



Remediation Strategy Report

Site: The Cruz Dinas Powys

Prepared For: Barratt & David Wilson Homes South Wales

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Job No: 17998

REPORT TITLE : **Remediation Strategy Report: Investigation of their former site compound off Ffordd Merrett, Dinas Powys CF64 4RH.**

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3	30 th April 2024	Update to Section 8 Preparation of Topsoil

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TABLE OF CONTENTS

SECTION 1 Introduction and Proposed Development	1
1.1 Introduction	1
1.2 Objectives	1
1.3 Previous Investigations and Assessments	1
1.4 Limitations and Exceptions of Investigation	2
1.5 Quality Assurance	2
SECTION 2 Site Characteristics	3
2.1 Site Location and Description	3
2.2 Geology and Ground Conditions	4
3.1 Contamination of Concern	6
3.1.1 Soils	6
SECTION 4 Sources of Contamination Requiring Remediation	7
SECTION 5 Proposed Remedial and Mitigating Measures	8
5.1 General	8
5.1.1 Protection of Construction & Maintenance Workers and Passers- by or Neighbouring Site Users	8
5.1.2 Protection of Future Site Users	8
SECTION 6 Validation of Remedial and Mitigating Measures	9
6.1 Screening of Made Ground and Removal of Temporary Road	10
6.2 Validation of Site Soils	10
6.3 Validation Report	12
SECTION 7 Working Practices	13
7.1 Protection of Construction Workers	13
7.2 Protection of the Environment	13
7.3 Management & Disposal of Soils	14
Section 8 Preparation of Topsoil	15
Tables	
Table 2.1 Detailed Stratigraphical Information	4
Table 5.1 Validation Criteria	10
Figures	
Figure 2.1 Site Location	3
Drawings	
Drawing 01 Proposed Topography	

SECTION 1 Introduction and Proposed Development

1.1 Introduction

Barratt & David Wilson Homes South Wales (the Client) has undertaken the residential development at land off Ffordd Merrett, Dinas Powys CF64 4RH. During the construction of the development, the area of land called the Cruz was used as a site compound and storage area. As part of the agreement to use the land, The Vale of Glamorgan requested that the land be put back to its previous state prior to the development.

Following the removal of the former site compound it was evident that levels had changed from its original condition and the Vale of Glamorgan requested this be investigated. Terra Firma subsequently undertook two phases of investigation to look at the material left on site following construction works.

TFW Group Limited (Terra Firma) has been commissioned by the Client to prepare a Remediation Strategy report for the site.

Terra Firma were commissioned by the client to undertake a geoenvironmental assessment of the site. The aim of the assessment was to identify areas of the site which may have undergone filling following occupation of the site during construction. Two site visits have been conducted where a series of trial pits were excavated across the site area to allow inspection of site soils and retrieve soil samples for chemical analysis.

Following the two phases of investigation it was identified that some construction derived waste was found within the shallow soils on site. This mainly contained inert material such as rare brick and blocks. It was also noted that some of the material contained historic made ground identified due to the age of the bricks encountered which correlates to information obtained during the original site investigation by Ian Farmer Associates. Soil chemical testing confirmed no contaminants were identified above generic assessment criteria for a residential development with plant uptake by Terra Firma's geoenvironmental assessment.

This report presents a Remediation Strategy for the site based on these previous investigations and assessments with the intention of returning the site to an acceptable condition agreeable with the Vale of Glamorgan.

1.2 Objectives

The objective of the Remediation Strategy is to detail the remedial steps that are required to render the site fit for future use.

In summary, the following remediation requirements have been identified and are covered in detail in this report.

- Removal of inappropriate material from the made ground during the reprofiling of the site by screening with the aim of meeting requirements of BS 8601 Specification for Subsoil and Requirements for Use.
- Removal of the temporary access road into the former site compound from site.

1.3 Previous Investigations and Assessments

The Remediation Strategy is based on the findings of previous investigations and assessments. This report shall be read in conjunction with the following documents.

- Geoenvironmental Assessment Report: The Cruz, Dinas Powys. Report Reference: 17998-Issue03, dated 5th November 2023

- ST. Cyres Lower School, Dynas Powys – Report on Site Investigations – NC832-50-NJW dated July 2014 by Johnson Poole and Bloomer

1.4 Limitations and Exceptions of Investigation

This report has been prepared for the sole internal reliance of the Client and its design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geo-environmental and geotechnical consultants. Terra Firma does not provide legal advice and the advice of lawyers may be required.

It is not within the scope of Terra Firma to:

- Provide Method Statements and Risk Assessments for the site remediation, preparation, and development.
- Design, assess or install utility service trench fill and pipes for potable water supply beneath the site.

1.5 Quality Assurance

The quality and environmental aspects of the assessment and investigation comply with UKAS Accredited ISO 9001:2015 and ISO 14001:2015 standards.

SECTION 2 Site Characteristics

The following subsection information has been summarised from previous investigation and assessments listed in **Section 1.3**.

2.1 Site Location and Description

The site is located on the former site compound off Ffordd Merrett, Dinas Powys CF64 4RH and centres on an approximate National Grid Reference of 316343, 170756 occupying a plan area of approximately 1.64 Hectares.

The site is mostly covered in grass with an area of tarmac ground at the entrance of the site.

Site boundaries are defined by fences to the north and east of the site, the south and west of the site are bound by a treeline.

Offsite features include residential buildings to the east and the north, and small woodland and fields to the south and west.

The site elevation is approximately 43m AOD at the northwest of the site, falling gently to around 40-41m at the east.

The site location can be seen on **Figure 2.1**. and the approximate extent of the former site compound is presented on **Figure 2.2**.



Figure 2.1 Site Location



Figure 2.2 Approximate Extent of Former Site Compound

An aerial image dated May 2020 is presented in **Figure 2.2**. The site was previously covered by a mixture of hardstanding along the access road into the northeast of the site, and compacted stone across the majority of the site providing a car park for contractors, storage areas for materials and plant, and site offices, and welfare. Vegetation covered the far southwest of the site.

2.2 Geology and Ground Conditions

The 1:50,000 scale British Geological Map of the area (Sheet 263) and the 1:10,560 ST17SE Geological Map was consulted for geology underlying the site. Detailed stratigraphical information is provided in **Table 2.1**.

Table 2.1 Detailed Stratigraphical Information

Period	Group	Formation	Member
Triassic	Penarth Group	Blue Lias Formation	St Mary's Well Bay Member - Interbedded limestone and mudstone.

Strata are typically dipping 5° to the southwest in the local area.

Superficial deposits are recorded on site as alluvium deposits. Alluvium is a general term for clay, silt, sand and gravel. It is the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope.

Made ground comprising of reworked topsoil and sand and gravels containing construction materials is expected up to 1.0m on site.

SECTION 3 Quantitative Risk Assessment

3.1 Contamination of Concern

3.1.1 Soils

The original site investigation conducted by Johnson Poole and Bloomer (July 2014) identified elevated levels of PAH speciates in a sample of made ground taken from TP5. This trial pit locates in the Cruz area.

Soil samples taken during the recent investigation by Terra Firma confirmed that all substances tested for were found to be present at concentrations below their respective human health threshold level. Samples were taken of the newly placed made ground.

SECTION 4 Sources of Contamination Requiring Remediation

There are no identified sources of contamination at the site with all contaminants having been recorded below generic assessment criteria for a residential development with plant uptake. However, the screening of soils will allow the removal of any potentially injurious items within the made ground.

It is acknowledged that site levels have risen since occupation of the Cruz. Given that the material placed on the Cruz have been confirmed as clean it is recommended that the materials are kept on site and spread out to create a slightly elevated site which will improve the drainage characteristics of the site and surrounding area. In order to conform with the requirements of BS 8601, the following remedial measures are recorded to create a site suitable for future development.

1. The 'topsoil-like' soils will be stripped and stored appropriately elsewhere on site for future re-use.
2. The former temporary road into the site compound will be excavated and removed from site.
3. When the soil beneath the 'topsoil-like' soil is exposed and during the reprofiling, anything visible in the made ground that shouldn't be there must be removed. If it isn't, then the reprofiled soil will not be subsoil, as set out in BS8601 Specification for subsoil and requirements for use.

The made ground will be screened to remove any inappropriate material such as plastic, metal, etc, and over-sized material to allow for safe enjoyment of the public open space by residents.

The aim of the soil screening is to meet the requirements of *BS 8601 Specification for subsoil and requirements for use*. Once this has been achieved, the 'topsoil-like' soils will be placed back on top of the subsoil.

Terra Firma will maintain a part-time presence throughout the remedial works. Samples will also be taken of the screened soils to demonstrate further that they are suitable to remain on site. A validation report will be provided at the end of the remedial works.

SECTION 5 Proposed Remedial and Mitigating Measures

5.1 General

Based on the finding of previous investigations and assessments, the following remedial measures have been devised for the site.

Specific validation requirements for the proposed remedial measures are discussed in the following section.

5.1.1 Protection of Construction & Maintenance Workers and Passers-by or Neighbouring Site Users

The potential production of soil dust during construction works presents a risk to construction and maintenance workers as well as passers-by or adjacent site users through, direct soil and dust ingestion, dermal contact and inhalation of dust.

A selection of mitigating measures is presented below to disrupt the contaminant pathway to the receptor.

- Suitable PPE for site workers.

Standard PPE equipment such as gloves and goggles will be effective in mitigating most risks. Given the cohesive nature of soil, it is unlikely that dust will be generated during the works.

5.1.2 Protection of Future Site Users

No contamination has been identified by a geoenvironmental assessment. Additional samples will be taken of the screened soils during the reprofiling by a Terra Firma engineer to demonstrate further that the soils are uncontaminated.

The following remedial measures will require verification and inclusion within a Validation Report:

- The extent of the proposed remediation is presented in **Figure 6.1**. Made ground as indicated in pink was located at the south of the site prior to occupation by the site compound. Whilst the entire area as indicated by the green boundary will be remediated to the standard of the rest of the work, the client will not be responsible for remediation of made ground and/or waste materials arising from any previous development.



6.1 Screening of Made Ground and Removal of Temporary Road

Inspection by a geoenvironmental engineer should be made to confirm all inappropriate material has been removed from the made ground and that the former temporary access road has been removed.

The method of remediation is outlined below.

1. The 'topsoil-like' soils will be stripped and stored appropriately elsewhere on site for future re-use.
2. The former temporary road into the site compound will be excavated and removed from site.
3. When the soil beneath the 'topsoil-like' soil is exposed and during the reprofiling, anything visible in the made ground that shouldn't be there must be removed. If it isn't, then the reprofiled soil will not be subsoil, as set out in BS8601 Specification for subsoil and requirements for use.
4. Material will be either mechanically screened or hand-picked, depending upon the quantity of unsuitable material observed in the soil by the supervising geoenvironmental engineer.

The made ground will be screened to remove any inappropriate material such as plastic, metal, etc, and over-sized material to allow for safe enjoyment of the public open space by residents.

The aim of the soil screening is to meet the requirements of *BS 8601 Specification for subsoil and requirements for use*. Once this has been achieved, the 'topsoil-like' soils will be placed back on top of the subsoil.

Proposed final site levels are shown in Drawing 10069-205 attached to the rear of this report.

Terra Firma will maintain a part-time presence (approximately 50%) throughout the remedial works, specifically targeted at stripping of the soils, and inspection of screened soils.

Samples will be taken of the screened soils to demonstrate further that they are suitable to remain on site. A validation report will be provided at the end of the remedial works.

Validation of the screening will comprise photographic evidence, inspection of the remaining soil by a geoenvironmental engineer. Soil laboratory testing of the soils will also be undertaken at regular intervals at the discretion of the geoenvironmental engineer to confirm that the made ground soils remain uncontaminated following the reprofiling works.

A validation report including a description of the works undertaken, validation photographs and chemical validation test results shall be presented upon completion.

The proposed topography of the site is presented on **Drawing 01**.

6.2 Validation of Site Soils

All samples should be analysed for the determinants listed in **Table 6.1**.

Table 6.1 Validation Criteria

Determinand	Units	Guideline Value (Residential)	Source
Inorganic			
Arsenic	mg/kg	37	1
Cadmium	mg/kg	11	1
Chromium III	mg/kg	910	1
Chromium VI	mg/kg	6	1
Copper	mg/kg	2400	1

Lead	mg/kg	200	2
Mercury (inorganic)	mg/kg	40	1
Nickel	mg/kg	180	1
Selenium	mg/kg	250	1
Zinc	mg/kg	3700	1
Cyanide	mg/kg	-	-
Boron	mg/kg	290	1
Asbestos	%	Non Detected	-

Organics – Phenol & PAH

Phenol	mg/kg	120	1
Naphthalene	mg/kg	2.3	1
Acenaphthylene	mg/kg	170	1
Acenaphthene	mg/kg	210	1
Fluorene	mg/kg	170	1
Phenanthrene	mg/kg	95	1
Anthracene	mg/kg	2400	1
Fluoranthene	mg/kg	280	1
Pyrene	mg/kg	620	1
Benzo(a)anthracene	mg/kg	7.2	1
Chrysene	mg/kg	15	1
Benzo(b)fluoranthene	mg/kg	2.6	1
Benzo(k)fluoranthene	mg/kg	77	1
Benzo(a)pyrene	mg/kg	2.2	1
Indeno(123cd)pyrene	mg/kg	27	1
Dibenzo(ah)anthracene	mg/kg	0.24	1
Benzo(ghi)perylene	mg/kg	320	1

Organics – TPH

VPH C5 – C6 Ali	mg/kg	42	1
VPH C6 – C8 Ali	mg/kg	100	1
VPH C8 -C10 Ali	mg/kg	27	1
EPH C10 – C12 Ali	mg/kg	130	1
EPH C12 – C16 Ali	mg/kg	1100	1
EPH C16 – C21 Ali	mg/kg	65000*	1
EPH C21 – C35 Ali	mg/kg	65000*	1
EPH C35 – C44 Ali	mg/kg	65000	1
VPH C5 – C7 Arom	mg/kg	70	1
VPH C7 – C8 Arom	mg/kg	130	1
VPH C8 – C10 Arom	mg/kg	34	1
EPH C10 – C12 Arom	mg/kg	74	1
EPH C12 – C16 Arom	mg/kg	140	1
EPH C16 – C21 Arom	mg/kg	260	1
EPH C21 – C35 Arom	mg/kg	1100	1
EPH C35 – C40 Arom	mg/kg	1100	1

1 - LQM/CIEH Suitable For Use Level (S4UL) 2015

2 - Defra Category 4 Screening Level (Provisional value)

PH – Petroleum Hydrocarbon

Ali – Aliphatic

Arom – Aromatic

Thresholds based on 1.0% soil organic matter

* – Ali C16-21 and C21-C35 based on criteria for Ali EC >16-35

6.3 Validation Report

Following completion of the works a validation report should be compiled demonstrating the completion and effectiveness of the works set out in the Remediation Strategy.

The Validation Report should include, but not limited to, the following:

1. A record of any areas where made ground is removed or where inappropriate material has been removed from the made ground.
2. A record of the volume of made ground soils/inappropriate material removed, from which areas and details of the receiving landfill. Transfer tickets should be retained.
3. As the excavated made ground is to be retained on site, the CL:AIRE materials management plan should be provided.
4. A record of the number of imported soil sources and their respective volumes.
5. Details of the source and supplier of all imported soils.
6. Chemical test data for re-used soil samples taken during the reprofiling works.
7. Chemical test certificates for imported soils where available from the provider.
8. Chemical test data for all imported soils as sampled at source (if possible) and on site.
9. Details of the source and volume of any imported stone/aggregate.

The validation report will be for the benefit of both the client, and Vale of Glamorgan Council.

SECTION 7 Working Practices

7.1 Protection of Construction Workers

In order that construction workers are protected during site works across the site the following should be adhered to:

1. Compliance with health and safety regulations.
2. Provision of Method Statements and Risk Assessments.
3. Compliance with Control of Substances Hazardous to Health (COSHH) Assessment.
4. Good level of Personal Protection Equipment (PPE).
5. Good level of hygiene by site workers.
6. Dust suppression measures.
7. Emergency contingencies should be defined prior to commencement of site works.

7.2 Protection of the Environment

During the remediation and construction periods, there is a risk to the environment and adjacent sites from de-watering, excavations, moving contaminated soil, drainage misconnections, discharges of perched groundwater to local surface waters or the ground, runoff from construction materials and/or exposed ground, wheel washing and oil or chemical spills.

A drainage plan should be devised, identifying manholes to prevent pollutants accidentally reaching surface water sewers. Temporary drainage measures may need to be put in place.

The contractor(s) must also strictly adhere to the Pollution Prevention Guidelines for Working at Construction and Demolition Sites (PPG6). This publication gives both advice and guidelines which should be followed with regards to the planning and preparation of site works, site drainage, delivery and storage of construction materials, the management of waste, good housekeeping in particular to prevent runoff of silt and other fines into nearby water courses, refuelling, concrete and what to do in the event of an emergency.

Within the documentation prepared by the contractor(s), the following information should be provided, but not limited to:

- Project Description.
- Key participants/contractor(s).
- Technical procedures.
- Phasing of works and approximate timescales.
- Site plans to scale.
- Details of consents or license needed.
- Health and Safety, COSHH Assessment, Method Statements and Risk Assessments.
- Emergency contingencies.

In addition, the following precautions should also be taken.

- All potential chemicals and associated risks and emergency procedures for spills/leaks should be considered in the site risk assessment and the details provided to all site employees.
- Any potential pollutant materials or chemicals/detergents used on site should be adequately stored in suitable containers, with clear labelling.
- Any oil or hazardous substance containers and associated pipe works should be enclosed within a bund.
- Care taken during delivery of materials, with correct supervision and labelling detailing the substance and its quantities.
- All delivery drivers should be informed of procedures and restrictions.

- Any materials on delivery should be covered to ensure there is no spillage.
- Any detergents, paints, chemicals etc should not be allowed to be discharged into surface drains or water courses.
- Washing out and cleaning of concrete/cement plant should be carried out in a contained area with adequate measures to collect all run-off water.
- Security and prevention of vandalism, especially of oil drums/containers.

7.3 Management & Disposal of Soils

During site works, excavations of the made ground will take place over most of the site.

All materials excavated should be managed and stored appropriately in a controlled manner to ensure protection of site construction workers and neighbouring site users, and to prevent the transfer of contamination to other areas of the site.

Keeping as much site-won soil on site as possible would provide the most sustainable approach and avoid landfill and haulage fees, disruption and aggravation of local residents caused by haulage lorries and would avoid unnecessary CO2 emissions.

Any movement and transfer of materials on site should be documented in a materials management plan, in accordance with 'CL:AIRE Definition of Waste: Development Industry Code of Practice (DoW CoP)'.

Excavated made ground should be disposed of at landfill. Prior to disposal classification of the material will need to be completed in accordance with Environment Agency protocol detailed in 'Technical Guidance WM3 – Waste Classification - Guidance on the Classification and Assessment of Waste'.

A contaminated land specialist should supervise and document any earthworks on site.

Waste transfer and disposal must be undertaken by an authorised person. A waste transfer note must accompany each load and records should be maintained for inspection if required.

Section 8 Preparation of Topsoil

The client's proposes to use site-won topsoil prepared by their landscape contractor. The proposed method for the preparation of topsoil is presented below.

1. Topsoil should be spread to a minimum depth of 150mm for areas to be seeded. The Landscape Contractor is responsible for bringing to the attention of Barratt Homes any areas where topsoil has not been spread to a satisfactory depth, so that additional topsoil can be spread to make up the required depth. The contractor is to refer to the remediation strategy and site investigation reports for any additional requirements.
2. If areas to be seeded are weed infested, they shall be treated with an approved herbicide such as 'Round-up' (Chipmans) a fortnight before cultivation takes place, further applications may be required to make the area weed free. All certification to be supplied in accordance with COSHH regulations prior to the commencement of the works.
3. Areas to be seeded shall be cultivated by the Landscape Contractor to a depth of 100mm, removing all weeds, large stones, and other extraneous material from the topsoil and off site. The topsoil shall be graded to remove minor hollows and ridges and bring it to a uniform and even grade at the correct finish level which, unless otherwise stated, shall be 25mm above adjoining paving and shrub beds and 150mm below DPC after reasonable consolidation.
4. Prior to seeding, the areas will be brought to a fine tilth by approved mechanical means or by hand raking. If necessary, regrading of the surface will be carried out so that it conforms to the finished levels shown on the Mitigation Works drawing.
5. At the final cultivation, and after the area has been brought to a fine tilth and raked. The Landscape Contractor will remove all stones over 10mm in diameter in any dimension on or at the surface of the area. The area will then be firmed by treading or rolling with a light roller.
6. After cultivation operations have been carried out, the area will be sown with grass seed approved by the Council's Representative and of an appropriate mix for the site. Seed will be sown at the rate of 15-35 gm/m² by either hand or mechanical means, ensuring an even distribution.
7. All reasonable precautions shall be taken to ensure the pedestrian and other traffic does not cross areas during cultivation, nor until the grass is established. The Landscape Contractor may be required to erect barriers to protect the site or to temporarily fence the site off.
8. Where in the opinion of the Council's Representative excessive subsidence of seeded area arises, such subsidence must be made good, raising all depressions with good quality topsoil, carrying out the necessary cultivation's, fertilizing, and seeding as previously specified and as required by the Council's Representative.
9. Should any bare patches occur on the previously seeded areas, the Landscape Contractor will re-seed the bare patches with the seed mixture previously specified for that area.

Drawings

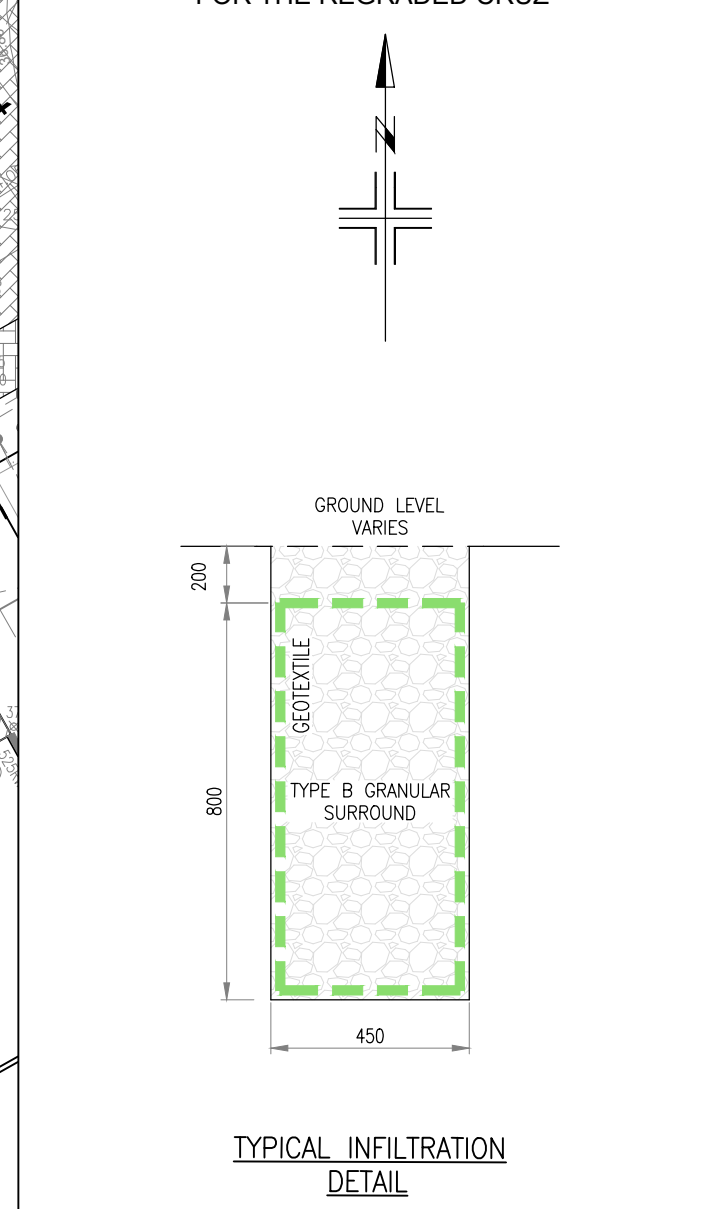
GENERAL NOTES

- On Site
- The contractor is to check and verify all buildings and site dimensions and levels, including sewer invert levels, before works start on site. The contractor is to comply in all aspects with the current building legislation, British Standards, building regulations etc.
- Positions of existing services/underground apparatus adjacent to or crossing proposed excavations are to be checked by the contractor prior to starting work.
- This drawing is to be read in conjunction with and checked against all other drawings Engineering Details, Specification and any structural, geotechnical or other specialist document provided. Any anomaly in contradiction between any of the above is to be reported to BOW South Wales.
- This drawing is schematic for clarity only, positions of pipe runs and manholes may vary on site due to site conditions.

KEY

- EXISTING LAND DRAIN TO REMAIN
- INFILTRATION TRENCH
- PROPOSED CONTOUR AT EVERY 100mm
- PROPOSED CONTOUR AT EVERY 500mm

CONTOURS ARE ASPIRATION FOR THE REGRADED CRUZ



9/23/01/24 Proposed contours adjusted, infiltration detail added.
A/12/22/23 Proposed contours adjusted.
Revision:

Project: **St Cyres School**
Murch, Dinas Powys

Client: **BARRATT**

Drawing: **CRUZ Mitigation Works Contours**

Scale: 1:250 @ A0 Date: 30/11/23 Drawn by: NC

Drawing No: **10069-205** Rev: B

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Orig Status: **FOR COMMENT**

