grained soil possessed negligible infiltration characteristics.

3.2.2. Soiltechnics Ground Investigation Report (April 2021)

This Ground Investigation Report (report reference STS5226-G01_Rev 0) also focused on a larger site area, including the mixed-use housing development to the south of the care home site. Excavation encountered Made Ground or Topsoil overlying River Terrace Deposits extending down to 5-7m in depth, and subsequently the White Chalk Subgroup. Groundwater was encountered at depths between 5.2-8.5m. Due to the variable nature of the River Terrace Deposits, strip foundations were deemed not to be acceptable. A piled foundation solution was recommended for the larger buildings, namely the care home. Plastic and liquid limit determinations performed on samples from the River Terrace Deposits indicated that the soils are of medium volume change potential. No significant contamination was identified, although low levels of PAH were identified in near surface Made Ground as well as localised asbestos fibres and elevated arsenic and lead being present. A capping layer was recommended to be incorporated into all future gardens and soft landscaping. Gas monitoring classified the site as characteristic situation 1 (CS1), therefore on this basis gas protection measures were not considered necessary.

3.2.3. Soiltechnics Subsoil Verification Testing (August 2023)

Soiltechnics carried out verification testing (report reference L-STV59595M-001) of subsoil stockpiles at sites which were to be imported to be used at Durrington-On-Sea. Soil samples were taken from five recently formed stockpiles, totalling to 13 samples taken. The Billinghurst subsoil typically comprised of brown, slightly gravelly Clay with infrequent brick and concrete, whilst the Newick subsoil comprised of firm brown slightly sandy slightly gravelly Clay, with subrounded to subangular flint, bricks, and concrete. It should be noted that the material from Newick was used on the care home site. The report concluded that the subsoil deposits are not affected by chemical contamination and therefore can be reused within a residential development.

3.2.4. Ridge Desk Top Study – 2024

Ridge carried out a Desk Top Study (report reference 5021508-RDG-XX-ST-DOC-C-00DTS01), using information gathered from a site reconnaissance undertaken on 17th January 2024, as well as publicly available information.

Historical map review identified numerous potential sources of contamination, including tanks, brick works, a railway line, chimney, and kilns.

During environmental records review, multiple instances of ground workings were identified on site and in the surrounding area, including cuttings and brick works on site and cuttings 31m west. Industrial land uses such as chimneys, tanks, and a railway station were also identified, as well two electrical substations 19-24m south-west.

Ridge produced a preliminary conceptual site model and conceptual exposure model for the proposed future land use. The following sections present potential contaminants, pathways and receptors based on the information collected during the desk study.

<u>Potential Sources</u>

- On site
  - Contaminants of concern (CoC) include those commonly identified in Made Ground such as heavy metals, hydrocarbons, organic, inorganic compounds, polycyclic aromatic hydrocarbons (PAHs) and asbestos. Asbestos formerly within fabric of structures may have been mixed with soils to create asbestos containing soils (ACS).
  - Potential for ground gas and soil vapour. Ground gas potential will be dependent on the make-up of Made Ground beneath the site i.e., degradable, and organic content.
  - Radon gas from bedrock based on an assessed 3-5% action level.
- Off site
  - Contaminants of concern (CoC) include commonly identified in made ground, such as heavy metals, polycyclic aromatic hydrocarbons.
  - Total hydrocarbons, fuel and lubricants, sulphur compounds, PCBs, asbestos, coal tar, coal dust, heavy metals, organic compounds, fuels, inorganic compounds, acids, and alkalis associated with the off-site boiler house and fuel tanks, gasholder.

<u>Potential Pathways</u>

- Indirect
  - Vertical and lateral migration of ground gas and/or soil vapours leading to accumulation in enclosed spaces.
  - Vertical and lateral migration of organic and inorganic compounds through underlying geology.
  - Windblown dust and fibres to adjacent receptors.
  - Surface run off.

- Direct
  - Inhalation of ground gases.
  - Inhalation of vapours.
  - Inhalation of contaminated dust.
  - Ingestion contaminated home grown produce, soil and/or soil derived dust.
  - Dermal contact.
  - Direct contact with services (potable water).

Potential Receptors

- Human
  - End users of the site.
  - Maintenance workers once the development is complete.
- Environmental
  - Underlying Principal aquifer – bedrock geology.
  - Underlying Secondary B aquifer – superficial geology.

A risk assessment was undertaken in order to identify the highest risks on-site as assessed in the desk study. The severity and likelihood of each risk was assessed in order to give a risk level. Majority of the risks were classed as very low to low, however, the following risks were given as higher risk levels:

Direct contact, ingestion, and inhalation of impacted soils/ groundwater, as well as windblown dust from the site and its historical development (receptor: residential end user) was classed as Moderate risk level. Vertical migration of contaminants through the underlying geology and/ or via overland flow (receptor: Secondary B Aquifer-superficial); Migration of radon through permeable soils, inhalation of radon (receptor: residential end user); and Direct contact, ingestion, and inhalation of impacted soils/ groundwater, as well as windblown dust from off-site sources (receptor: residential end user), were all classified as Low/Moderate risk level.
Based on the information obtained during the compilation of the Preliminary Investigation and the preliminary conceptual site model, a potential for a moderate risk of contamination was identified. Therefore, Ridge recommended a Phase 2 Ground Investigation to address the potential risk posed by future end users, including the drilling of boreholes, sampling, and monitoring.

3.2.5. Ridge Ground Condition Assessment - 2024

Following recommendations from the Desk Top Study, Ridge produced a Ground Condition Assessment (report reference 5021508-RDG-XX-ST-DOC-C-00GCA01). Seven (7 No.) windowless sample boreholes (WS01 – WS07) were advanced through the base of their respective inspection pits to a maximum depth of 5.00mbgl, completed using a tracked dynamic sampling rig.
Two (2 No.) rotary cored boreholes (RC01 and RC02) were advanced to 20mbgl (RC01) and 11mbgl (RC02). Two (2 No.) machine dug trial pits (SA01 and SA02) were advanced to a depth of 1.40mbgl and 2.40mbgl, with soakage tests undertaken within the pits.

Field testing included three (3 No.) plate load tests on natural and Made Ground as well as five (5 No.) TRL DCP tests.

The objective was to allow for the assessment of underlying ground conditions and permit in-situ Standard Penetration Testing (SPT) and falling head tests to provide geotechnical parameters for future use. Furthermore, it allowed for the production of detailed engineering logs and the recovery of samples for geotechnical and environmental testing.

Boreholes were spread across the site to allow adequate geo-environmental assessment.

RC01, WS03 and WS05 were installed with standpipes to enable future ground gas monitoring. The response zones were determined to target the groundwater. These monitoring wells were secured with upright steel covers. The remaining windowless sample and rotary core boreholes were backfilled with arisings in reverse order and reinstated in respect of existing conditions upon completion.

All intrusive locations were logged, and visual/olfactory evidence of contamination noted in accordance with best practice. Soil sampling of the near surface materials was undertaken to assess the contamination risks to human health and controlled waters. Samples were also removed at varying depths for geotechnical testing. Environmental samples were handled using a fresh pair of nitrile gloves. Selected samples were placed in sealable bags, sealed glass jars or plastic tubs (dependent on the exact laboratory requirement and analysis to be undertaken) and stored in a temperature-controlled environment before transit.

Ground Gas monitoring was conducted from 25 March through to 8 April 2024 over three rounds in accordance with BS8576:2013 *Guidance on investigations for ground gas – permanent gases and volatile organic compounds*.

All newly installed (RC01, WS03 and WS05) were monitored for the presence of soil gases including methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide. In addition, gas flow rates, downhole pressure and atmospheric pressure were also measured, using a GA5000 Geotech Gas Analyser.

3.2.5.1. Groundwater

Groundwater was identified at depths ranging 2.30m to 4.00mbgl within the exploratory holes during the investigation. During subsequent groundwater gauging, groundwater levels were recorded ranging from 3.00m to 4.56mbgl.

3.2.5.2. Ground Conditions

Made Ground was encountered in four of the seven boreholes, however shortly after crushed material would cover the entire site. This material varied greatly, and the composition of the Made Ground encountered during the investigation only partly represents what is now on site.

The Made Ground being laid on site was described as ranging from a silty very gravelly Sand to a sandy gravelly silty Clay, with the gravels being described as fine to coarse, angular to rounded. Anthropogenic material inside the Made Ground commonly included crushed brick, concrete, and general rubble. The depth recorded was from to 0.40-0.45mgl in three of the boreholes, however in WS07 the maximum depth of 1.50mbgl was recorded.

Brown-yellow, soft, predominantly gravely silty Clay was encountered in all seven boreholes and forming the top portion of WS01-03. Most boreholes then went on to encounter small amounts (~0.50mbgl) of sandy or gravel before returning to clay. Clay reached a maximum depth of 5.00mbgl in WS02 & WS06, however all other boreholes reached chalk at around 3.85-4.40mbgl.

The off-white chalk encountered by the window sampler was primarily weak/structureless, matrix supported, and recovered as gravelly clay, with the gravel being fine and medium, sub-angular to sub-rounded. The deeper chalk encountered in the rotary cores was generally stronger, with only occasional pockets of structureless chalk. Stronger, more clast supported chalk was encountered at 8.25m in RC01 and 6.50m in RC02.

3.2.5.3. Visual and Olfactory Observations

No visual and/or olfactory observations of contamination was recorded across the natural soils in the site.

3.2.5.4. Soil Results

Twelve soil samples collected during the Ridge investigation at various depths and locations were submitted to a UKAS accredited laboratory for analysis against a generic contamination suite. The contamination suite included heavy metals, phenols, speciated polyaromatic hydrocarbons (PAHs), fractionated total petroleum hydrocarbons (TPH), BTEX and MTBE compounds, and an asbestos screen.

No significant levels of contamination were recorded following an analysis of results from the laboratory contamination screen, furthermore, values for most PAH & TPH, and all BTEX & MTBE determinands were returned below laboratory LOD.

All results were compared against *Residential without Homegrown Produce* GAC. There were no exceedances of the GAC for heavy metals, phenols, speciated polyaromatic hydrocarbons (PAHs), fractionated total petroleum hydrocarbons (TPH), BTEX and MTBE compounds, and asbestos.

Asbestos was not identified within any of the tested samples.

Currently, there are not considered to be any viable sources of contamination onsite and therefore the site is not considered to be impacted by contamination. There are no significant levels of contaminants, furthermore values returned for PAH and TPH, and all BTEX and MTBE determinands all returned below exceedances, and the majority of the tested samples returned values below their respective laboratory LOD

3.2.5.5. Groundwater Results

No groundwater was tested as part of the Ridge 2024 investigation.

3.2.5.6. Gas Results

Three rounds of monitoring were completed to confirm or negate the low risk identified in the Desk Top Study. Gas monitoring commenced on 23rd March 2024, with three rounds of monitoring up to 8th April 2024, boreholes RC01, WS03, and WS05 were monitored for the presence of soil gases including methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide. In addition, gas flow rates and downhole pressure were also measured using a GA5000 Geotech Gas Analyser. Gas monitoring was conducted for at least three minutes, with readings taken at 30 second intervals.

Following the monitoring rounds the following 'worst-case conditions' were encountered: a maximum flow of 0.1L/hr, and a maximum CO2 concentration of 8.5%.

After the results of the gas monitoring concluded, the GSV equates to a threshold of 0.07. Therefore, gas monitoring data from the three rounds of monitoring indicates that the classification of Characteristic Situation CS1.

3.2.5.7. Assessment of Contamination Sources

Currently, there are not considered to be any viable sources of contamination onsite and therefore the site is not considered to be impacted by contamination.

3.2.6. Conceptual Site Model

3.2.6.1. Sources

Following investigations conducted to date and screening of chemical analysis results, there are not considered to be any viable sources of contamination onsite. The site is not considered to be impacted by contamination.

3.2.6.2. Pollutant Linkage Assessment

By considering the sources, pathways and receptors (pollutant linkages), an assessment of the human health/ environmental risks is made with reference to the significance and degree of the risk. This assessment is based on consideration of whether the source contamination can reach a receptor and hence whether it is of major or minor significance. As there are no viable sources of contamination onsite, this assessment was not undertaken.

All ground workers and contractors to follow suitable health and safety risk assessments to reduce exposure to any unidentified contaminants whilst working on site.

3.2.7. Recommendations

No further works or ground investigation were considered to be required.

Whilst no remediation has been found to be required based on the investigation and testing undertaken it was recommended that imported topsoil to be used in future areas of soft landscaping. NHBC require a minimum thickness of 100mm. Such material will need to be tested to ensure suitability at the site. Typical ratio for testing is one sample per $50m^3$.

It was recommended that a Watching Brief should be maintained on site during development works by the Site Manager/Supervisor. If any material is noted to show visual and/ or olfactory evidence of contamination or any different soils encountered from the ground investigation, in the first instance this material should be stockpiled separately on plyboard or sheeting. An Environmental Consultant such as Ridge should be contacted to advise what further work is required but this would likely involve characterisation of soils through laboratory analysis prior to removal off site. Local Authorities will be notified, and a future plan of action will be agreed.

Given the brownfield nature of the site it was recommended that barrier water supply pipe is used.

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4. FOUNDATION SOLUTION APPRAISAL

It is proposed that a piled foundation solution will be utilised, using continuous flight auger (CFA) piling method.

Alternative foundation solutions have been explored for the site, based on the proposed development, and comments are provided in Table 4.1 below:

FOUNDATION SOLUTION	REASONS WHY NOT SUITABLE
Traditional strip, pad, trench-fill	Ground conditions too soft (particularly superficial deposits) and would lead to excessive settlement.
Raft foundation	Ground conditions too soft (particularly superficial deposits) and will lead to excessive settlement of raft slab and bearing failure.
Ground improvement (stone columns) followed by traditional foundations	Soft clays too soft for this technique.
Dynamic compaction	Not suitable given ground conditions and residential setting of the site.
Ground improvement using Rigid Inclusions followed by raft foundation	Method not approved by NHBC
Ground improvement using Controlled Modular Columns followed by raft foundation	Method not approved by NHBC

Table 4.1. Alternative foundation options

5. PILING RISK ASSESSMENT

5.1. Proposed Piling Methodology

The development is proposed to be founded on 268 No. Continuous Flight Auger (CFA) bearing piles and will be comprised of 300mm diameter piles with lengths that will terminate in the underlying indigenous White Chalk Sub-Group.

This is subject to detailed design by the piling contractor.

5.2. General

The Piling Risk Assessment has been undertaken in accordance with guidance by the Environment Agency, namely, Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention NC/99/73 (EA, 2001).

In particular this risk assessment refers to the six pollution scenarios detailed within NC/99/73 which are summarised in Table 5.1. The six possible pollution scenarios have been identified and described, representing situations where the Environment Agency is concerned that piling or penetrative ground improvement operations have a potential to cause pollution.

The six scenarios considered are as follows:

SCENARIO	DETAILS
1	Creating of preferential pathways through a low permeability layer (an aquitard) to allow potential contamination of an aquifer.
2	Creation of preferential pathways through a low permeability surface layer to allow migration of landfill gas, soil gas or vapours to surface.
3	Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.
4	Direct contact of the piles of engineered structures with contaminated soil or leachate causing degradation of pile materials.
5	Driving of solid contaminants down to an aquifer during pile construction.
6	Contamination of groundwater and subsequently surface waters by wet concrete, cement paste or grout.

Table 5.1: Generic Pollution Scenarios

5.3. Risk Assessment

The piling risk assessment for the site is contained within Table 5.2, below. Risk estimation has been undertaken in line with guidance provided by the NHBC and Environment Agency (NHBC/EA, 2008).

POLLUTION SCENARIO	SOURCE (S) PATHWAY (P) RECEPTOR (R)		COMMENT
Creation of preferential pathways through a low permeability layer (an aquitard) to allow potential contamination of an aquifer.	S	Contaminated Made Ground	**Risk: Low** The proposed piling method is CFA which is a non-displacement method of piling. Theoretically, any disturbance to the ground is minimal and there should be no formation of preferential pathways, as the concrete is cast in intimate contact with the surrounding soil. The pile carries load via skin friction so is in contact with the surrounding ground for its full length.
	P	Pile / soil interface	
	R	Principal Aquifer	
Creation of preferential pathways, through a low permeability surface layer, to allow migration of landfill gas, soil gas or vapours to surface.	S	Soil Gas / Vapours	**Risk: Low** Very low gas generation potential identified during ground gas risk assessment. No landfill gas identified in monitoring visits. Characteristic Situation CS1 was identified from GSV, which is the lowest risk classification. The creation of any new pathways will be minimal due to the CFA piling technique. No cases of known/inferred pollution from this scenario reported.
	P	Pile / soil interface	
	R	Buildings, Construction Workers and End Users	
Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.	S	Contaminated Made Ground	**Risk: Low** CFA piling results in the generation of arising at the surface which could include potentially contaminative material. Health and safety precautions e.g. method statements, person protective equipment (PPE) and respiratory protective equipment (RPE) will be adopted by the contractor during piling works. Site inductions to inform all site workers of potential risks and what to do in the case that contaminated arisings are identified will be by the contractor during piling works. Any contaminated arisings will be stockpiled then disposed off-site at a suitably licensed facility under an appropriate duty of care. No cases of known/inferred pollution from this scenario reported by EA.
	P	Direct Contact and Inhalation and Ingestion of Dust	
	R	Site Workers	

Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials.	S	Contaminants in soils and groundwater	**Risk: Low** All tested samples indicated a Design Class of DS1 and an Aggressive Chemical Environment for concrete class (ACEC) of AC-1, which are the lowest Design Class and ACEC class for concrete requirements, indicating that there will be minimal sulphate attack on concrete. Aggressive ground conditions not identified from the site investigation. No cases of known/inferred pollution from this scenario reported by EA.
	P	Direct contact and aggressive attack	
	R	Buried concrete	
The driving of solid contaminants down into an aquifer during pile driving.	S	Contaminated Made Ground	**Risk: Low** Proposed piling method is CFA which is a non-displacement method of piling. No viable sources of contamination were identified in the investigation. No cases of known/inferred pollution from this scenario reported by EA.
	P	Soil / pile interface	
	R	Secondary and Principal Aquifers	
Contamination of groundwater, and subsequently, surface waters by wet concrete, cement paste or grout.	S	Construction materials	**Risk: Low** The site is not located within a Groundwater Source Protection Zone and piles are proposed to extend beneath groundwater levels. Whilst the risk of contamination cannot be discounted the impact is assessed as low as both concrete and grout have low mobility potential. No cases of known/inferred pollution from this scenario reported by EA.
	P	Migration via permeable materials	
	R	Groundwater	

Table 5.2: Piling Risk Assessment for Barrington Road, Durrington-on-Sea site.

6. CONCLUSIONS

The development is proposed to be founded on 268 No. Continuous Flight Auger (CFA) bearing piles and will be comprised of 300mm diameter piles with lengths that will terminate in the underlying indigenous White Chalk Sub-Group.

CFA piling is a non-displacement method. Non-displacement piling methods involve the extraction of soil prior to the placing of the pile. Theoretically therefore there is no disturbance of the surrounding soil and provided that the pile is formed or placed in intimate contact with the surrounding soil there should be no formation of preferential pathways. The pile relies on skin friction to carry the load and therefore by design has to be in tight contact with the surrounding ground to work.

Detailed investigation of the site has been undertaken and no viable sources of contamination identified. There were no exceedances of the GAC used and gas monitoring did not identify any causes for concern.

Various potential foundation solutions have been evaluated for the site and the piled solution is the only feasible solution for the proposed building given the ground conditions present.

As part of this assessment a number of potential adverse environmental impacts have been considered and assessed on a qualitative basis. The overall risks associated with the proposed foundation works are considered to be low and the use of CFA piles is considered appropriate for the ground conditions at the site.

References

Environment Agency. 2001. Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention ref NC/99/73.

HBC and Environment Agency 2008. Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D Publication 66: 2008.

APPENDIX 1 – REPORT CONDITIONS

This report is produced solely for the benefit of **McCarthy Stone** and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

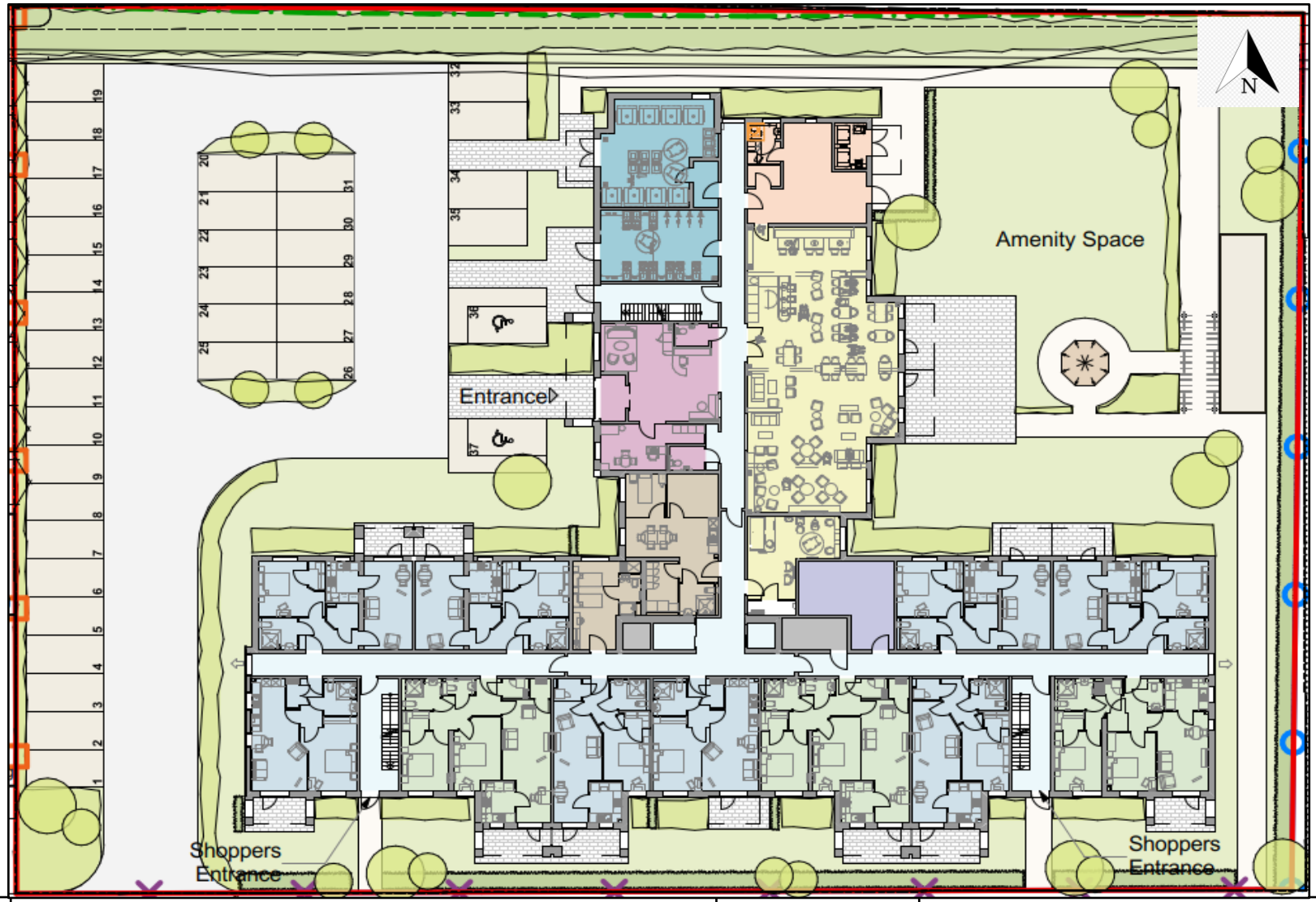
The report is based on ground investigations carried out by Ridge & third parties. Some of the opinions are based on unconfirmed data and information and are presented in good faith without exhaustive clarification. Where ground contamination is suspected but no physical Site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to detailed activities related to the Site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, not revealed by this research cannot be discounted.

This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Ridge and Partners LLP. In time improved practices or amended legislation may necessitate a re-assessment.

The report is necessarily limited to those aspects of land contamination specifically reported on and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents that may occur. The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous use and abuse of the Site and adjacent Sites. The report concentrates on the Site as defined in the report and provides an opinion on surrounding Sites. If migrating pollution or contamination (past or present) exists, this can only practically be better assessed following extensive on and off-site intrusive investigations and monitoring.

RIDGE

FIGURE 1 – DEVELOPMENT PLANS

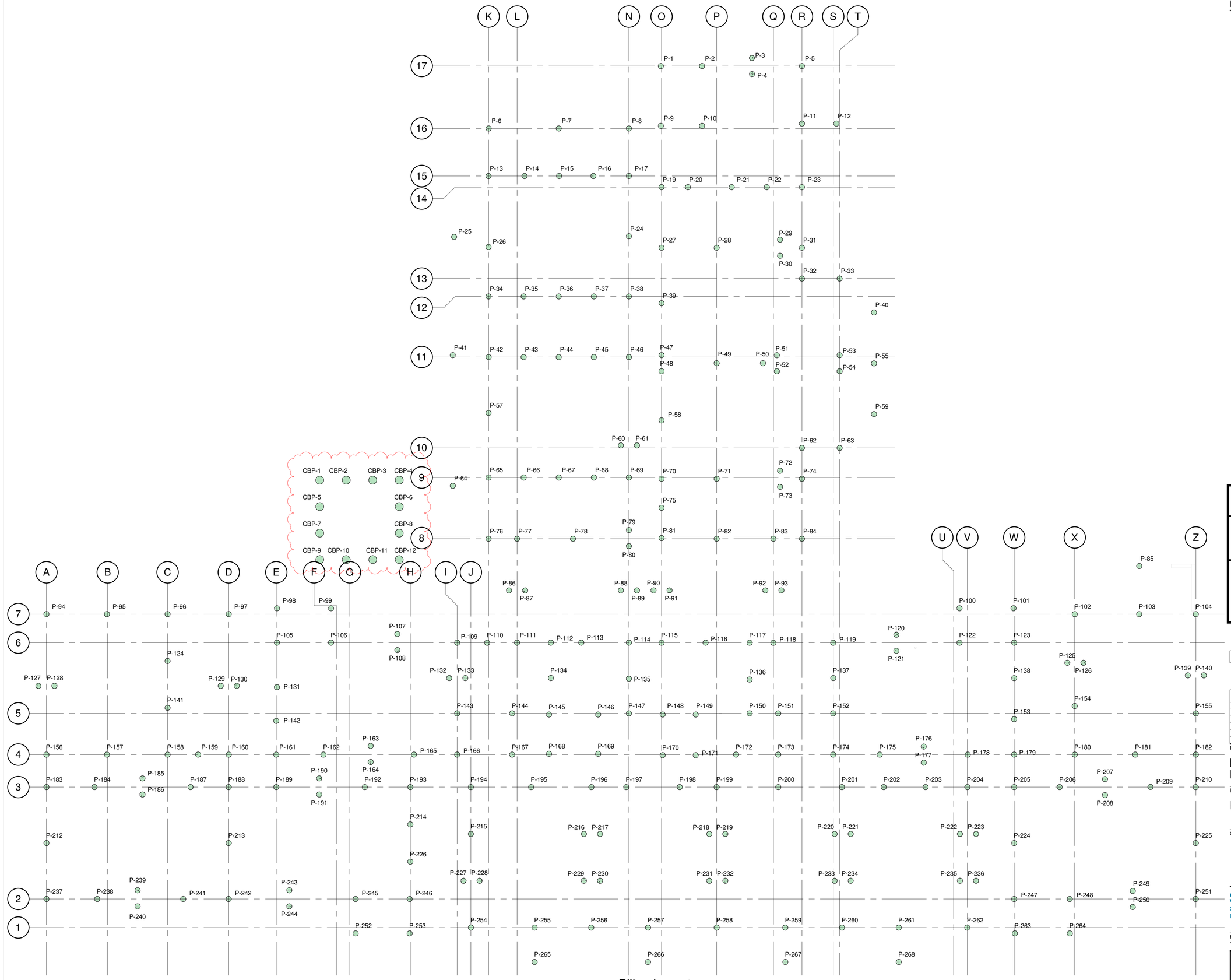


Project:	5021508 - McCarthy Stone - Land at Barrington Road, Durrington-On-Sea	**Title:**	Site Development Plan
Job Number:	5021508	**Client:**	McCarthy Stone
Drawing:	5021508-Fig2	**Revision:**	-
Drawn:	EP	**Date:**	January 2024
Checked by:	MS	**Scale:**	NTS

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DO NOT SCALE FROM THIS DRAWING

Piling Layout

(1 : 100)

Notes

GENERAL

1. This drawing is to be to be read in conjunction with all relevant Engineers, Architects and Specialists drawings, models and specifications.
2. No dimensions are to be scaled from this drawing.
3. All dimensions are in millimetres and levels are in metres unless noted otherwise.
4. The Engineer is not responsible for dimensional information except where shown on the drawings. All setting out information, dimensions etc. shall be calculated from the Architects drawings.
5. All drawings issued in CAD/Revit format are provided solely as a supplement to the information shown on the equivalent PDF drawing only.
6. The contractor shall verify all site dimensions and existing details, setting out dimensions and levels with the Architect. Engineer to be informed of any discrepancies before proceeding with work.
7. Existing details are assumed and are to be confirmed on site with any discrepancies recorded and reported to the Engineer so that any adjustments required to the scheme can be considered.
8. The contractor is responsible and liable for ensuring the stability of the works, adjoining structures and services at all stages of construction. Any temporary works are to be designed and detailed by the contractor.
9. All existing services are to be located prior to commencement of the work on site. Unless shown we have no knowledge of any underground obstructions or services. These are to be determined prior to the commencement of the works on site.
10. Refer to the Architect's/Fire Consultant's drawings and specifications for the overall fire strategy and protection requirements of the building and structure.

PILING

1. All piles to be 300mm nominal diameter to subcontractor design.
2. Piles to be contractor designed and constructed generally in accordance with ICE specification for piling works.
3. Maximum pile tolerance to be as follows:
   level ±15mm
   position ±50mm
   rake 1 in 75mm
   settlement at DVL 10mm
4. Contractor to allow for 100% integrity testing and 5% static load testing in accordance with ICE specification for piling works.

HAZARDS LEADING TO UNUSUAL OR SIGNIFICANT RISKS DURING THE CONSTRUCTION PROCESS ARE IDENTIFIED ON THIS DRAWING AS:

NOTE: THE LIST BELOW IDENTIFIES CERTAIN RISKS WHICH ARE DEEMED TO BE UNUSUAL, ABNORMAL OR UNEXPECTED TO A COMPETENT CONTRACTOR CARRYING OUT WORK OF THIS NATURE BUT DOES NOT COVER ALL POSSIBLE SITUATIONS WHICH MAY BE ENCOUNTERED DURING THE CONSTRUCTION PROCESS. IT IS THEREFORE THE MAIN CONTRACTOR'S RESPONSIBILITY TO IDENTIFY ANY FURTHER RISKS/HAZARDS AND TAKE APPROPRIATE ACTION.

RISKS/HAZARDS SPECIFIC TO THIS DRAWING:

CONSTRUCTION ISSUE

Rev.	Amendment	Dm.	Chkd. / Appd.	Date
C02	Crane piles updated following receipt of TSK Design.	IR	GM/GM	04.03.24
C01	Construction Issue	IR	GM/GM	16.02.24
P03	Preliminary Issue	IR	GM/GM	15.12.23
WIP1	Work in Progress	DW	GM	07.12.23
P02	Preliminary Issue	IR	GM/GM	17.11.23
P01	Preliminary Issue	IR	GM/GM	07.11.23

Project

McCarthy Stone
Durrington-on-Sea

Drawing

Piling Layout

Client

McCARTHY STONE
Life, well lived

SWH Project Number: 303941

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Scale at A1 - 1 : 100

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