

Tai Tarian Limited

MELYN CLOSE, NEATH

Outline Remediation Strategy Report

12523/RAH/20/ORS

CLIENT: Tai Tarian Ltd

PROJECT: Melyn Close, Neath

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 CJ Construction (Wales) Ltd on behalf of Tai Tarian Ltd to prepare a remediation strategy for the redevelopment of the site to a standard suitable for proposed residential without home grown produce end use.

A Site Investigation Report (ref:12523/LP/19/SI/RevA) was produced by Integral Géotechnique, dated March 2020. Further to this, a Supplementary Site Investigation Report was also completed by Intégral Géotechnique (ref:12523/RAH), dated October 2020. These reports have been relied upon as part of this remediation strategy, and should be read in conjunction.

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

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1.2 PROPOSED DEVELOPMENT

The proposed development will comprise two multi-storey blocks of flats, areas of hardstanding and localised areas of soft landscaping.

2.0 BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The site is located adjacent to Melyn Close approximately 1km southwest of Neath at a National Grid Reference of 274480, 196170, see Figure 1.

The site is roughly rectangular in shape and occupies an area of approximately 0.22 hectares. The boundaries of the site are defined by existing residential properties with associated car parking and landscaped areas to the southwest, an existing access lane to the southeast, properties off Helen's Road to the northeast and the rear of properties off the A474 to the northwest. A site plan is presented in Figure 2.

The site is generally situated at an approximate elevation of 11m AOD. The grassed area within the western corner of the site slopes down steeply to an approximate elevation of 8m AOD. In the northeast of the site, the ground rises slightly with an exposed rock face within the northern corner. Helen's Road to the northeast is at a higher elevation than the site at approximately 18m AOD.

The site was visited during September 2020 to undertake the supplementary site investigation. At this time, the former block of five-storey flats had been demolished and the site was largely surfaced by made ground.

2.2 AVAILABLE SITE INVESTIGATION DATA

The following reports have been reviewed as part of these works.

Intégral Géotechnique	Site Investigation Report (Revision A), dated March 2020 Ref: 12523/LP/19/SI/RevA
Intégral Géotechnique	Supplementary Site Investigation Letter Report, dated October 2020 Ref: 12523/RAH

The above reports should be reviewed in conjunction with this report to gain a detailed appraisal of the site and the works completed to date.

The following provides a summary of the findings of the above listed investigations.

2.2.1 Site History

As part of the desk study included within the preliminary Site Investigation Report, the history of the site was assessed with the aid of historical maps which indicate that the site comprised generally undeveloped land until the 1960's. Up until this time, a limekiln was located on the north-east boundary of the site, subsequently demolished, and earthworks features were shown in the western corner. An old furnace was shown in the southwest of the site on the 1919 and 1935 maps only, but its position is not clear.

Flats were constructed on the site in the 1950/60's, which may have involved ground disturbance and reprofiling.

More recently, in the last year, the former flats have been demolished and the site is vacant and occupied by CJ Construction (Wales) Ltd for the proposed redevelopment.

2.2.2 Summary Ground Conditions

During the preliminary and supplementary intrusive site investigations, the ground conditions have been found to comprise a cover of made ground, overlying variable superficial deposits overlying weathered sandstone bedrock.

Made Ground

Typically, a layer of dark grey to black (becoming brown) slightly silty/clayey ashy sand/gravel with cobbles was encountered to circa 1.1/1.3mbgl, locally shallower (0.7mbgl in BH03). The materials contain various anthropogenic materials such as glass shards, clay pipe fragments, scrap plastic and scrap metal (cans). Gravel comprises fine to coarse sandstone, brick, concrete, slate, coal and limestone and cobbles were of predominantly sandstone, concrete and brick. Occasional boulders of concrete, up to 1.0m x 0.4m x 0.15m.

Superficial Deposits

Soft to firm and firm sandy and/or gravelly silty clays and loose to medium dense brown slightly silty gravelly sands. Gravel is generally of sub-angular to rounded sandstone and mudstone. Encountered beneath the made ground and extending to between 1.8m and 2.3mbgl.

Weathered Bedrock

The site is underlain by carboniferous sandstone of the Hughes Member. The supplementary investigation allowed the bedrock to be better investigated than the preliminary investigation, during which, boreholes refused on possible bedrock or sandstone boulders.

2.2 AVAILABLE SITE INVESTIGATION DATA (CONTINUED)

Suspected weathered bedrock comprising medium dense gravel of angular to sub-angular sandstone was encountered from 1.8m to 2.3m in TP01. Underlying this, or immediately underlying superficial deposits, weak to medium strong sandstone was encountered at 2.3mbgl in three deeper trial pits spread across the site (TP01, TP03 and TP05). Sandstone is grey and fine to medium grained. The excavator was scratching at the base of the trial pits with no progress.

During the preliminary site investigation, BH05 encountered possible bedrock/sandstone boulder at 0.5mbgl. The supplemental trial pits have consistently encountered the bedrock at greater depths (circa 2.3mbgl), and the findings indicate that the 'refusal' within the preliminary boreholes is likely to be attributed to sandstone cobbles/boulders rather than in-situ bedrock. However, the presence of an exposed rockface in this part of the site may suggest that rockhead is shallower in this part of the site compared to elsewhere.

Spalling of excavations was frequent during the investigations and groundwater was not encountered in any of the exploratory hole locations.

2.2.3 Identified Contamination

During the preliminary and supplementary investigations undertaken by Intégral Géotechnique, representative samples were taken from across the site and tested for a range of chemical elements/compounds.

In total, seven samples of made ground have been subjected to the following:

- Arsenic, boron, beryllium, cadmium, cadmium, total chromium, chromium III, chromium VI, copper, lead, mercury, nickel, selenium, zinc, total cyanide, pH value, total polyaromatic hydrocarbons (PAH), phenol, asbestos screen and organic content.
 - In addition, three samples were subjected to analysis for petroleum hydrocarbons during the preliminary site investigation

The results showed some samples recorded elevated levels of arsenic and lead as well as several exceedances of PAHs. All the other elements/compounds were below the relevant screening thresholds and no asbestos was identified within the samples.

2.2 AVAILABLE SITE INVESTIGATION DATA (CONTINUED)

Whilst a cover of Made Ground has been encountered at the site, no obvious point sources of contamination were encountered (tanks, hydrocarbons, electrical substations, infilled stream etc.) and no visual or olfactory signs of contamination were noted during the investigation.

2.2.4 Conceptual Site Model

Based on the findings and observations, a conceptual site model has been defined for the site.

The potential active pathways by which future end users and the wider environment could be affected by the contaminant sources identified are listed below:

1. Outdoor/indoor exposure to soil through skin contact;
2. Ingestion of soil;
3. Outdoor/indoor inhalation of fugitive dust;
4. Indoor inhalation of ground gas;
5. Migration of contaminants in ground to drinking water supply pipes

The remediation works to be carried out at the site have been designed to address the identified potentially active contaminant pathways listed above.

2.3 DETAILED SITE-SPECIFIC RISK ASSESSMENT

Due to the identified PAH, arsenic and lead contamination, remedial measures are required in order to remove the potential risk to future end users.

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 the fate, transport and toxicological properties and the exposure.

Chemical sampling and analysis has been undertaken as part of the preliminary and supplementary site investigations, providing a sufficient dataset to characterise the risk arising from made ground. This risk is assessed for human health, vegetation, groundwater and consideration is also given to the production of ground gas.

2.3 DETAILED SITE-SPECIFIC RISK ASSESSMENT (CONTINUED)

Human Health

The chemical test results indicate that the made ground poses a risk to site end users, owing to exceedances of arsenic, lead and PAH's when compared with the Suitable 4 Use Levels (S4ULs). As such, the identified risk requires appropriate remedial mitigation measures which are detailed in Section 3.0.

Vegetation

Concentrations of zinc and copper in the existing near surface made ground indicate the potential for adverse effects to vegetation. In addition, the near surface soils are unlikely to be of suitable material quality for the landscaping and garden areas. Accordingly, the risk to vegetation requires appropriate remedial mitigation measures which are detailed in Section 3.0. The mitigation measures required to sever the link between made ground and site end users (for protection of human health) will also succeed in providing an adequate growing medium for vegetation.

Groundwater

Whilst made ground has been encountered across the site, the thickness has not been identified as significant and the chemical test results do not indicate significantly elevated contaminant concentrations which are considered potentially leachable.

The proposed development will comprise two buildings covering much of the site (residential apartments/flats) and will incorporate hardstanding areas, an access road and managed drainage systems. In addition, the proposed remedial mitigation measures required to protect human health will comprise a clean cover capping system in areas of soft landscaping. Together, these conditions will greatly reduce the potential for rainwater percolation into and through the made ground, therefore minimising the potential generation of soil leachate.

Furthermore, during the preliminary site investigation, soil infiltration testing indicated that the underlying in situ natural soils are of negligible permeability and thus the transmission of any made ground sourced leachate would be limited.

Based on the above, the risks to controlled waters are therefore considered to be low and specific remedial mitigation measures are not required.

2.3 DETAILED SITE-SPECIFIC RISK ASSESSMENT (CONTINUED)

Ground Gas

Made ground has been recorded to a maximum depth of 1.3mbgl during the investigation, including beneath the former building. Potentially putrescible materials were not noted during the site investigations. This indicates that the potential for an on-site source of ground gas is considered to be low.

There are no BGS registered or historical landfills recorded within 250m of the site boundary which could provide an off-site source of gas. Areas of historically potentially infilled land are noted 81m to the northeast of the site at the location of former clay pits. There is no information as to the depth of the clay pits or what materials may have been used when they were infilled. However, given the distance from the site and their location on the other side of a canal, watercourse and a main road, the risk of ground gas migration is considered to be low.

No radon protection measures are required to be incorporated into new buildings and no specific ground gas protection measures are required.

3.0 REMEDIATION STRATEGY

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

Elevated levels of arsenic, lead and PAHs have been recorded within representative samples of made ground taken from across the site. In addition, the made ground does not provide a suitable growth medium for vegetation.

To protect site end users from the elevated contaminants in the made ground, it is recommended that a clean cover capping system is placed in all areas of soft landscaping and recorded in the CDM files for the development.

The clean cover capping system should comprise a minimum 600mm of suitable material introduced to the non-hardstanding areas with a suitable geotextile membrane at the base of the imported soils. In areas of hardstanding the pollutant linkage will be sufficiently broken by the concrete/tarmac surfaces, thus the hardstanding acts as a pollutant barrier itself.

The depth of excavation required in the made ground will be dependent on the finished levels of the development, when considering the thickness of clean capping soils that is required to be placed within garden and soft landscaped areas.

Residual obstructions associated with the former buildings, such as foundations, floor slabs, redundant services and walls, etc., should be broken out and removed if encountered.

This remediation process will ensure the delivery of a suitably remediated site for development and is of critical importance to the robustness of the remediation strategy.

The following remediation strategy is proposed:

1. Remnants of floor slabs, foundations, pits, basements, etc., if encountered should be broken out and removed. These works should be monitored for evidence of any unforeseen contamination. The acceptable and suitable excavated materials/arising, are to be processed and crushed to a suitable grade and stockpiled on site for testing and future re-use as granular fill.
2. In soft landscaped areas where made ground is to remain in-situ there will be the potential for the made ground to contain elevated levels of arsenic, lead and PAHs.

3.0 REMEDIATION STRATEGY (CONTINUED)

3. To sever the pollutant linkage between any contaminated made ground and site end users, it is recommended that a clean capping/cover system be incorporated into the proposed soft landscaped areas. This capping system will take the form of a minimum 600mm of clean topsoil and subsoil placed a geotextile membrane.

Consideration is also given to the removal of the made ground in its entirety, which would negate the requirement for a 600mm thick capping system, and instead a 150mm thick layer of topsoil/subsoil could be placed above natural ground

4. Drinking water supply pipe specification to be agreed between CJ Construction/Tai Tarian and DCWW. Reference should be made to UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, document No. 10/WM/03/21.

4.0 REMEDIATION IMPLEMENTATION

4.1 OBJECTIVES

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

- Removal of obstructions from below proposed buildings associated with the former historical site use;
- Break any potential pathway/pollutant linkage 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:

- The removal of any residual obstructions from below proposed buildings such as residual foundations, floor slabs, pits, walls, etc, associated with the former site use, if encountered.
- Made ground arisings should be screened to remove any unacceptable materials such as concrete, timber, etc. Following screening, the materials should be stockpiled separately, (i.e. placed in stockpiles separate from any crushed concrete, tarmac, natural ground etc.).
 - Granular materials will be subject to crushing to a suitable grade (6F5) prior to materials being approved for re-use at the site.
 - All surplus deleterious and in-situ soft materials will be removed off-site.
 - Stockpiled suitable materials will be placed in layers and well compacted in accordance with Department of Transport (DTp) Specification for Highway Works beneath areas of hardstanding or beneath the proposed building floor slabs.
 - Made ground materials are not suitable for re-use/remaining in-situ beneath proposed areas of soft landscaping unless overlain by a clean cover capping system (see below).
- In areas of soft landscaping that are underlain by made ground, a capping layer of minimum 600mm thickness of clean imported subsoil and topsoil is required. In order to maintain the integrity of the capping soils, prevent the upwards migration of contamination, and to act as warning to future site end users of the presence of underlying contaminated soils, a geotextile membrane should be placed at the base of the capping layer.

4.2 METHODOLOGY (CONTINUED)

A product such as *Terram* or similar alternative membrane could be considered.

- Alternatively, consideration can be given to removal of the made ground in its entirety beneath areas of soft landscaping, which would remove the requirement for 600mm thickness of clean imported topsoil/subsoil. In this instance, a minimum of 150mm of clean imported topsoil/subsoil would apply and a geotextile separation membrane would not be required.
- The adoption of DCWW agreed drinking water supply pipe.

In order to aid drainage of the soft landscaped areas, it is recommended that the surface of the engineered formation is raked and loosened prior to the placement of the required 600mm thick capping layer.

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

- Any buried obstructions, old footings, floor slabs and buried features associated with the former building have been sufficiently broken out and removed;
- Incorporation of a robust clean 600mm thick capping layer within proposed soft landscaped areas, with a geotextile membrane at the base of the capping soils.
- Where necessary, 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.

4.3 OPERATIONS (CONTINUED)

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.

In the event Asbestos is encountered on site, measures should be taken in accordance with the Control of Asbestos Regulations 2012.

5.0 REMEDIATION VERIFICATION AND VALIDATION

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:

- Validation of the chemistry and thickness of the proposed 600mm thick capping layer to be placed within soft landscaped areas including validation of the geotextile membrane at the base of the capping soils
- Or*
- Confirmation and validation that the made ground has been removed beneath soft landscaped areas and validation of the thickness of a 150mm thick layer of clean imported topsoil/subsoil.
- Notification in the CDM file of residual risks associated with the remediated site.
- Certification by Tai Tarian/CJ Construction of installation of DCWW agreed drinking water supply pipe

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 residential development with gardens. Samples of topsoil and subsoil will be taken for laboratory analysis, at a rate of 4 per 250m³.

If made ground is removed rather than covered by a 600mm capping layer, the exposed natural ground formation should be validated prior to placement of the reduced 150mm capping layer.

5.3 FINAL REMEDIATION VALIDATION

Placement of the required final 600mm capping layer will be the responsibility of the developer and is usually undertaken late in the development programme.

Reporting of the clean capping to garden areas will be submitted independently of the remediation works following the completion of the verification methods detailed above. Validation reporting will comprise validation letter report(s) to be submitted to the local authority as evidence that the site has been sufficiently remediated to protect site end users. Letter reports can be produced per plot/area to satisfy CML certification where necessary.

FIGURES



NORTH

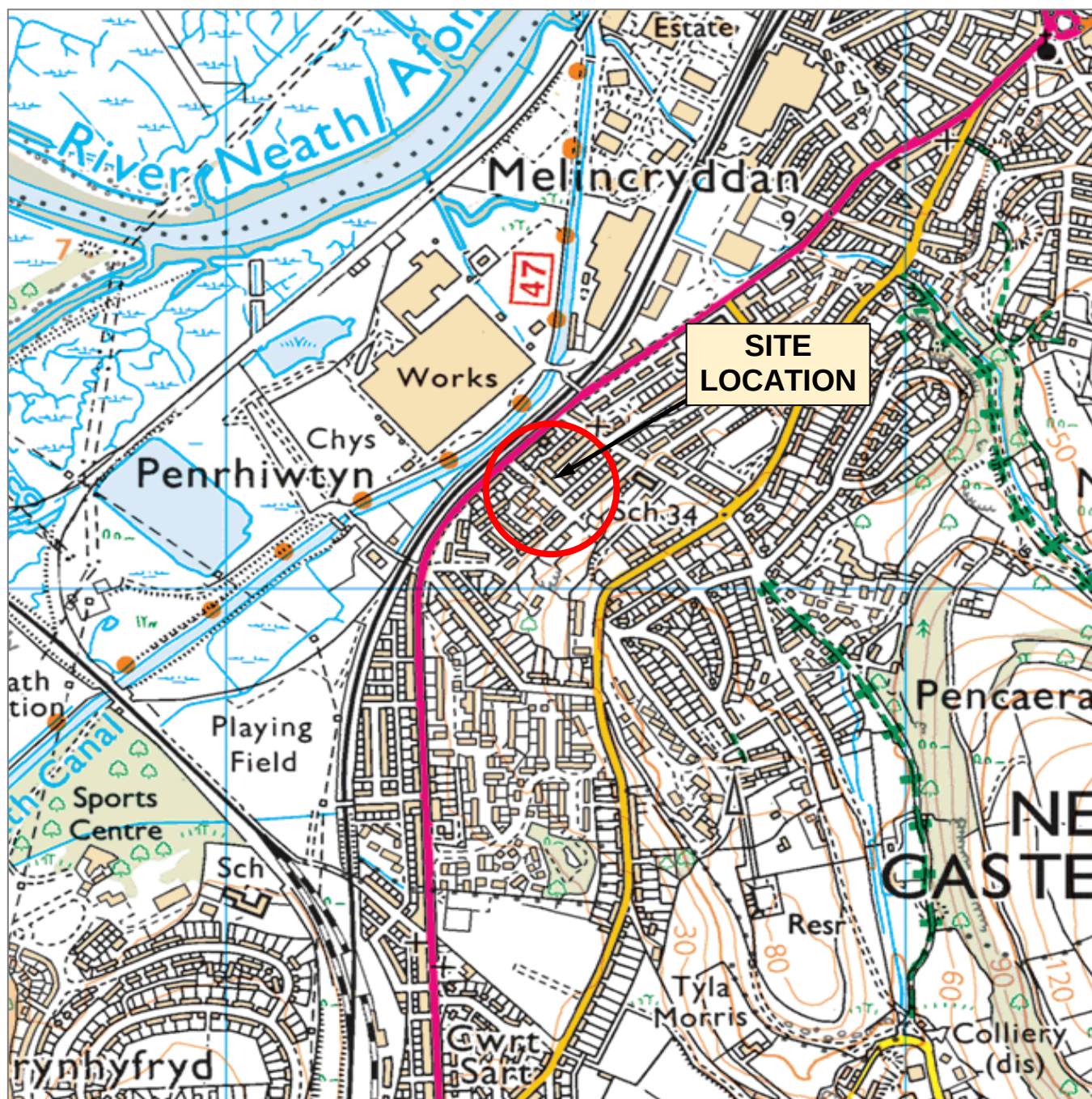


Figure 1: Site Location Plan

12523: Melyn Close, Neath

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Figure 2: Site Plan

Project: Melyn Close, Neath

Client: CJ Construction

Job no.: 12523

Scale: 1:500 at A4

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