

Bluefield Land Limited

**PONTARDAWE FOUNDRY, OLD FOUNDRY
ROAD, PONTARDAWE, SA8 4EZ**

Outline Remediation Strategy Report

12360/LW/23/ORS

CLIENT: Bluefield Land Limited

PROJECT: Pontardawe Foundry, Old Foundry Road,
Pontardawe, SA8 4EZ

TITLE: Outline Remediation Strategy Report

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1.0 INTRODUCTION

1.1 GENERAL

Intégral Géotechnique (Wales) Limited (IG) have been appointed as Geotechnical and Geoenvironmental Consultants by Bluefield Land Limited to prepare a remediation strategy for the redevelopment of a site known as Pontardawe Foundry along Old Foundry Road, Pontardawe to a standard suitable for proposed commercial end use.

The proposed commercial development will comprise the construction of 15 units with associated car parking areas, access road and minimal areas of soft landscaping.

The following report has been produced by Intégral Géotechnique (Wales) Limited:

- Pontardawe Foundry, Old Foundry Road, Pontardawe, Site Investigation Report, Report No. 12360/RAH/19/SI Rev B dated August 2023.

This report has been relied upon as part of this remediation strategy and should be read in conjunction with this report.

The purpose of this report is to provide a remediation strategy for the delivery of the site to a standard suitable for the proposed commercial end use and details how the remediation works will be monitored and validated.

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1.2 PROPOSED DEVELOPMENT

The proposed commercial development will comprise the construction of 15 units with associated car parking areas, access road and minimal areas of soft landscaping as illustrated in Kennedy James Griffiths, Proposed Site Plan, Drawing No. 1618:PL1 04 dated 5 March 2023.

2.0 BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The site is located to the south of Arthur Terrace, in Pontardawe, at a National Grid Reference of SN 726 041, see Figure 1. Access was gained off Old Foundry Road, along the south-eastern boundary of the site.

The site is roughly rectangular in shape and occupies an area of approximately 0.75 hectares. The boundaries of the site are defined by an industrial estate access road to the south-east, the residential properties of Holly Street to the south-west, an approximately 2m high embankment to the former Swansea Canal with Arthur Terrace beyond and an approximate 1.5m high retaining wall to Holly Street to the north-west, and vacant land to the north-east, see Figure 2.

The former foundry buildings and neighbouring church were demolished at the time of the intrusive investigation and a large stockpile was located in the north-east of the site, comprising demolition materials, covering a maximum of 55m by 36m and up to four metres high. Smaller bunds of material were located in the three access ways and the site was partially surrounded by Heras fencing.

The main part of the site is situated on largely flat ground, sloping very slightly from north-west to south-east sitting between 33m and 31m AOD. There is a more significant change in level in the north of the site, with an embankment from the path level alongside the canal (approximately 36/37m AOD), dropping steeply to the site level at approximately 32mAOD immediately south.

Vegetation grows the north of the site, south of the canal.

2.2 AVAILABLE SITE INVESTIGATION DATA

The following report has been produced by Intégral Géotechnique (Wales) Limited:

- Pontardawe Foundry, Old Foundry Road, Pontardawe, Site Investigation Report, Report No. 12360/RAH/19/SI Rev B dated August 2023.

This report has been relied upon as part of this remediation strategy and should be read in conjunction with this report.

2.3 SITE HISTORY

The history of the site was assessed with the aid of historical maps. The 1878 edition of the map shows the site to be occupied by an Iron Foundry. The foundry buildings are shown to be present in the central part of the site. The parts of the site to the north-east and south-west of the foundry are shown to be undeveloped. An Old Limekiln is indicated to the north-west of the site. A canal is present on an embankment running along the north-west boundary of the site. The land to the north and north-west of the site is mostly developed for residential use. A gas works is present to the west of the site, approximately 110m west-north-west. The land to the south and east is undeveloped. Pontardawe town is shown to the south-west of the site.

The 1918 edition of the map shows no change to the foundry part of the site. No additional buildings or features are present. A Methodist Chapel is now present in the south-western part of the site. Further residential development has taken place to the north and south-west of the site and a printing works is indicated approximately 50m to the south-west. The land to the south and east remains undeveloped.

Between 1918 and 1941/1942 there is no significant change to the site. The surrounding areas have been further developed for residential use and the gas works is no longer present.

The 1941/1942 editions of the map show the development of additional foundry buildings to the north of the existing buildings. A circular feature is shown immediately to the north of the northern site boundary. A large Sheet Mill has been developed some 100m to the south of the site, together with associated railway tracks, tanks and chimneys. The land between the site and the Sheet Mill remains as undeveloped.

The 1964/1965 edition of the map shows the site to now be occupied by 'Works'. No significant change to the buildings has taken place, with the exception of the additional new building in the north-east corner of the site. The circular feature previously identified just outside the northern boundary is now shown as a pond. The southern part of the site is occupied by an English Methodist Church.

The 1974 edition of the map shows very little change to the site. A chimney is now shown as part of the 'Works' located in the approximate centre of the site. The land to the south and east of the site is now shown to be an industrial estate with several buildings and uses shown, including a factory, a bakery, a council yard and a bus depot. The pond formerly present immediately to the north of the site is no longer shown. There have been no significant changes to the land to the north and west of the site.

2.3 SITE HISTORY (CONTINUED)

There have been no significant changes to the site between 1974 and present day. The foundry and the church closed and became disused, the dates of this are unknown. These were demolished in 2006 and a layer of crushed stone placed across the site.

2.4 SUMMARY GROUND CONDITIONS

The site is covered by a layer of made ground/fill, typically shallower in the western part of the site. Coarse rubble is present at ground level site-wide with the exception of, an asphalt and concrete covered road leading from the access point in the north-west corner to the southern access along the southern boundary and along the north of the site, plus an area covered by concrete slabs in the approximate centre of the site. Made ground is underlain by superficial deposits of alluvium/fluvioglacial deposits to significant depths. Weathered bedrock was not encountered during the intrusive investigations.

The old buildings associated with the foundry and the church have been demolished, however not all foundation/obstructions have been grubbed out and removed.

Made Ground

Made ground soils are present across the whole site, from ground level and encountered to variable depths. The soils were encountered to a maximum depth of 3.0m below ground level (bgl) in BH2.

The general made ground typically comprises “*Greyish brown/dark grey/dark brown, silty clayey gravel/sand with cobbles*” and contains concrete, brick, wood fragments, slag, clinker, coal, (suspected) lime gravel, plastics, metals, ceramic fragments sandstone. This was encountered to between 0.8m and 3.0mbgl.

More locally, dark grey/black ashy gravel/sand was encountered to a maximum of >2.0mbgl in TP102 and locally included within the soils detailed above, described as “*Black/dark grey, silty clayey sandy gravel with ash. concrete, brick, coal, burnt shale, clinker and slag.*”

Made ground soils were noted to be difficult to dig in the central area of the site; trial pits required widening or lengthening in order to make progress. Additionally, obstructions were noted in TP101 (0.2m thick concrete slab) and TP111 (possible old footings/walls immediately below ground level).

2.4 SUMMARY GROUND CONDITIONS (CONTINUED)

Superficial Deposits

Superficial deposits were encountered as either silts/clays, peat or sand/gravels. The deeper boreholes confirmed that silts/clays are the predominant soil, with localised areas of gravel/gravel and cobbles. It is likely that the shallow soils encountered across the site represent alluvial strata, and with depth (some 6m below ground level), the soils are likely to be fluvioglacial deposits.

Granular superficial deposits were typically encountered in the western part of the site and where encountered in the east of the site, were observed at depth in the eastern part.

Where the base of the granular soils could be confirmed (where excavation or drilling continued into strata immediately below), the granular soils were observed to a maximum thickness of 1.80m (in BH3). Sandy gravelly silty clays were commonly encountered overlying the gravels in the west.

SPT testing in the granular soils indicates the soils are loose to medium dense with N values of 6 and 20. The observations during trial pitting suggest that this is the case site-wide, with spalling observed in the soils and no record of particularly difficult excavation/hard digging.

Peat deposits were predominantly encountered in the eastern part of the site, with the exception of BH1 which encountered peat lenses within silt/clay. Peat was described as dark brown/orange, brown and black peat with abundant decaying organics and occasional large tree trunks as seen in TP101 and BH1. Peat was commonly observed as lenses within the alluvial silts across the site and was observed to a maximum depth of 5.7m in BH1.

As expected, SPT testing in the peat deposits indicates the soils are very low strength, with N values between 2 and 3 (with the exception of a wood obstruction encountered in BH1).

Silts and clays across the site are typically of low compressible strength and alternate between silty clays and clayey silts. Gravel content is rare but occasional sandstone was observed.

The in-situ SPT testing in the cohesive soils indicates the clays and silts to be of low strength, generally soft becoming firm to 15m, with N values ranging between 2 and 9 in BH1, 0 and 18 in BH2 and 1 and 13 in BH3.

2.4 SUMMARY GROUND CONDITIONS (CONTINUED)

However, in soils below 5m, SPT test results indicate N values typically between 4 and 15, and therefore the silts/clays are interpreted to be largely firm between 5m and 15m below ground level. BH1 was continued to 28m depth, and SPT results indicate the soils to be soft to firm below this depth.

Stockpiles

In the north-east of the site, a stockpile covers an approximate surface area of 1450m² and is up to 4.5m tall. The material largely comprises demolition rubble, with abundant fragmented concrete and bricks, and localised hardstanding gravel.

The material was typically described as demolition rubble logged as follows:

“Made Ground comprising: light grey/buff, slightly silty/clayey, sandy, gravel and cobbles or cobbles and boulders of brick, concrete and breezeblocks. Occasional reinforcing bar, scrap metal, plastic, slate, sandstone, tile fragments and textile (fabric and rope).

Sample B, as indicated on Figure 2, differed very slightly, described as a brownish grey slightly silty/clayey sandy fine to medium gravel of concrete, sandstone and brick, with occasional blacktop and high cobble and boulder content.

Groundwater

Water ingress or seepage was typically encountered around 1.0mbgl in the trial pits, ranging from 0.6m to 3.8mbgl during the intrusive works.

During the drilling of the boreholes, groundwater was encountered at 0.5m in BH1, 4.5m in BH3 and BH2 encountered a perched water strike at 1.1m and another water strike at 4.3mbgl.

2.5 IDENTIFIED CONTAMINATION

2.5.1 ***Made Ground***

The results of the laboratory testing indicate a localised single exceedance of cyanide. Asbestos was detected within eight samples of made ground.

Cyanide was detected at an elevated concentration within one made ground sample from TPA at 0.4 – 1.0m (Intégral Géotechnique – 2006 investigation) at a concentration of 130mg/kg, elevated above the adopted threshold of 34mg/kg.

2.5 IDENTIFIED CONTAMINATION (CONTINUED)

In regard to petroleum hydrocarbons it should be noted that historic testing methods differed from today, and therefore results have been screened on a “worst-case” basis, for example where aliphatic and aromatic results have not been separated in historic test results, the screening process has assumed that all detections are either aromatic or aliphatic, whichever is most stringent.

The results of the petroleum hydrocarbon testing indicate that the concentrations of the petroleum hydrocarbon bands are below the adopted thresholds within the made ground samples.

Asbestos has been identified in eight of the thirteen samples of made ground tested as part of the 2019 investigation, four samples of made ground collected below ground level and four sample of stockpiled material (also made ground). Fibres of amosite and chrysotile asbestos were identified and quantified as follows:

- TP101 – 0.7m: Chrysotile - 0.082%
- TP102 – 1.1m: Chrysotile - <0.001%
- TP104 – 0.3m: Chrysotile - 0.003%
- TP195 – 0.2m: Amosite - <0.001%
- Sample A: Chrysotile - <0.001%
- Sample C: Chrysotile - <0.001%
- Sample D: Chrysotile - 0.001%
- Sample E: Chrysotile - <0.001%

No further exceedances were detected within the samples of made ground.

2.5.2 *In-situ Natural Ground*

No visual or olfactory evidence of contamination of the in-situ natural ground was identified during trial pitting, with the exception of a hydrocarbon odour associated with groundwater ingress into alluvial silt in TP110. A sample was collected at 1.70m and analysis detected minor concentrations of aromatic EPH chain lengths C10-C21, but none of the concentrations exceed the adopted thresholds.

A total of four samples of natural soils, all alluvial silts/clays or peat, have been tested during the 2019, 2006 and 2005 investigations. The results of all testing indicate a single elevated concentration of the petroleum hydrocarbon band aromatic C5-C7 within TP4 1.0m (ESP – 2005 investigation), at a concentration of 83mg/kg, elevated above the adopted threshold of 27mg/kg.

2.5 IDENTIFIED CONTAMINATION (CONTINUED)

As stated above the historic testing methods for petroleum hydrocarbons differed from today, and therefore results have been screened on a “worst-case” basis, for example where aliphatic and aromatic results have not been separated in historic test results, the screening process has assumed that all detections are either aromatic or aliphatic, whichever is most stringent.

No further exceedances were detected within the samples of natural ground.

2.5.3 Groundwater Contamination

Most of the results were below the laboratory detection limits of the laboratory. However, three elevated concentrations of vanadium have been recorded in excess of the EQS value and a single elevated concentration of sulphate in excess of the UK Drinking Water Standards have been detected over the three rounds of testing.

No further determinants tested were detected above the adopted guideline values and no organic contaminants have been recorded at levels greater than the Limit of Detection.

2.5.5 Ground Gases

The results of the gas monitoring programme indicated a maximum methane concentration of <0.5% and a maximum carbon dioxide concentration of 1.6%. A maximum gas flow rate of <0.3l/hr was measured during the gas monitoring programme.

In accordance with CIRIA Report C665 a Gas Screening Value (GSV) of 0.0048l/hour has been calculated. For a commercial development, this GSV corresponds to gas characteristic situation 1.

In accordance with BS8485:2015 +A1:2019, based on the results of the gas monitoring with the site being classified as Characteristics Situation (CS) 1, for Development Type B and C (commercial), the minimum gas protection score required is 0, and therefore no specific gas protection measure are required.

2.6 DETAILED SITE-SPECIFIC RISK ASSESSMENT

The general approach for assessing the potential risk to a receptor is by a combination of qualitative and quantitative risk assessment.

A quantitative risk assessment would involve selecting and deriving generic assessment criterion to compare low risk substances, based on fate, transport and toxicological properties and the exposure scenario being considered.

2.6 DETAILED SITE-SPECIFIC RISK ASSESSMENT (Continued)

A single elevated concentration of cyanide and asbestos fibres were detected within the made ground. Asbestos fibres were also encountered within the onsite stockpile of made ground/demolition rubble. A localised single exceedance of a petroleum hydrocarbon band was detected in the natural ground.

There are no published screening criteria values for asbestos, and neither are there any in preparation. As discussed in CIRIA Report C733 Asbestos in Soil and Made Ground: a Guide to Understanding and Managing Risks, agreement has yet to be reached in the UK on an appropriate toxicological criterion on which a screening value for asbestos could be based. It also states that 'based on current knowledge, it is believed that that a scientifically defensible UK GAC (generic acceptance criteria) for asbestos in soil cannot be developed or imported.'

It is therefore considered that a more qualitative assessment of the potential risk is appropriate, as asbestos is determined to be a non-threshold substance.

CIRIA Report C733 states that asbestos (asbestos containing materials and asbestos containing soils) only present a risk to health if airborne fibres are released into the atmosphere. The report goes on to state that the number of fibres released into the air from asbestos containing soils is likely to be influenced by a number of site-specific factors, as listed below.

- Characteristics of the asbestos (concentration, degree of heterogeneity, depth in relation to final ground level, volume/area, type, condition, extent of bonding, weathering, fraction of free fibres, shape of fibres)
- Characteristics of the soil (type, moisture content, surface vegetation, presence of hard standing)
- Weather (humidity, precipitation, temperature, ground freezing, wind speed and direction)
- Land use/soil disturbing activities (behaviour of receptors, distance between receptor and source, types of activity, duration/frequency of activity, dust mitigation measures).

The depth below ground level of the asbestos containing soils is imperative to the potential risk posed.

CIRIA Report C733 states that in the absence of significant physical disturbance, exposure to airborne asbestos fibres from soil will be from friable materials or asbestos fibres present at, or very close to, the soil surface (the soil – air interface).

2.6 DETAILED SITE-SPECIFIC RISK ASSESSMENT (CONTINUED)

Materials that have been buried, or are below the soil surface, will pose a lower, or less immediate, risk as these materials are unable to release airborne fibres unless brought to the soil surface by physical activity/disturbance.

Given the contamination recorded and the presence of asbestos within the made ground (in-situ and stockpiled), it is considered that a potential risk to human health may exist via the following relevant contaminant pathways:

- Dermal contact
- Ingestion of soil or soil derived dust
- Inhalation of soil bourn dust
- Migration of contaminants in ground to drinking water supply pipes

It is considered that remedial measures will be necessary to protect future site users and construction site operatives from the contamination recorded within the made ground.

The remedial measures to be carried out have been designed to address the identified potentially active contaminant pathways listed above.

3.0 REMEDIATION STRATEGY

The findings of the site investigation carried out across the site has identified that a potential risk to end users is present from the contamination recorded within the made ground (in-situ and stockpiled).

A remediation strategy is proposed such that the site is prepared to a standard suitable for the proposed commercial end use.

The following remediation strategy is proposed for the site:

- If any asbestos containing materials (ACMs) are observed on site they should be handpicked by an asbestos awareness trained contractor. These works should be carried out by a suitably licensed contractor in accordance with the requirements of the Control of Asbestos Regulations (2012).
- Any handpicked ACM should be disposed off-site at a suitable licensed facility as hazardous waste. Daily records and waste transfer notes should be kept in order to document the identification and subsequent removal of any ACM. These records and waste transfer notes should be made available for review as they will be required for remediation verification.
- Following completion of the asbestos clearance works appropriate validation sampling should be undertaken, as required.
- All soft landscaped areas will require provision of a clean capping/cover system in order to break the link between future site end-users any residual contamination within the underlying made ground. The capping system should be in the form of a minimum thickness of 600mm of clean imported subsoil and topsoil, placed on top of a hi-vis geotextile separation/alert membrane in all areas of soft landscaping.
- Adoption of appropriate drinking water supply pipe.

4.0 REMEDIATION IMPLEMENTATION

4.1 OBJECTIVES

The main objective of the proposed remediation works is to render the site suitable for commercial end use. The remediation activities required in order to achieve this objective are as follows:

- Break any potential pathway between proposed site end users and contaminated soils.

4.2 METHODOLOGY

The remediation works required in order to meet the objectives defined above will be undertaken as follows:

- Handpicking of any encountered asbestos containing materials by a suitably licensed contractor in accordance with an appropriate risk assessment, managed in accordance with the requirement of the Control of Asbestos Regulations (2012). Any handpicked asbestos containing materials should be disposed of off-site at a suitable licensed facility as hazardous waste. Following completion of the asbestos clearance works appropriate validation sampling will be required.
- All soft landscaped areas will require provision of a clean capping/cover system in order to break the link between future site end-users and any residual contamination within the underlying made ground. The capping system should be in the form of a minimum thickness of 600mm of clean imported subsoil and topsoil, placed on top of a hi-vis geotextile separation/alert membrane in all areas of soft landscaping.
- Adoption of DCWW agreed drinking water supply pipe.

The site will be deemed remediated by the following active remedial measures:

- Handpicking and removal of any encountered ACM by a licensed asbestos contractor.
- Completion of any required validation sampling.

4.2 METHODOLOGY (CONTINUED)

- Incorporation of a robust clean 600mm thick capping layer within proposed soft landscaped areas, with a hi-vis geotextile separation/alert membrane at the base of the capping soils.
- Provision of DCWW agreed drinking water supply pipe.

Review of the methodologies will be a continuing process and subject to findings of the proposed validation works, and if necessary further quantitative and qualitative risk assessments.

4.3 OPERATIONS

The works are to be undertaken by a specialist contractor experienced in brownfield reclamation/remediation. The remediation works will be monitored by Intégral Géotechnique (Wales) Limited.

Site preparation and operational constraints will be covered in the contractor's method statements. These should include the contractor's proposals for controls and monitoring of dust, noise, vibrations and odour.

Site procedures for managing the remedial works in a manner that will not cause pollution to controlled waters will be covered in the contractor's method statements which will be submitted in discharge of the Conditions of Planning.

The proposed remediation works will be controlled by the appropriate mobile treatment license to be held by the remediation contractor, if such works become necessary. The conditions imposed under the planning process will be considered adequate to control the works.

Additionally, a system should be established by which any 'unusual' materials that may be encountered are reported rapidly to the site management, so that the appropriate action may be taken, following specialist advice if necessary. An unusual material may be identified on site by colour, odour or physical nature.

5.0 REMEDIATION VERIFICATION

5.1 OBJECTIVES

A remediation verification report is required in order to record the data gathering necessary to demonstrate that the works have been carried out in accordance with the agreed strategy, confirm that the works satisfy the site remediation criteria and that the site is suitable for the proposed development.

5.2 REMEDIATION VERIFICATION METHODOLOGY AND DATA GATHERING REQUIREMENTS

The site reclamation/remediation will be verified by the following measures:

- Laboratory testing of soil samples as required, risk assessment and validation of the exposed surface following hand picking of any identified asbestos.
- Evidence to be provided of site records and waste transfer notes relating to identification and subsequent removal of any asbestos containing materials (ACM).
- Validation of the chemistry and thickness of the proposed 600mm thick capping layer to be placed within landscaped areas.
- Validation of the hi-vis geotextile separation/alert membrane layer at the base of the capping soils.
- Notification in the CDM file of residual risks associated with the remediated site.
- Certification of installation of DCWW agreed drinking water supply pipe.

6.0 FINAL REMEDIATION VALIDATION

The development will not be complete, in accordance with the remediation strategy for the site, until placement of the final 600mm (minimum thickness) of clean imported capping soils over a hi-vis anti mixing membrane to soft finished areas and hard finish construction has been completed.

In order to validate these works a series of hand dug pits will be excavated to confirm an adequate thickness of inert soils are in place. A photographic record will be kept. The capping system is to comprise imported clean inert materials conforming to the Requirements for the Chemical Testing of Imported Materials for Various End Uses and Validation of Cover Systems prepared by Welsh Land Contamination Working Group and satisfy appropriate soil guideline values for commercial development with areas of soft landscaping. Samples of topsoil and subsoil will be taken for laboratory analysis, at a rate of 4 per 250m³.

Placement of the required final 600mm capping layer will be the responsibility of the developer and is usually undertaken late in the development programme, as areas of soft landscaping are completed.

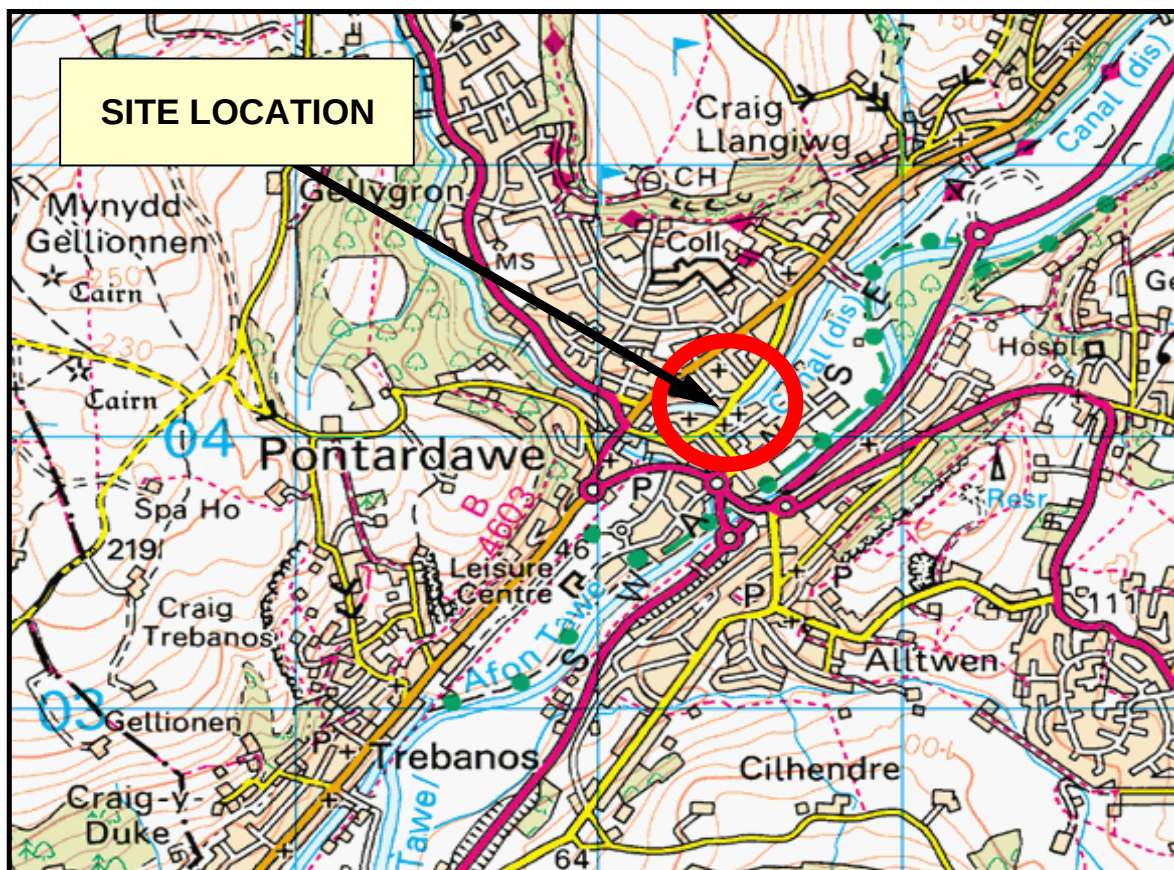
Reporting of the clean capping to areas of soft landscaping will be submitted independently of the remediation works.

In order to aid drainage of the areas of soft landscaping, it is recommended that the surface of the engineered formation is raked and loosened prior to the placement of the capping layer.

FIGURES



NORTH



Scale = 1:25000

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FIGURE 1 - SITE LOCATION

Pontardawe Foundry, Pontardawe

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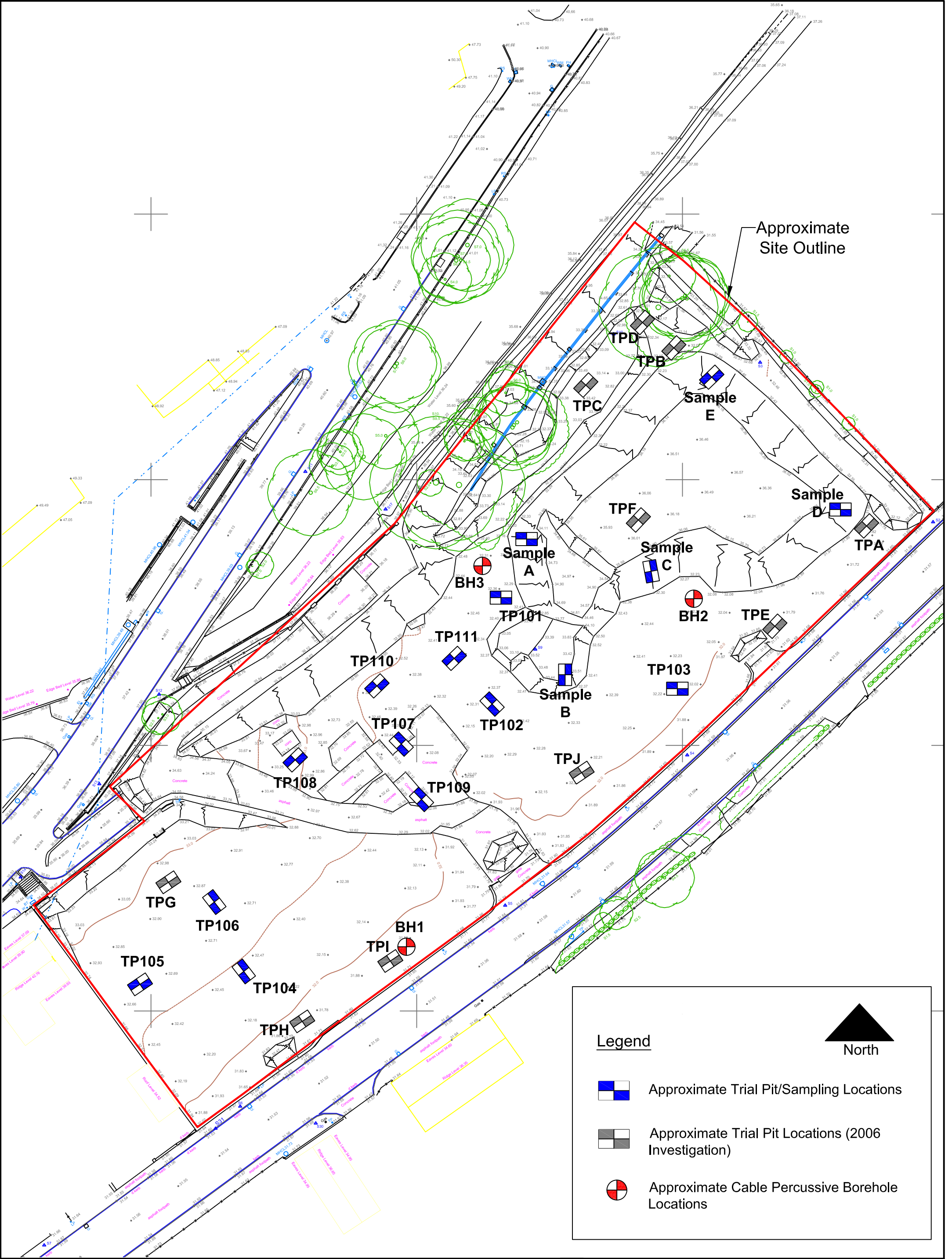


Figure 2: Exploratory Hole Location Plan