

Growing Baldock

Environmental Statement Volume 2: Figures & Appendices

Chapter 12: Ground Conditions and Soils

Appendix 12.7 Technical Documentation Multi Modal Bridge



SHADBOLT
ENVIRONMENTAL



Baldock, North Hertfordshire
Multi Modal Bridge

CD 622 Technical Documentation
Multi Modal Bridge

Urban & Civic

Draft

December 2024



SHADBOLT
GROUP

Baldock, North Hertfordshire

Multi Modal Bridge

CD 622 Technical Documentation

Multi Modal Bridge

Client	Urban and Civic
Our Reference	Baldock, North Hertfordshire - Multi Modal Bridge
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Submitted	Draft – December 2024

Urban&Civic



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PREAMBLE

Shadbolt Group (SG) were commissioned by the Client, **Urban & Civic (Corby) Ltd.** to prepare documents in accordance with the Design Manual for Roads and Bridges document CD 622 Managing Geotechnical Risk, relating to the proposed multi modal over the existing railway at the proposed development on the site referred to as Baldock, North Hertfordshire.

It is understood that there are currently two planned bridges, one pedestrian and one multi-modal bridge with mixed pedestrian and vehicular access. We understand that several alignment options for the new road and multi-modal bridge were considered however the alignment has now been finalised and the current report considers only the current planned alignment.

This report is intended to form a single document covering the pre-construction technical reporting requirements of CD 622 from Statement of Intent through to the Geotechnical Design Report. The current version of the report (V1) incorporates all elements up to and including the Ground Investigation Report. The report will be updated to include the Geotechnical Design Report upon receipt of relevant design information and to incorporate the Special Geotechnical Measures Form elements if deemed to be required.

A drawing showing the proposed general alignment of the road and multimodal bridge is shown on Tony Gee Drawing Ref. L124010-TG-ZZ-ZZ-SK-CB-0010 rev P02, "Proposed Site Plan", a copy of which is presented in **Appendix B** for reference.

1.0 STATEMENT OF INTENT (SOI)

1.1 Details of the Project

Urban & Civic (U&C) are currently in the planning stages for a proposed mixed residential and commercial development to the east of the town of Baldock, North Hertfordshire.

At the time of writing, the proposed developments are still in the planning stages and the site is comprised predominantly of agricultural land for cropping or grazing.

A new road for vehicular and pedestrian access and including construction of a new multi modal bridge crossing the existing railway is proposed as part of the wider development to provide access between the new proposed development areas to the north and south of the railway line. There were previously several options considered for the route of the vehicular road however we understand the alignment has now been finalised and is that considered in the current report, the approximate location of which is indicated on Figure 1 below.

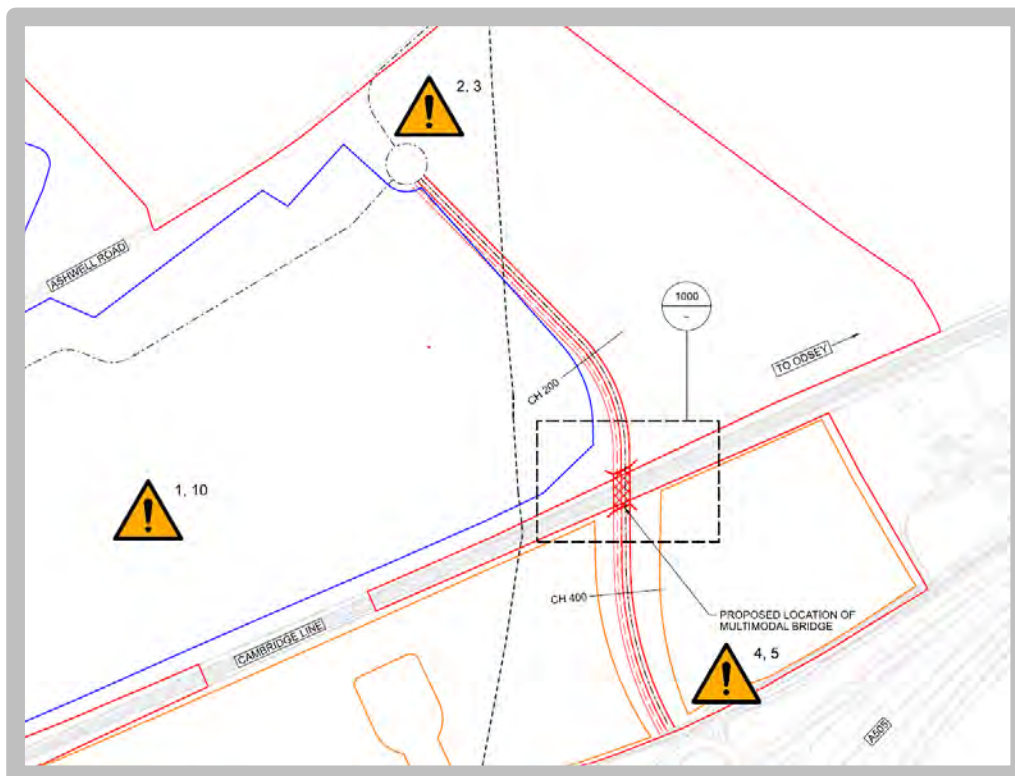


Figure 1 – Approximate Location of Proposed New Road and Multi Modal Bridge Crossing

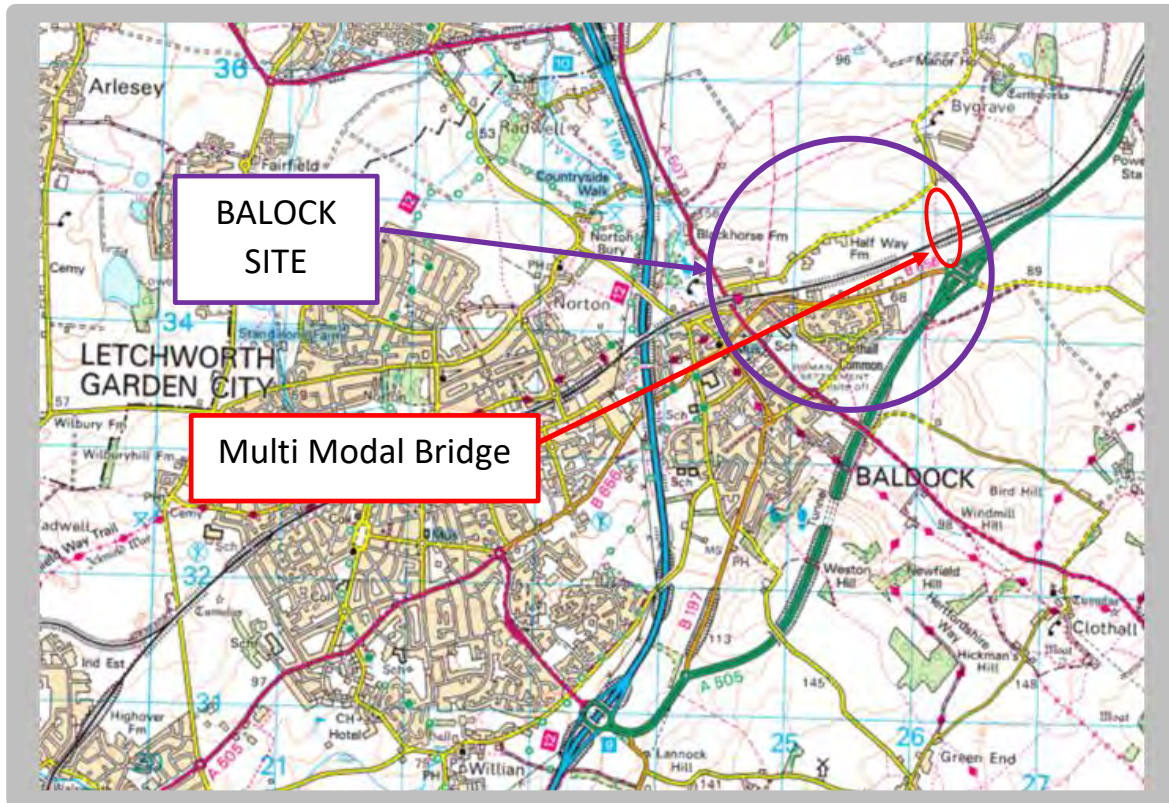


Figure 2 – Site Location in Regional Context

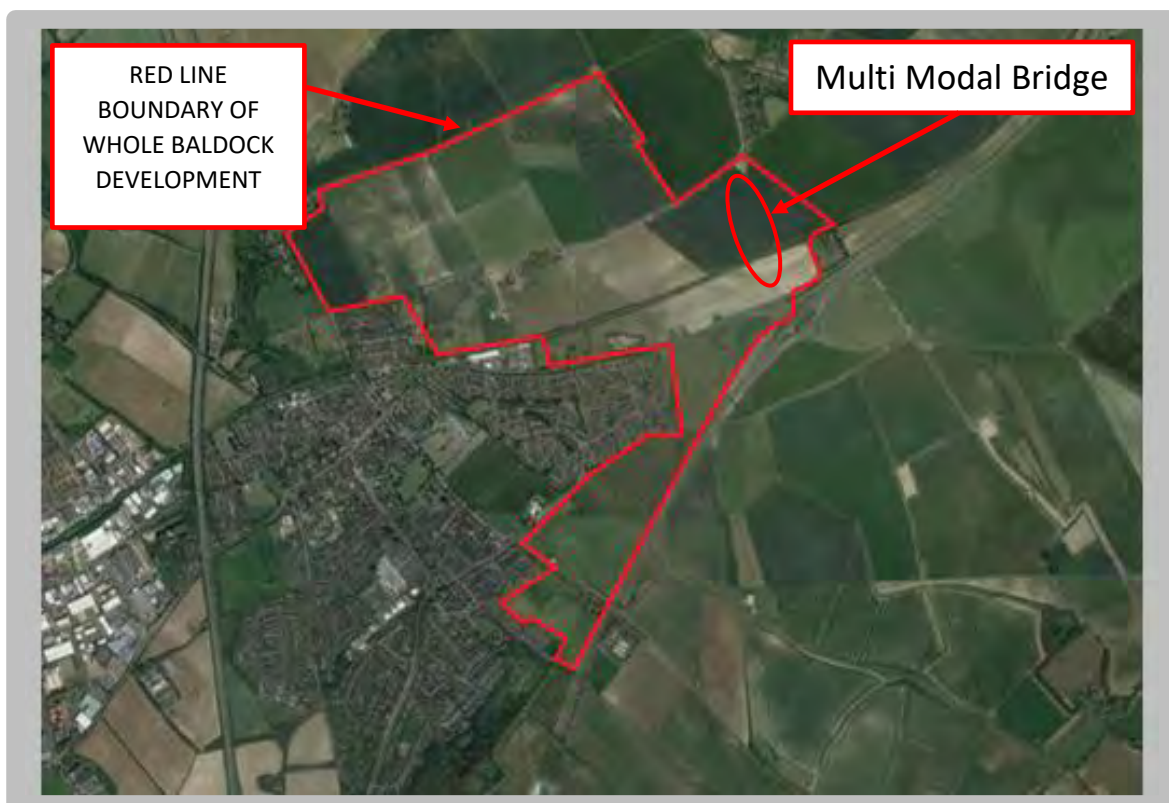


Figure 3 – Aerial Photo Showing Location of Proposed Multi Modal Bridge within Baldock Development

1.2 Objectives

SG have been commissioned by U&C to produce documents to satisfy the requirements in accordance with CD 622.

The objectives of the development proposals are to create a permanent vehicular access linking developments north and south of the railway line and provide improved access to the A505 to the proposed development.

SG's commission is to review previous relevant reports and site investigation works undertaken and provide standalone documents in relation to the construction of the road and new Multi-Modal Bridge as proposed.

1.3 Existing Information

Previous reports outside of the current CD 622 standard relating to Road and Bridge Option 1 include:

- 77000739-DS – Baldock North Infrastructure, Vehicle and Pedestrian Bridge Desk Study, September 2020, WSP
- 77000739_VBGIR – Baldock North Vehicle Bridge, Ground Investigation Report, November 2020, WSP
- 2899 – Baldock, North Hertfordshire, Preliminary Risk Assessment, Issue V1, July 2022, Shadbolt Group

The previous WSP report were carried out in a similar location to the currently proposed road but with a slightly altered alignment. Given the proximity of the investigation area the findings are considered to be relevant to the current investigation.

1.4 Geotechnical Risk

1.4.1 Key Geotechnical Risks

The site is not located within a coal field and from preliminary searches however there are 6 No records relating to non-coal mining areas recorded by the BGS or the Coal Authority (CA) within 1000m of the site. 4 No. of these non-coal mining areas are recorded as encroaching onto site and refer to potential Chalk mining. The likelihood is noted as "sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered." In addition, none of the former workings, such as ponds or chalk pits are shown to be located within the proposed road alignment.

There are no records relating to underground working, mining cavities, JPB mining areas, brine areas, gypsum areas, tin mining, clay mining, natural cavities recorded by the BGS or the Coal Authority (CA) within 1000m of the site.

Surface ground workings are shown along the route of the existing railway line identified as "cuttings".

The BGS consider the risk to the site from natural ground subsidence due to shrink/swell clays, running sand, compressible deposits, collapsible deposits, landslides, and ground dissolution of soluble rocks all to be at the maximum "very low" on the area of the site in the vicinity of the proposed road and bridge and for several hundred meters surrounding the proposed road route.

Furthermore, the site is located within an area where the BGS and EA have identified a risk of soluble rock. The maximum soluble risk category identified in the subject area is deemed to be “Significant soluble rocks are likely to be present. Problems unlikely except with considerable surface or sub-surface water flow”.

Two faults are noted within the Groundsure report for the whole Baldock development site; however, these are located over 500m northwest from the subject area of this report.

The primary geotechnical risk at this stage is considered to be potential slope instability of the proposed embankment and interaction with the slope of the existing railway line cutting. Although considered to be very low risk the potential for soluble rocks exists below the site which given the potential sensitivity of the bridge may be significantly impacted by management of drainage from the new development and road/bridge.

The key geotechnical risks are presented in the Geotechnical Risk Register, presented in Section 7.

The Geotechnical Risk Register is a live document and will be updated at each stage of the reporting process and may be reviewed at any stage if required.

1.4.2 Geotechnical Category

The proposed works are for the formation of a new embankment and bridge to allow road construction for vehicular access across the existing railway line and at this stage are classified as Geotechnical Category 2.

This will be reviewed as the project progresses and further information and assessments become available.

1.5 Proposed Studies and Investigations

A general site investigation has been undertaken across part of the proposed development. A targeted site investigation was carried out along the current proposed road alignment in two phases. The first phase in July 2024 and the second phase in November 2024 with the two phases carried out on the south and north of the railway line respectively due to restrictions imposed by agricultural crop schedule.

In accordance with CD622 the following report elements will be combined within this report for the new road and Multi-Modal Bridge.

- Statement of Intent (SOI)
- Preliminary Sources Study Report (PSSR)
- Ground Investigation Report (GIR)
- Geotechnical Design Report (GDR)*
- Special Geotechnical Measures Form (SGM)**

* The GDR is outstanding in the current version (V1) of the report. The report will be updated upon receipt of the design documents.

** Subject to OOGA requirements, not expected to be requested at this stage.

1.6 Specialist Consultation

Discussions are ongoing with Network Rail with regards necessary clearances and design requirements.

The bridge design is to be undertaken by others to the approval of Network Rail and the OO (Overseeing Organisation).

Ongoing consultation in relation to archaeology is ongoing as part of the planning process and it is expected that consultation in relation to ecology and landscaping of the proposed public open spaces planned as part of the whole development will be required. Although taking part for the whole development site it is possible that the conclusions of such consultations could impact the road construction.

1.7 Programme

The SOI PSSR, and GIR elements are presented within this combined report for review in December 2024.

The GDR and SGM (if required) elements will be included within future revised report upon receipt of design documents for the proposed road and bridge.

The proposed development is currently in the planning and design stages and the project timeline has not yet been finalised. The GDR and SGM (if required) elements of this report will be updated upon receipt of the relevant data. A Geotechnical Feedback report will be produced on completion of the construction phase.

2.0 PRELIMINARY SOURCES STUDY REPORT (PSSR)

2.1 Introduction

Following on from the above Statement of Intent (SOI) the following sections present a summary of existing Desk Study data in relation to potential geotechnical risks in the development of the new road and Multi-Modal Bridge.

The proposed highways link is to comprise a single carriageway road along with shared use footway/cycleway and equestrian access. An embankment will be required either side to elevate the carriageway and associated abutments for the proposed bridge to cross the existing railway line. The carriageway is likely to be in the order of 400m-500m in length. We understand that detailed design of the road route, carriageway and embankments is underway but has not yet been finalised. Options being considered for construction of the bridge at present are precast-concrete W-beams, steel multi-girder and steel ladder deck construction. It is also understood that the required slope of the carriageway is still under review, with the current assumption that the road will be classified as an Urban Local Distributor Road, however this is yet to be agreed with the relevant authorities. This report will be updated upon receipt of the detailed design.

A drawing showing the proposed general alignment of the road and multimodal bridge is shown on Tony Gee Drawing Ref. L124010-TG-ZZ-ZZ-SK-CB-0010 rev P02, "Proposed Site Plan". In addition, the General Arrangement and Bridge Option Section are shown on drawings L124010-TG-ZZ-ZZ-SK-CB-1000 vP02 and L124010-TG-ZZ-ZZ-SK-CB-1001 vP02 respectively. A copy of which is presented in **Appendix B** for reference.

2.2 Sources of information, desk study, site reconnaissance, site description and review of findings

Data has been obtained from the following sources:

Review of previous Desk Study and Ground Investigation carried out by WSP on behalf of Hertfordshire County Council for the previously proposed crossings;

- 77000739-DS – Baldock North Infrastructure, Vehicle and Pedestrian Bridge Desk Study, September 2020, WSP
- 77000739_VBGIR – Baldock North Vehicle Bridge, Ground Investigation Report, November 2020, WSP

A Preliminary Risk Assessment was undertaken for the Baldock, North Hertfordshire development by Shadbolt on behalf of Urban&Civic. The planned alignment of the road and location of the Multi-Modal Bridge is located towards the eastern end of the Baldock development for which the PRA was commissioned.

- 2899 – Baldock, North Hertfordshire, Preliminary Risk Assessment, Issue V1, July 2022, Shadbolt Group

2.3 Summary of Previous Reports

The previous WSP Desk Study report was carried out for a proposed vehicular road bridge and pedestrian bridges with the Ground Investigation Report issued for each of the schemes.

The vehicular road and bridge considered by the WSP report left the roundabout linking the B656 and Royston Road and arced northwards, crossing the railway at the current pedestrian crossing.

For comparison, the current road option leaves the roundabout at a similar location but arches to the northeast and links with Ashwell Road to the north slightly further to the east.

The fieldwork carried out and reported in 2020 included machine excavated trial pits, window sample boreholes, and rotary boreholes to a maximum depth of 15.50m bgl along with associated in-situ and laboratory testing and a geophysical survey.

The ground conditions encountered a profile of Topsoil (max 0.40m) over Subsoil (max 0.70m) over bedrock deposits of the White Chalk Member soils of structureless/structured Holywell Nodular Chalk. The structureless chalk was encountered to between 0.80m and 2.90m depth overlying the structured chalk encountered to the maximum depth investigated. No significant groundwater was encountered during the investigations or during subsequent monitoring.

The recent Preliminary Risk Assessment was carried out by Shadbolt and reported July 2022 was carried out on the whole Baldock proposed development site of which the current area under investigation is located on the eastern edge. Review of the information within the desk study indicates that the area has remained as agricultural land throughout the recorded history apart from the construction of the railway line which was established prior 1881 which is the earliest historical map available.

2.4 Site Reconnaissance

A site reconnaissance visit was undertaken by Shadbolt Group in June 2022.

The whole proposed Baldock development site is an irregularly shaped plot of land located east of the town centre of Baldock, approximately 23km northwest of the county town of Hertford. It comprises agricultural land and was predominantly cropped with barley and potato at the time of the initial site visit.

The area in the vicinity of the proposed new road is located towards the eastern end of the site as a whole and straddles the existing railway line.

The area to the north of the railway line slopes moderately downwards to the southwest and is arable land and bounded by Ashwell Road to the north with further areas of arable land to the east and west.

The railway line is lined with timber fencing either side of the railway and with overhead power lines along the route. A pedestrian level crossing is present approximately 90m to the west of the proposed new Multi-Modal Bridge. The railway line lies atop an embankment to the west of the crossing point and moves to a cut to the east of the crossing. The railway line is approximately 0.50-1.00m below the general surrounding ground level at the point of the proposed new bridge.

The area to the south of the railway line is also arable land with the B656 (Royston Road) bounding the site to the south. Further agricultural land is present to the west with a kennels to the east. The general topography in this area is flat dipping slightly to the southwest.

To the southeast of the site boundary is a roundabout with a slip road leading to the A505 dual carriageway road leading northeast.

An area of Local Authority owned public open space is present south of the B656 surfaced with rough densely vegetation and cross by several public footpaths.

No obvious olfactory or visual evidence of significant contamination was noted during site reconnaissance.

No significant changes were noted during the fieldwork carried out by Shadbolt in October – December 2023 or July/November 2024 except the land was in differing stages of the cropping process that noted previously.

2.5 Ground Conditions

2.5.1 Geology

Published BGS maps (at 1:10,000 and 1:50,000 scales) have been reviewed via the BGS Maps Portal. Sheet explanation of the British Geological Survey. 1:50 000 sheet 221 Hitchin (England and Wales) and 1:10,000 sheet TL23SE (Weston) are obtained as part of the Groundsure Geo-Insight report for the Baldock, North Hertfordshire development.

The mapping indicates Made Ground and Worked Ground to be present along the railway line. The “Made Ground” is shown to the west with “Worked Ground” indicated to the east indicative of the switch from embankment to cutting along the route of the railway line.

Both the 1:10,000 and 1:50,000 scale map sheets indicated that there are no significant superficial deposits across the majority of the site however bands of superficial deposits do cross the site roughly northwest to southeast.

The superficial geology underlying the site is indicated to comprise Head Deposits (clay, silt, sand and gravel). On the 1:10,000 scale sheet these deposits are described more specifically as Dry Valley Deposits: Brown sandy silt or clay with chalk and flint pebble.

The solid geology underlying the site comprise CHALK, specifically that of the Holywell Nodular Chalk Formation and New Pit Chalk Formation (Undifferentiated).

2.6 Preliminary Engineering Assessment

Due to the age of the railway line the excavation of the cutting and trimming and stabilisation of the slopes is not likely to have been carried out to an engineering standard comparable to current methods or standards, however, also given the age of the railway line inherent slope instability would likely have presented before now. In addition, the slopes of the cutting are relatively shallow as the cutting is not deep at the location of the proposed road/bridge.

No visual evidence of significant slope stability was noted in the existing slope within the cutting however the slope of the cutting are vegetated on both the northern and southern sides with some large shrubs and former trees also present on the embankments. The presence of vegetation is likely to stabilise the slopes however this may also obscure evidence of smaller scale or initial instability. It was noted that some trees had been recently felled along the embankment and further to the west prior to the fieldwork as part of continuing maintenance. Drainage culverts are present at the base of the embankments to the west to allow surface runs off however drainage of the cutting section of the railway line could not be confirmed.

Evidence of burrows (possible rabbit/badger warrens) were noted at several points along the railway that may contribute to slope instability. An ecological inspection was carried out prior to the fieldwork and the ecologist did note that the badger sets were known to be currently unused. Such burrowing may migrate to the new bridge embankment.

The underlying bedrock geology is expected to comprise Chalk strata which is potential soluble. Increased run off and drainage from the new road/bridge and surrounding developments could result in formation or propagation of solution features.

Minor cut and fill works are anticipated to be required in order to improve / prepare the sub grade with larger scale earthworks for formation of the embankment and bridge abutments.

2.7 Comparison of Project Options and Risks

Several potential options were considered for the alignment of the road. The current alignment is considered likely to be most favourable due to the existing roundabout at the southern end providing convenient access and the minimal height of embankments required at this point due to the railway line being at a low point (within a cutting). As such the current alignment is considered likely to present the lowest cost and foreseeable geotechnical risk.

2.8 Drawings and Photographs

A drawing showing the proposed general alignment of the road and multimodal bridge is shown on Tony Gee Drawing Ref. L124010-TG-ZZ-ZZ-SK-CB-0010 rev P02, "Proposed Site Plan". In addition, the General Arrangement and Bridge Option Section are shown on drawings L124010-TG-ZZ-ZZ-SK-CB-1000 vP02 and L124010-TG-ZZ-ZZ-SK-CB-1001 vP02 respectively. A copy of which is presented in **Appendix B** for reference.

3.0 GROUND INVESTIGATION REPORT (GIR)

3.1 Existing Information

The following section carries on from the preceding sections and presents the Ground Investigation Report, discussing the findings and interpretation of Ground Investigation works undertaken in relation to the proposed permanent highway construction covered by this report.

3.2 Existing Information and Field and Laboratory Studies (Undertaken)

Site works undertaken by RSK Environment Limited and reported by WSP in 2020. The works carried out were located to the west of the currently proposed road (circa 40m west at farthest point). Given the proximity of the investigation and the similarity of the formerly proposed scheme to the current proposed alignment, the works are considered to be potentially relevant and ground conditions may be referred to below when deemed to be pertinent. The previous works comprised the following;

- *Excavation of 8 No. machine excavated trial pits to depths of between 3.50m and 4.00m bgl.*
- *The drilling of 6 No. window sample boreholes to depths of between 2.25m to 5.45m bgl.*
- *The drilling of 4 No. rotary boreholes to depths of between 14.79m and 15.50m bgl.*
- *Undertaking of a Geophysical ERT Survey.*
- *Monitoring of standpipes installed within selected boreholes.*
- *Associated in-situ testing and laboratory testing undertaken on sample retrieved during the fieldworks.*

Shadbolt have recently undertaken targeted works in July 2024 and November 2024 along the route of a proposed road and bridge in order to confirm the ground conditions and to obtain appropriate samples for geotechnical analysis.

The fieldworks completed during the recent July / November 2024 ground investigation comprised;

- *Excavation of 10 No. machine excavated trial pits to depths of between 3.00m and 4.00m bgl.*
- *The drilling of 4 No. window sample boreholes to depths of between 1.45m to 3.45m bgl.*
- *The drilling of 4 No. rotary boreholes to depths of 16.00m bgl.*
- *Monitoring of standpipes installed within selected boreholes.*
- *Associated in-situ testing and laboratory testing undertaken on sample retrieved during the fieldworks*

The strata encountered is discussed below and the logs are presented in **Appendix C**.

3.2.1 Topsoil

Topsoil was encountered within all of the exploratory holes undertaken and was generally describes as brown gravelly sandy SILT (north of railway) to brown slightly gravelly CLAY (south of railway) with the gravel fraction comprising chalk and locally flint. Such Topsoil type material was typically encountered in thicknesses between 0.10m and 0.40m bgl but typically to 0.30m bgl.

3.2.2 Superficial Geology

Superficial deposits were only encountered within 3No exploratory location, TP-VB-06, TP-VB-08 and WS-VB-04. The shallow deposits

These deposits comprised clayey gravelly SAND to 0.25m bgl in TP-VB-06 to the north of the railway line and slightly gravelly slightly sandy SILT in the other two location to the south of the railway line to a maximum depth of 0.80m bgl.

The shallow none chalk soils directly below the Topsoil are considered likely to be indication of localised Head Deposits and are impersistent across the site.

3.2.1 Made Ground

No Made Ground soils were encountered within the exploratory points. Given that the area is arable land and is likely ploughed then all soils down to a depth of approximately 0.60m could be considered to be Made Ground Type Topsoil/subsoil as they have been disturbed by human activity at some point however given the lack of anthropogenic inclusions it is difficult to accurately distinguish between such slight anthropogenic disturbance and natural weathering of shallow soils.

3.2.3 Solid Geology

Solid geology of the White Chalk Subgroup was encountered across the site directly beneath the Topsoil and localised Superficial deposits.

The chalk strata were typically initially encountered as structureless white mottled orange brown silty GRAVEL to depth of between 0.60m and 3.70 typically. Typically, low grade structured chalk was encountered north of the railway line at 0.60-0.80m bgl. Such structureless chalk extending to greater depth on the southern side of the railway line and extended to between 1.50m in the rotary boreholes and up to 3.70m at the base of the trial pits in this area.

At depth the chalk typically comprised white locally mottled orange brown and speckled black extremely weak low to medium, rarely locally high-density CHALK with very closely to closely, locally medium spaced horizontal (bedding) and steeply inclined / vertical fractures. The fractures were typically planar undulating rough, locally striated tight, locally partly open clean with grey, brown and orange brown staining and black speckling and occasionally silt infill where partly open.

The fractures, particularly those that are steeply inclined resulted in a significant disturbance along the fracture line resulting in some of the core lengths to disintegrate into fine to coarse gravel sized fragments. Such shattering of the core result can in some lengths of competent rock being recovered as non-intact core and can result in low SCR and RQD quotients, potentially not representative of the true rock mass properties. In addition, such fracturing can obscure other fractures or stratigraphic features.

The base of the Chalk strata was not encountered within any of the exploratory holes the maximum depth of which was 16.00m bgl.

The ground conditions encountered are broadly consistent with those encountered and described in the previous WSP report outlining the ground investigation that was carried out to the east of the current site area.

3.2.4 Groundwater

No groundwater was encountered during the drilling of the 2020 works reported by WSP or during the 2024 works carried out by Shadbolt Group.

The WSP report does indicate that former BGS boreholes carried out to greater depth indicated groundwater at a depth of between 18.6-18.9m below ground level which is below the maximum depth scheduled in this investigation.

Groundwater monitoring of the standpipe installed within the rotary boreholes recorded standing water level recorded only in 1 borehole on 1 occasion at 14.20m depth bgl in borehole RC-VB-03 on the November visit. The standpipes were recorded to be dry on all other monitoring visits. The results of the monitoring are presented in full in **Appendix F**. It should be noted that groundwater conditions will vary seasonally and with changes in weather conditions along with several other factors including local discharges consents, abstraction licences permeability of the underlying deposits.

Exploratory Point	Ground Level (m AOD)	Depth to Groundwater Level on Stated Monitoring Date (m bgl)				
		12/07/2024	15/08/2024	15/11/2024	04/12/2024	19/12/2024
RC-VB-01		Not yet installed	Not yet installed	DRY	DRY	DRY
RC-VB-02		Not yet installed	Not yet installed	DRY	DRY	DRY
RC-VB-03		DRY	DRY	14.20	Decommissioned	
RC-VB-04		DRY	DRY	DRY	Decommissioned	

3.2.5 Ground Obstructions

No significant ground obstructions were observed during the works excepting the rock strata. The chalk strata typically increased in strength and density at between circa 2-3m depth bgl with more structured chalk being encountered, in some cases with the chalk being beyond the ability of the plant utilised (10 tonne 360 tracked excavator with toothless bucket) to readily excavate.

3.2.6 Ground Conditions Summary

The new road and bridge are to be constructed to provide a link between the B656 / Royston Road in the south to Ashwell Road to the north and provide the proposed and existing developments with efficient access to the A505 and A1.

The strata underlying the proposed route comprises generally Topsoil over localised superficial deposits to a maximum of 0.80m depth overlying natural Chalk bedrock. The chalk stratum is initially recovered as structureless silty GRAVEL to depth of between 0.60-3.70m overlying structured extremely weak white mottled orange brown low to medium density Chalk becoming and extending to the base of the exploratory hole undertaken at 16.00m depth bgl.

3.2.9 Site Investigation In-situ and Laboratory Testing

The following in-situ and laboratory geotechnical testing was undertaken as part of the site investigation, the results of which are summarised in Table 3.2.9 (below) and presented on logs and laboratory reports in full in **Appendices C and E** respectively.

Method	Strata	Parameter	Comments
Atterberg Limits (4 No.)	Weathered Chalk 0.40m to 0.60m	Liquid Limit 32-39% Modified Plasticity Index 8-13%	Near surface cohesive soils are Low to Medium Plasticity and Non-Plastic to Low Volume Change Potential (single test only)
Particle Size Distribution	TBC	TBC	TBC
Compaction (Dry Density - Moisture Content Relationship) (3 No.)	Chalk 0.50m to 2.00m	Moisture Content as received was 24-28.2% Optimum Moisture Content is 19 to 25%	Materials ranged from 3.2% dry to 9% wet of optimum moisture content for earthworks (Average 5.7% Wet)
Standard Penetration Test (SPT) (12 No.)	Chalk 0.70m to 3.00m	SPT 'N-Values' in range N=18 to N=50 (Average N=34)	No correlations relating SPTs to chalk parameters or classifications.

CBR (Lab Remoulded) (3 No.)	Chalk 1.00m to 1.50m	Indicated CBR value of Chalk is 2.3% to 31%	Lab remoulded CBR tests indicate CBR of 2.3% to 31% Based upon the high variable nature of the laboratory testing, in-situ testing such as SPTs values or TRL DCPs taken in conjunction with in-situ description are considered to provide a more reliable estimate of the in-situ CBR value.
Chalk Crush Value (7 No.)	Chalk 0.50m to 2.00m	Material Greater than 10mm = <10% to 97% (Average 31.4%) Specimen Moisture Content = 27% to 30% (Average 28.7%) Saturated Moisture Content = 27% to 30% (Average 28.5%) Chalk Crushing Value = 3.2 to 3.9 (Average 3.41)	Materials classified as Chalk Class B or C according to TRL LR806
Saturation Moisture Content and Intact Dry Density (12No. Awaiting further testing)	Chalk 0.50m to 2.40m	Saturation Moisture Content = 25.4% to 32.2% (Average = 29.15%) Intact Dry Density = 1.44Mg/m ³ to 1.60Mg/m ³ (Average = 1.51 Mg/m ³)	Chalk is typically classified as Low to Medium density.
Point Load Tests (2No. Awaiting further testing)	Chalk 2.00m 2.40m	Is(50) = 0.75MPa to 0.78MPa	Rock is typically classified as “extremely weak” in line with BS 14689 Rock strength classifications.

Table 3.2.9 – Summary of In-Situ and Laboratory Geotechnical Testing undertaken.

Additional testing is currently outstanding, and the report will be updated upon receipt of the completed testing.

3.2.12 Contamination Testing

Shadbolt Group undertook an initial screen of the laboratory results using Shadbolt Group Tier One Screening Values Version (TSVs). This screening was undertaken using TSVs derived for the current and proposed Public Open Spaces (Residential) end use, which is considered to be appropriate / conservative for the grass verges of the embankment.

Contaminant concentrations below the TSVs are considered not to warrant further risk assessment. Concentrations of potential contaminants above the TSVs require further consideration of the potential pollutant linkages.

In total 8 No. soil samples were submitted for testing for a suite of common contaminants during the Shadbolt Group ground investigation. The laboratory chemical results have reported concentrations of potential contaminants to be within SE TSVs for ‘Public Open Space’ end use.

The water-soluble sulphate test results generally recorded concentrations between 10.0mg/l and 50.9mg/l. The soil pH was generally between 8.0 and 8.3 indicating slightly alkaline condition.

Sulphate levels and soil pH have been assessed and DS-1 and ACEC class 1 concrete is suitable for use at the site.

A copy of the laboratory testing reports is presented in **Appendix D**.

3.4 Ground Summary

Ground investigations undertaken along the length of the proposed route of the road has confirmed a reasonably consistent geological profile, similar to that recorded previously of Topsoil over weathered structureless Chalk over structured fractured Chalk at depth. Groundwater was not identified during the field work with standing groundwater levels recorded on only one occasion during the monitoring at a depth of between 14.20m bgl during subsequent monitoring. No significantly elevated concentrations of contaminants have been reported from soils retrieved from the site.

3.5 Geotechnical Risk Register

See Section 7

3.6 Engineering Assessment

See Section 4

4.0 GEOTECHNICAL DESIGN REPORT (GDR)

The GDR element of this report will be completed upon receipt of design documents for the proposed road and bridge.

5.0 CONCLUSIONS

6.0 REFERENCES

- Site walkover survey.
- Historical and Recent Ordnance Survey maps and plans.
- Geological Survey Sheets.
- The Environment Agency.
- Groundsure Report.
- British Geological Survey.
- Coal Authority Mining Report.
- BRE Report BR211; Radon: Protective measures for new buildings.
- NRPB-W26 'Radon Atlas of England and Wales,' NRPB, 2002.
- CIRIA 132 'A guide for safe working on contaminated sites,' CIRIA, 1996.
- CIRIA C552 'Contaminated Land Risk assessment. A guide to good practice,' CIRIA, 2001.
- BS10175 'Investigation of potentially contaminated sites – code of practice,' BS, 2011.
- CLR 11 'Model Procedures for the management of land contamination' EA, 2004
- Environmental Protection Act 1990: Part IIA
- Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance April 2012.
- Ciria C733 Asbestos in soil and made ground: a guide to understanding and managing risks, March 2014.
- BRE Special Digest 1, 2005 (Third Edition). Concrete in aggressive ground. Construction Research Communications Ltd, Watford.
- BS 5930: 1999. Code of practice for site investigations. BSI, UK.
- BS 10175: 2011. Investigation of potentially contaminated sites – Code of Practice. BSI, UK.
- CIRIA C665: 2006. Assessing risks posed by hazardous ground gases to buildings. London UK.
- DD ENV, 1997. Eurocode 7: Geotechnical Design. Parts 1 to 3. BSI, UK.
- Environment Agency, 2008 - onwards, Science Reports SC050021 (SGVs)
- TOMLINSON, M.J., 2001 Foundation design and construction. Prentice Hall, London.
- The LQM/CIEH S4ULs for Human Health Risk Assessment (S4UL3251), November 2014
- The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations, September 2015.
- Rocscience Slide Software
- Rocscience Settle 3D Software

HIGHWAYS AGENCY STANDARDS AND INFORMATION

- DMRB CD622 Rev 1 – Managing Geotechnical Risk, Highways England.
- Manual of Contract Documents for Highway Works – Series 600 Earthworks

BRITISH AND EUROCODE STANDARDS

- BS 8002:2015, 'Code of practice for earth retaining structures', British Standards Institution.
- BS 6031:2009 Incorporating Corrigendum No. 1, 'Code of practice for earthworks', British Standards Institution.
- BSEN 1997-1:2004+A1:2013 Incorporating corrigendum February 2009, 'Eurocode 7: Geotechnical design – Part 1: General rules', British Standards Institution.
- BS EN 1997-2:2007 Incorporating corrigendum June 2010, 'Eurocode 7 – Geotechnical design – Part 2: Ground investigation and testing', British Standards Institution.
- NA+A1:2014 to BS EN 1997-1:2004+A1:2013 Incorporating Corrigendum No. 1, 'UK National Annex to Eurocode 7: Geotechnical Design – Part1: General rules', British Standards Institution.

7.0 GEOTECHNICAL RISK REGISTER

No	Hazard	Consequence	Phase of project affected	Risk Management Measures	Comments or further recommended actions	Risk
1	Soft and compressible ground	High differential and total settlements. Increased costs to dig out and replace soft / very soft soils or undertake ground improvement techniques.	Construction, design life	Ground investigations carried out and confirmed geological profile of Topsoil over localised soft CLAY over Chalk at typically <1m bgl. Near surface Topsoil/soft CLAY shall be removed. Earthworks to be undertaken to construct embankment to appropriate engineering design with confirmatory validation testing conducted during/post construction.	From Ground Investigations to date significant depths of compressible materials are not anticipated. Near surface Topsoil/Sub-soil shall be removed. Construction of the proposed embankment will require placement of suitable site won/imported material to a suitable specification with appropriate validation testing. Base-Ex level is to be proof rolled to identify any soft spots and materials excavated and replaced as required. The works will be supervised by a suitably qualified geo-environmental engineer.	Low
2	Flooding	Increased construction costs. Damage to structures, foundations and earthworks, including erosion of embankment slopes. Maintenance liability.	Excavations, earthworks, design life	Design will consider flood levels and fluctuations, including rapid drawdown. Ensure adequate temporary and permanent drainage for earthworks.	The site is located within a Flood Zone 1 – low risk. The underlying strata comprises chalk and is likely to be permeable with typically good drainage noted during the fieldworks. Flooding is not expected to present a risk to the highway construction; however, care should be taken during excavation works to ensure excessively wet materials are not incorporated into the engineered fill. During wet weather pumping or drainage cuts may be required to prevent pooling of surface water. The works will be supervised by a suitably qualified geo-environmental engineer.	Low
3	Aggressive ground conditions	Long term degradation of concrete components leading to reduced design life and increased maintenance costs.	Design life	Laboratory tests to determine aggressiveness of the ground. Design sulphate classifications for buried concrete to be assessed. Depending on sulphate concentration, avoid calcium-based additives to treat soils (i.e. lime, cement) or blend in non- plastic soils. Increase specification of concrete to higher class.	The results have been assessed in accordance with the guidance given in BRE Special Digest 1:2005. Assuming a brownfield site with mobile groundwater the concrete Design Sulphate Class for the site is DS-1, ACEC Class AC-1. Chemical testing will be undertaken during the works on the fill to be placed and the works will be supervised by a suitably qualified geo-environmental engineer.	Low
4	Shrinking / Swelling Potential	Changes in groundwater conditions as a result of the construction may cause shrinking or swelling of any high plasticity clays which may result in excessive movement of structures.	Design life	Geotechnical sampling and testing to assess plasticity of the strata below the site. Treatment with hydrated lime / cement, however this is dependent on sulphate concentration.	Limited cohesive soils are present on site. Laboratory analysis on the shallow cohesive materials has indicated soils to be of Low to Medium Plasticity and at worst Low Volume Change potential. The natural underlying bedrock comprises of Chalk which is predominantly clast supported (Grade Dc) at shallow depth and structure chalk at depth, neither of which are expected to exhibit plastic behaviour.	Very low
5	Unexpected Ground Conditions	Unsuitable earthwork proposals if parameters assumed in the design are significantly different to those encountered on site during construction.	Design and construction works	GI has been undertaken and has confirmed soils are consistent and also consistent with those carried out by other previously.	Ground investigation have been undertaken at the site and a detailed ground model has been produced. However, should unexpected ground conditions be encountered NHC will be contacted immediately for comment. The works will be supervised by a suitably qualified geo-environmental engineer	Low
6	Instability of slopes on or adjacent to the proposed scheme	Failure of existing slopes and proposed embankment profile during construction.	Earthworks, Design life	Embankment and proposed slopes to be designed by appropriately qualified engineer. Validation testing of embankment fill to be carried out during construction to confirm placed material meets appropriate criteria / specifications. Possible ground investigation to confirm stability of existing railway embankment.	A ground investigation had been carried out along the current proposed road/bridge route. Should the route be altered further confirmatory investigations may be required. Confirmation of the composition and stability of the existing railway embankment may be prudent dependent upon the expected interaction between it and the proposed road embankment. The ground investigation data should be utilised to design an appropriate earthworks specification and validation strategy for the proposed embankment and road design. Geotechnical validation testing will be undertaken during the works as described within the strategy in order to ensure that the works are undertaken appropriately, and these works will be supervised by a suitably qualified geo-environmental engineer.	Low
7	Hard ground or obstructions	Delay site works, Increased construction costs.	Excavations, foundations	GI has been undertaken to confirm ground conditions along currently proposed route. Bedrock strata increased in density around 2-3m depth. No works have yet been carried out to confirm the stability of the slopes of the existing railway cutting assess their susceptibility to an increased surcharge. This may be required should interaction between the slopes of the existing railway cutting and the new road embankment be anticipated.	Obstructions may be associated with Made Ground and natural solid geology. Slope stability of existing railway cutting not yet confirmed. The works will be supervised by a suitably qualified geo-environmental engineer	Low

8	UXO	Delay site works, Increased construction costs.	Excavations, foundations	UXO bomb mapping indicates LOW Risk with no UXO identified within the area.	The works will be supervised by a suitably qualified geo-environmental engineer. Should UXO be encountered (unlikely) a suitably qualified UXO engineer will be contacted for further assessment.	Very Low
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APPENDIX A

REPORT CONDITIONS

REPORT CONDITIONS

This report is produced for the benefit of **Urban and Civic** in accordance with the terms of the appointment.

This report has been prepared in accordance with the terms and conditions of the appointment and relates to the condition of the site at the time of ground investigations. No warranty is provided as to the possibility of future changes in the condition of the site.

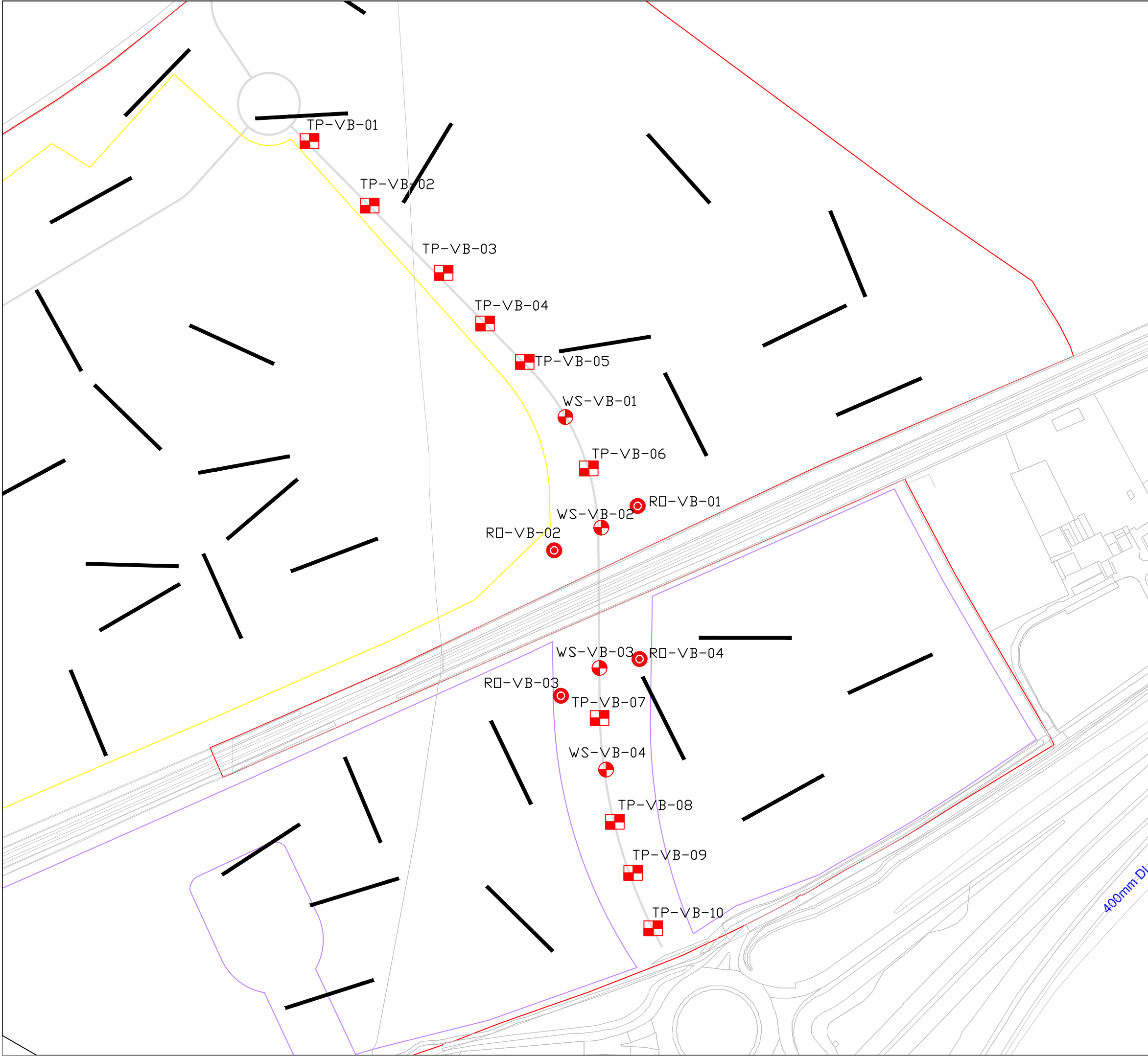
Shadbolt Group takes no responsibility for conditions which occur between the individual exploratory holes. Whilst every effort has been made to interpret the conditions between investigation locations, such information is only indicative.

Whilst the contamination assessment detailed within this report reflects our view, because there are no exact UK definitions of these matters, being subject to risk analysis, Shadbolt Environmental are unable to give categoric assurances that they will be accepted by authorities or funds without question. This report is prepared and written for the purposed uses stated in the report and should not be used in a different context without reference to Shadbolt Environmental. In time, improved practices or amended legislation may necessitate a re-assessment.

The report is limited to the geotechnical and environmental aspects detailed within the report, and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents.

APPENDIX B

DRAWINGS



DO NOT SCALE

KEY

-  Trial Pit
-  Rotary Borehole
-  Windowless Sample

Rev	Description	By	Ckd	Date
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SHADBOLT
ENVIRONMENTAL

Drawing Status: PRELIMINARY

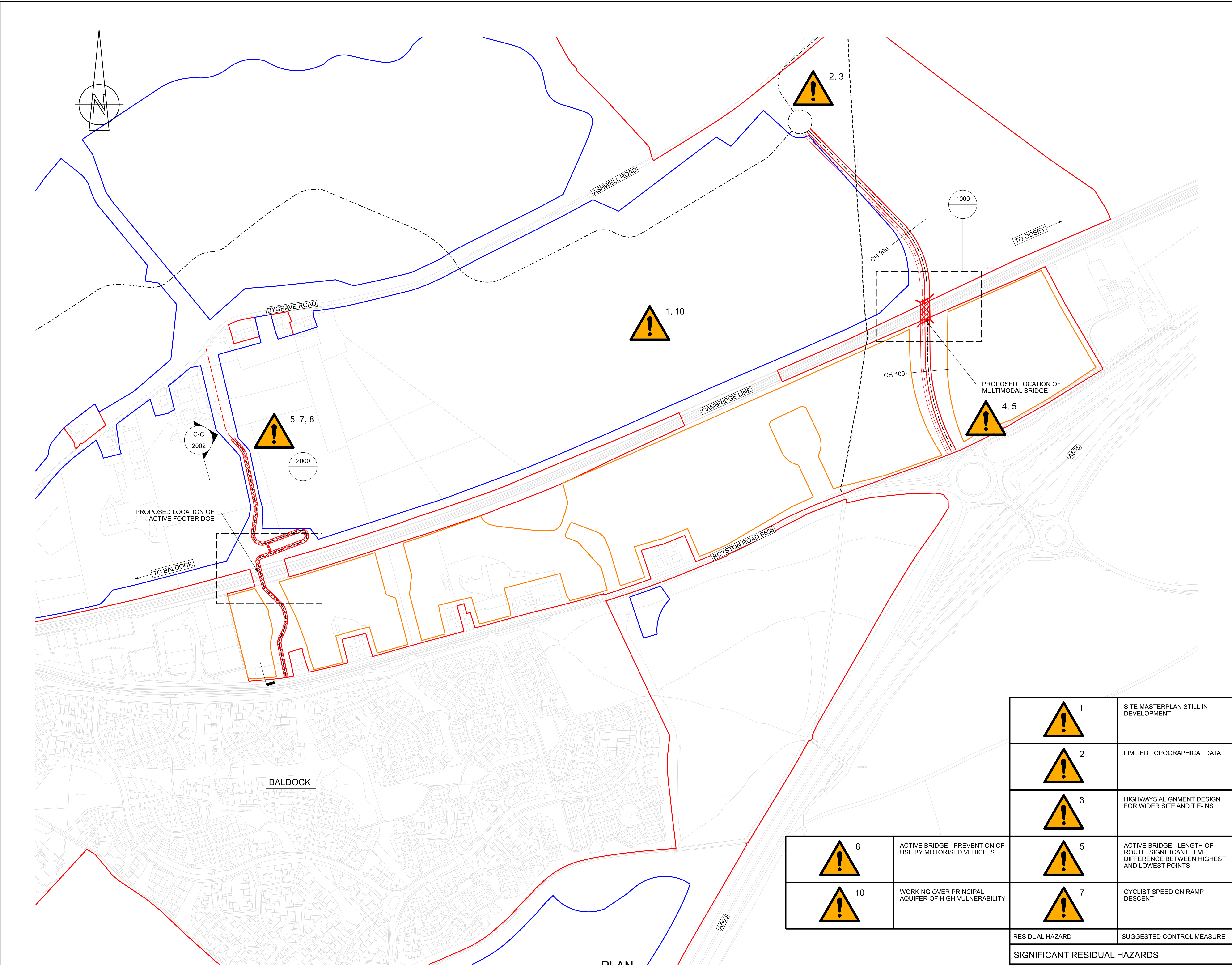
Client: Urban&Civic

Project: Baldock – Multi-Modal Bridge

Drawing Title: Exploratory Point Location Plan

Drawing No: 2899 – 004 Rev: R01

Scale: -/- By: SJF Ckd: -/- Date: Dec'24



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2. ALL LEVELS ARE IN METRES AOD UNLESS NOTED OTHERWISE.

3. FOR FURTHER INFORMATION ON HEALTH, SAFETY AND ENVIRONMENTAL HAZARDS REFER TO L124010-TG-S0-XX-HS-CB-0001.

KEY:

OUTLINE PLANNING BOUNDARY

EMPLOYMENT PARCEL

DEVELOPMENT PARCEL

EXISTING FOOTWAY

P02

JG

US

CFH

04.09.24

UPDATED FOLLOWING REVIEW

P01

JG

US

CFH

29.07.24

FIRST ISSUE

REV.

BY

CHKD

APPD

DATE

DESCRIPTION

CODE

DRAWING STATUS

S2

SUITABLE FOR INFORMATION



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Consulting Engineers

URBAN&CIVIC

BALDOCK
BRIDGE SCHEME

PROPOSED
SITE PLAN

SHEET 1 OF 1

DRAWING No.
L124010-TG-ZZ-ZZ-SK-CB-0010

DRAWN : JG

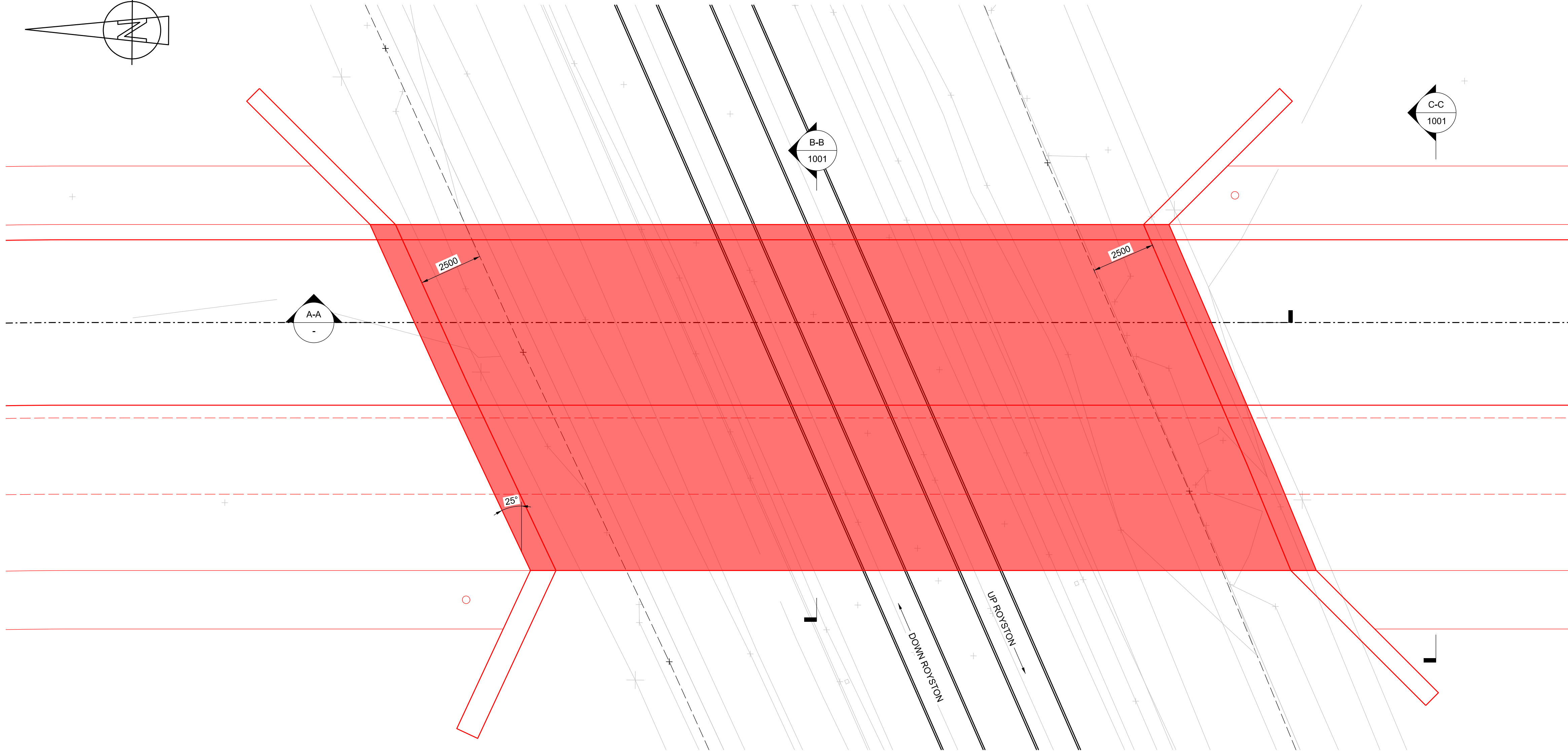
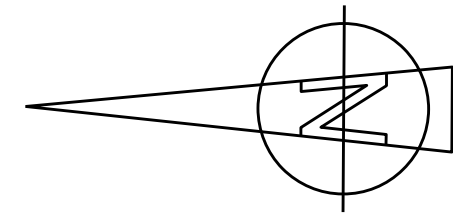
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REVISION

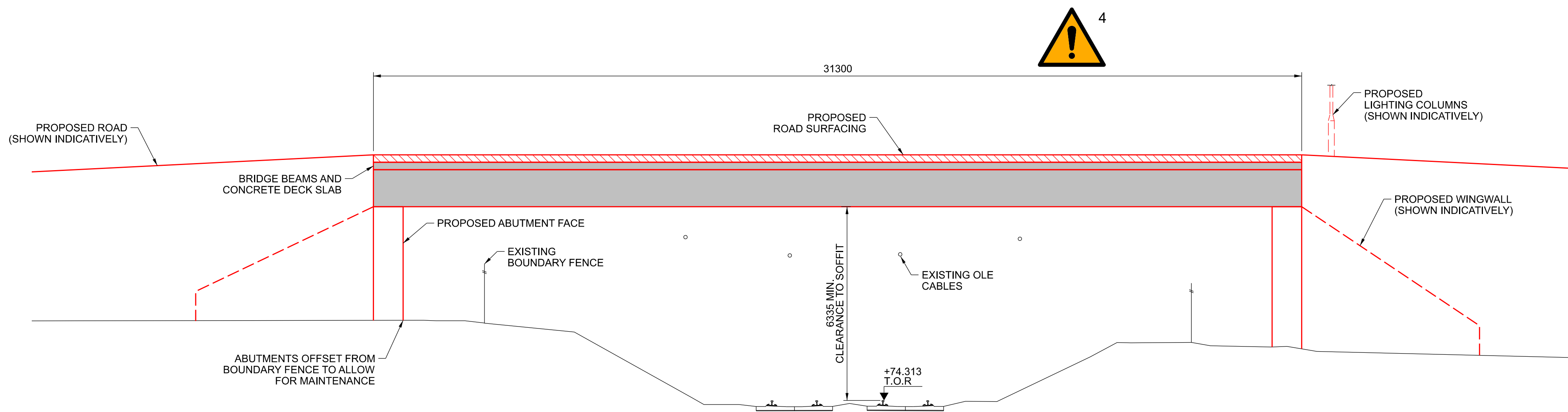
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ORIGINAL SIZE : A1

P02



PLAN
SCALE 1:100



SECTION A-A
SCALE 1:100



	
RESIDUAL HAZARD	SUGGESTED CONTROL MEASURE
SIGNIFICANT RESIDUAL HAZARDS	
NOTE: The above hazards do not include every hazard or assumption, but identify significant residual construction hazards that are not likely to be obvious to a competent contractor and those that could be difficult to manage effectively. Refer also to the designer's risk documentation.	

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NOTES

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P02

JG

US

CFH

04.09.24

UPDATED FOLLOWING REVIEW

P01

JG

US

CFH

29.07.24

FIRST ISSUE

REV.

BY

CHKD

APPD

DATE

DESCRIPTION

CODE

DRAWING STATUS

S2

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BALDOCK
BRIDGE SCHEME

PROPOSED
MULTIMODAL BRIDGE
GENERAL ARRANGEMENT

SHEET 1 OF 1

DRAWING No.

L124010-TG-ZZ-ZZ-SK-CB-1000

DRAWN : JG

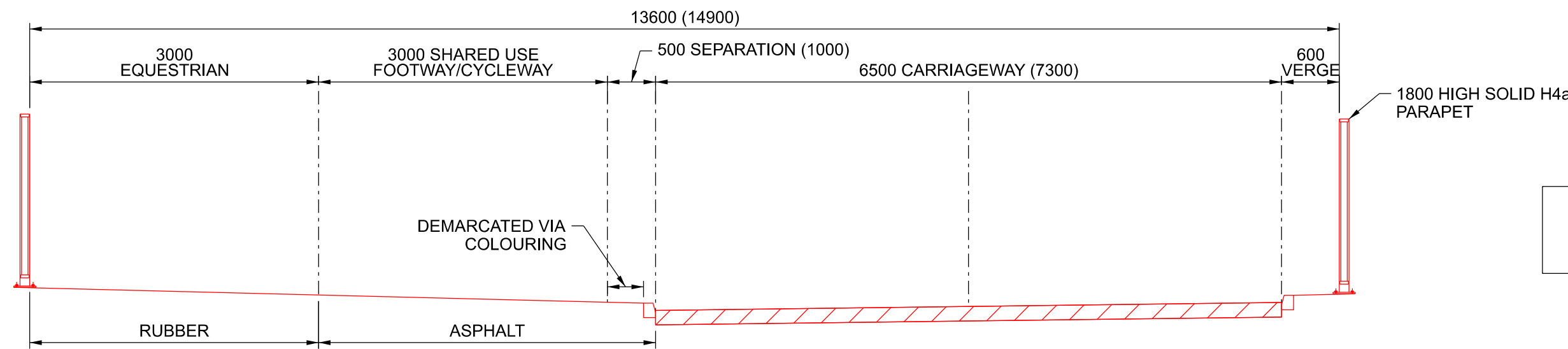
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REVISION

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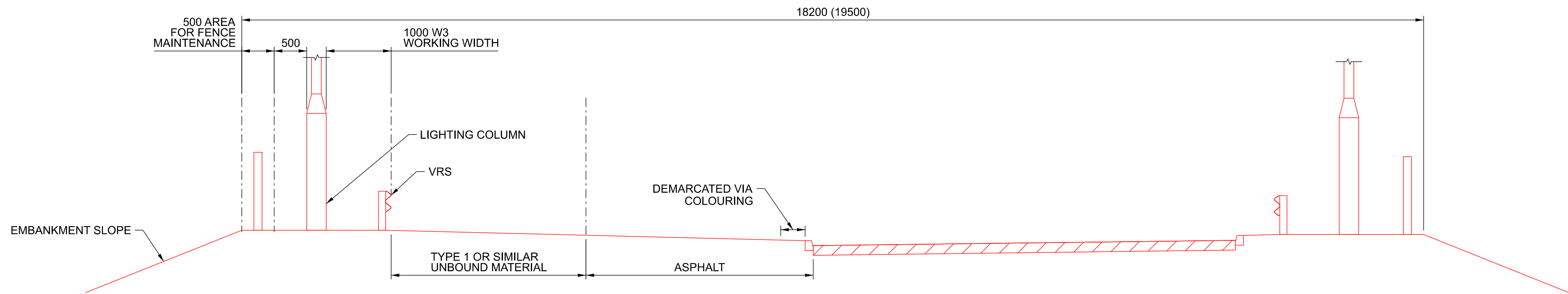
P02



NOTE:
CROSS SECTIONS SHOWN ARE FOR URBAN LOCAL DISTRIBUTOR - 30 MPH.
VALUES IN BRACKETS ARE FOR SECONDARY DISTRIBUTOR - 40 MPH.

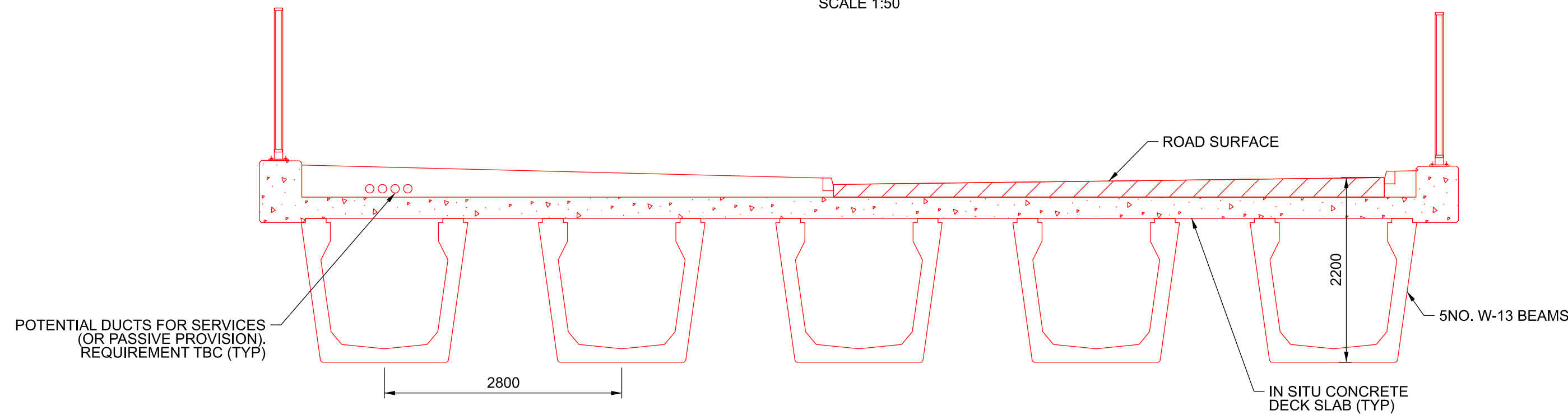
SECTION B-B

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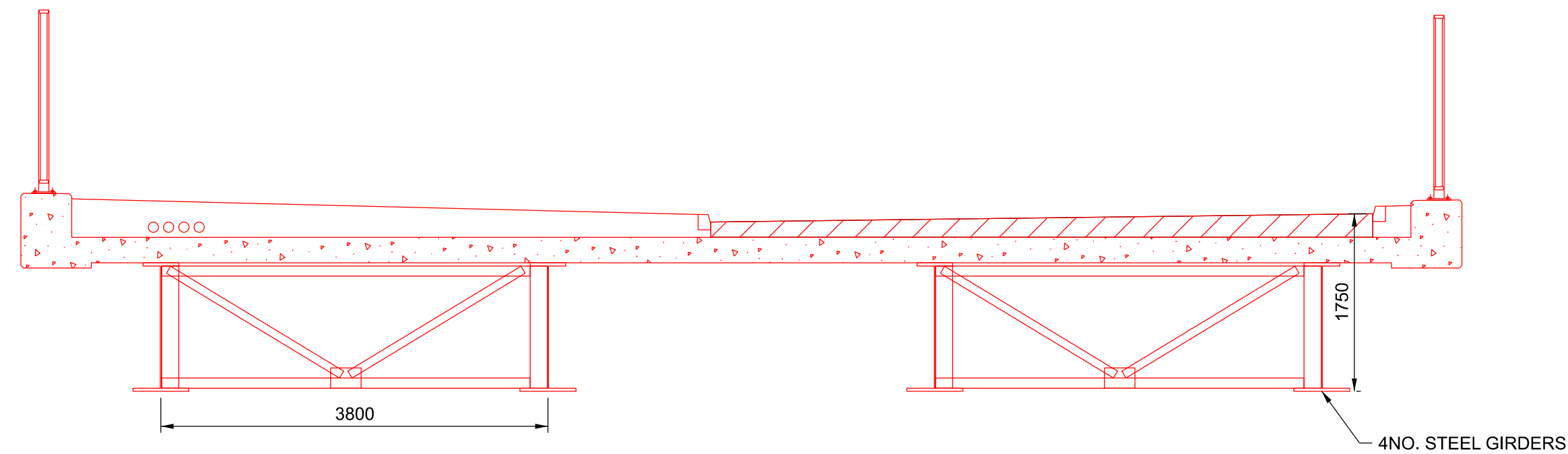
SECTION C-C

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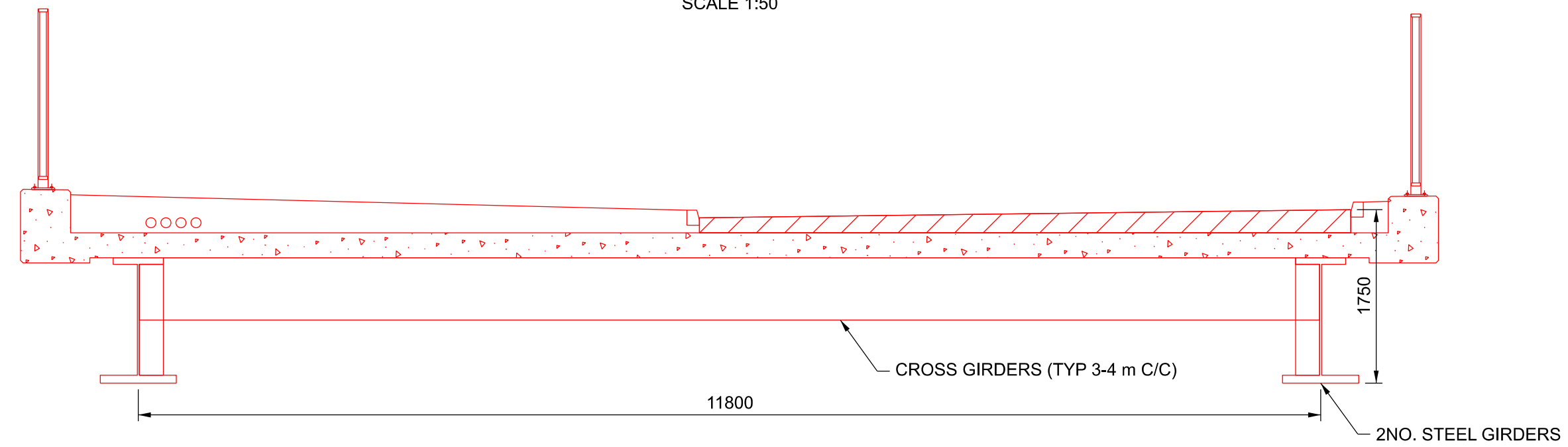
SECTION B-B (OPTION 1 - PRECAST CONCRETE W-BEAMS)

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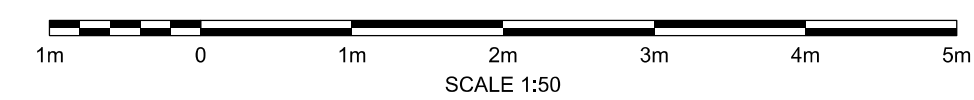
SECTION B-B (OPTION 2 - STEEL MULTI-GIRDER)

(L124010-TG-ZZ-ZZ-SK-CB-1000)
SCALE 1:50



SECTION B-B (OPTION 3 - STEEL LADDER DECK)

(L124010-TG-ZZ-ZZ-SK-CB-1000)
SCALE 1:50



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P02	JG	US	CFH	04.09.24	UPDATED FOLLOWING REVIEW
P01	JG	US	CFH	29.07.24	FIRST ISSUE
REV.	BY	CHKD	APPD	DATE	DESCRIPTION
CODE	DRAWING STATUS				
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MULTIMODAL BRIDGE
OPTION SECTIONS

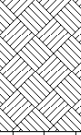
SHEET 1 OF 1

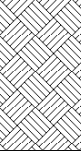
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APPENDIX C

LOGS

 SHADBOLT GROUP DESIGN MANAGE CONSTRUCT				Trial Pit Log			TrialPit No TP-VB-01 Sheet 1 of 1		
Project Name: Baldock (Multi-Modal Bridge SI 2024)				Project No. 2899 (MMB 2024)		Co-ords: 526041.00 - 235033.03 Level:		Date 13/11/2024	
Location: Baldock						Dimensions (m): 3.10		Scale 1:20	
Client:						Depth 4.00		Logged SJF	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10 - 0.20	ES		0.30			TOPSOIL: Brown friable gravelly sandy SILT with low root content. Gravel is angular to sub-angular fine to coarse chalk.		
	1.00 - 1.20	B					Extremely weak white mottled light orange brown low to medium density CHALK recovered as slightly sandy silty GRAVEL with cobbles from 1.50m depth. Fractures are horizontal and closely spaced (20-40mm) open with compact light orange brown sandy silt sized comminuted chalk. Grade C.		
	2.00 - 2.20	B							
	3.00 - 3.20	B							
				4.00			End of Pit at 4.00m		
Remarks: No groundwater encountered.									
Stability: Stable									
Plant: 10 tonnes tracked excavator									

 SHADBOLT GROUP DESIGN MANAGE CONSTRUCT				Trial Pit Log			TrialPit No TP-VB-02			
Project Name: Baldock (Multi-Modal Bridge SI 2024)				Project No. 2899 (MMB 2024)		Co-ords: 526073.59 - 234998.20		Date 13/11/2024		
Location: Baldock				Dimensions (m):		2.60		Scale 1:20		
Client:				Depth 3.00		0.00		Logged SJF		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
	Depth	Type	Results							
	0.10 - 0.20	ES		0.35			TOPSOIL: Brown friable gravelly sandy SILT with low root content. Gravel is angular to sub-angular fine to coarse chalk.			1
	0.50 - 0.60	B					Structureless CHALK composed of white mottled orange brown sandy GRAVEL of fine to coarse, sub-angular extremely weak low to medium density chalk. Grade Dc			
							Extremely weak white mottled light orange brown low density CHALK recovered as slightly sandy silty GRAVEL with cobbles and boulders from 1.00m depth. Fractures are horizontal and closely spaced (20-40mm) open with compact light orange brown sandy silt sized comminuted chalk. Grade C.			
	2.00 - 2.20	D		3.00			End of Pit at 3.00m			3
Remarks: No groundwater encountered.										
Stability: Stable										
Plant: 10 tonnes tracked excavator										

 SHADBOLT GROUP DESIGN MANAGE CONSTRUCT				Trial Pit Log			TrialPit No TP-VB-03 Sheet 1 of 1		
Project Name: Baldock (Multi-Modal Bridge SI 2024)				Project No. 2899 (MMB 2024)		Co-ords: 526113.47 - 234961.83 Level:		Date 13/11/2024	
Location: Baldock						Dimensions (m): 2.90		Scale 1:20	
Client:						Depth 3.50		Logged SJF	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.05 - 0.15	ES		0.40			TOPSOIL: Brown friable gravelly sandy SILT with low root content. Gravel is angular to sub-angular fine to coarse chalk.		
	0.60 - 0.80	B					Structureless CHALK composed of white mottled orange brown sandy GRAVEL of fine to coarse, sub-angular extremely weak low to medium density chalk. Grade Dc		
							Extremely weak white mottled light orange brown low density CHALK recovered as slightly sandy silty GRAVEL with cobbles from 1.30m depth. Fractures are horizontal and closely spaced (20-40mm) open with compact light orange brown sandy silt sized comminuted chalk. Grade C.		
	1.60 - 1.80	B			3.50			End of Pit at 3.50m	
Remarks: No groundwater encountered.									
Stability: Stable									
Plant: 10 tonnes tracked excavator									

 SHADBOLT GROUP DESIGN MANAGE CONSTRUCT				Trial Pit Log			TrialPit No TP-VB-04 Sheet 1 of 1		
Project Name: Baldock (Multi-Modal Bridge SI 2024)				Project No. 2899 (MMB 2024)		Co-ords: 526135.87 - 234934.46 Level:		Date 13/11/2024	
Location: Baldock						Dimensions (m): 2.60		Scale 1:20	
Client:						Depth 3.40		Logged SJF	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10 - 0.20	ES		0.30			TOPSOIL: Brown friable gravelly sandy SILT with low root content. Gravel is angular to sub-angular fine to coarse chalk.		
	0.80 - 1.00	B					Extremely weak white mottled light orange brown low density CHALK recovered as slightly sandy silty GRAVEL. Fractures are horizontal and closely spaced (20-40mm) open with compact light orange brown sandy silt sized comminuted chalk. Grade C. <i>not mottled orange brown past 0.60m depth.</i>		
	1.80 - 2.00	B		3.40					
			End of Pit at 3.40m						
Remarks: No groundwater encountered.									
Stability: Stable									
Plant: 10 tonnes tracked excavator									



 SHADBOLT GROUP DESIGN MANAGE CONSTRUCT				Trial Pit Log			TrialPit No TP-VB-06		
Project Name: Baldock (Multi-Modal Bridge SI 2024)				Project No. 2899 (MMB 2024)		Co-ords: 526191.93 - 234856.15		Date 13/11/2024	
Location: Baldock				Dimensions (m):		2.80		Scale 1:20	
Client:				Depth 3.50		0.00		Logged SJF	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.15 - 0.25	ES		0.10			TOPSOIL: Brown friable gravelly sandy SILT with low root content. Gravel is angular to sub-angular fine to coarse chalk. Loose orange brown clayey gravelly SAND. Gravel is angular to sub-angular fine to coarse chalk and occasional flint.		
				0.25					
	1.00 - 1.20	B					Extremely weak white mottled light orange brown low density CHALK recovered as slightly sandy silty GRAVEL with cobbles from 1.50m depth. Fractures are horizontal and closely spaced (20-40mm) open with compact light orange brown sandy silt sized comminuted chalk. Grade C. less matrix past 1.40m depth.		
	2.40 - 2.60	B					End of Pit at 3.50m		
				3.50					
Remarks: No groundwater encountered.									
Stability: Stable									
Plant: 10 tonnes tracked excavator									

 SHADBOLT GROUP DESIGN MANAGE CONSTRUCT				Trial Pit Log				TrialPit No TP-VB-07 Sheet 1 of 1	
Project Name: Baldock (Multi-Modal Bridge SI 2024)				Project No. 2899 (MMB 2024)		Co-ords: 526197.80 - 234721.84 Level: 74.45		Date 10/07/2024	
Location: Baldock						Dimensions (m): 3.00		Scale 1:20	
Client:						Depth 3.70		Logged RK	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10 - 0.20	ES		0.30	74.15		Grass over TOPSOIL - Brown slightly sandy slightly gravelly CLAY with low root content. Gravel is fine to coarse, angular to sub-angular of chert.		
	0.50 - 0.60 0.50 - 0.60	B D					Structureless CHALK composed of very weak low to medium density, white mottled light orange slightly silty GRAVEL. Gravel is fine to coarse, sub-angular of chalk,		
	1.00 - 1.20	B		0.80	73.65		Structureless CHALK composed of very weak low to medium density, white slightly silty GRAVEL. Gravel is fine to coarse, sub-angular of chalk,		
	1.50 - 1.60	D							
	2.60 - 2.70	D							
	3.50 - 3.60	D		3.70	70.75		End of Pit at 3.70m		
Remarks: No groundwater encountered.									
Stability: Stable									
Plant: 10 tonnes tracked excavator									

 SHADBOLT GROUP DESIGN MANAGE CONSTRUCT				Trial Pit Log			TrialPit No TP-VB-08 Sheet 1 of 1		
Project Name: Baldock (Multi-Modal Bridge SI 2024)				Project No. 2899 (MMB 2024)		Co-ords: 526206.02 - 234665.13 Level:		Date 10/07/2024	
Location: Baldock						Dimensions (m): 3.00		Scale 1:20	
Client:						Depth 3.50		0.50 Logged RK	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10 - 0.15	ES		0.30			Grass over TOPSOIL - Brown slightly sandy slightly gravelly CLAY with low root content. Gravel is fine to coarse, angular to sub-angular of chert.		1 2 3 4
	0.40 - 0.50	B				Firm light brown friable slightly gravelly slightly sandy SILT. Gravel is fine to coarse, angular to sub-angular of chalk and flint.			
	0.40 - 0.50	ES				Structureless CHALK composed of very weak low to medium density, white and brown slightly silty GRAVEL. Gravel is fine to coarse, sub-angular to sub-rounded of chalk. Grade D.			
	1.50 - 1.60	B				Structureless CHALK composed of very weak low to high density of white gravel. Gravel is fine to coarse, sub-angular of chalk.			
	2.50 - 2.60	D							
3.30 - 3.40	D		3.50			End of Pit at 3.50m			
Remarks: No groundwater encountered.									
Stability: Stable Plant: 10 tonnes tracked excavator									

 SHADBOLT GROUP DESIGN MANAGE CONSTRUCT				Trial Pit Log			TrialPit No TP-VB-09 Sheet 1 of 1		
Project Name: Baldock (Multi-Modal Bridge SI 2024)				Project No. 2899 (MMB 2024)		Co-ords: 526215.91 - 234637.53 Level:		Date 10/07/2024	
Location: Baldock						Dimensions (m): 0.50 3.00		Scale 1:20	
Client:						Depth 3.60		Logged RK	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10 - 0.15	ES		0.30			Grass over TOPSOIL - Brown friable slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, angular to sub-angular of chalk and flint		
	0.40 - 0.50	B					Structureless CHALK composed of very weak low to medium density of white and brown slightly gravelly SILT. Gravel is fine to coarse, angular to sub-angular of flint and chalk. Grade D.		
	0.40 - 0.50	ES					Structureless CHALK composed of very weak low to medium density of white silty GRAVEL. Gravel is fine to coarse, angular to sub-angular of chalk. Grade D.		
	1.00 - 1.20	B		2.00 - 2.10	D				
	3.50 - 3.60	D		3.60			End of Pit at 3.60m		
Remarks: No groundwater encountered.									
Stability: Stable									
Plant: 10 tonnes tracked excavator									
									

 SHADBOLT GROUP DESIGN MANAGE CONSTRUCT				Trial Pit Log				TrialPit No TP-VB-10 Sheet 1 of 1		
Project Name: Baldock (Multi-Modal Bridge SI 2024)				Project No. 2899 (MMB 2024)		Co-ords: 526226.72 - 234607.57 Level:		Date 10/07/2024		
Location: Baldock						Dimensions (m): 3.00		Scale 1:20		
Client:						Depth 3.70		Logged RK		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
	Depth	Type	Results							
	0.10 - 0.20	ES		0.30			Grass over TOPSOIL - friable brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, angular to sub-angular of chalk and chert.			1 2 3 4
	0.40 - 0.50	D					Structureless CHALK composed of very weak to weak, low to medium density white and brown mottled slightly silty GRAVEL. Gravel is fine to coarse, sub-angular of chalk. Grade C.			
	1.00 - 1.20	B		0.80			Structureless CHALK composed of very weak to weak, low to medium density of white slightly silty GRAVEL. Gravel is fine to coarse, sub-angular of chalk.			
	1.40 - 1.50	B								
	2.50 - 2.60	D		3.70						
3.50 - 3.60	D									
							End of Pit at 3.70m			
Remarks: No groundwater encountered.										
Stability: Stable										
Plant: 10 tonnes tracked excavator										



Windowless Sample Log

Borehole No.
WS-VB-01
Sheet 1 of 1

Project Name:	Baldock (Multi-Modal Bridge SI 2024)	Project No.	2899 (MMB 2024)	Co-ords:	526179E - 234884N	Hole Type	WLS
Location:	Baldock	Level:		Scale	1:25	Logged By	SJF
Client:		Dates:	12/11/2024				

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10 - 0.15	ES		0.30			Loose orange brown clayey gravelly SAND. Gravel is angular to sub-angular fine to coarse chalk and occasional flint.	1
		0.30 - 0.40	ES					Structureless CHALK composed of white mottled orange brown sandy GRAVEL of fine to coarse, sub-angular extremely weak low to medium density chalk. Grade Dc	
		0.80 - 0.90	D						
		1.80 - 1.95	D						
					2.45			End of Borehole at 2.45m	2
									3
									4
									5

Remarks
No groundwater encountered.





Windowless Sample Log

Borehole No.
WS-VB-02
Sheet 1 of 1

Project Name:	Baldock (Multi-Modal Bridge SI 2024)	Project No.	2899 (MMB 2024)	Co-ords:	526199E - 234824N	Hole Type	WLS
Location:	Baldock	Level:		Scale	1:25	Logged By	SJF
Client:		Dates:	12/11/2024				

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10 - 0.20	ES		0.30			Loose orange brown clayey gravelly SAND. Gravel is angular to sub-angular fine to coarse chalk and occasional flint.	
		0.70 - 0.90	D					Structureless CHALK composed of white mottled orange brown sandy GRAVEL of fine to coarse, sub-angular extremely weak low to medium density chalk. Grade Dc	
					1.45			End of Borehole at 1.45m	

Remarks
No groundwater encountered.





Windowless Sample Log

Project Name:	Baldock (Multi-Modal Bridge SI 2024)	Project No.	2899 (MMB 2024)	Co-ords:	526197E - 234749N	Hole Type	WLS
Location:	Baldock	Level:	75.37	Scale	1:25	Logged By	RK
Client:		Dates:	09/07/2024				

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10 - 0.15	D	N=56 (7,12/19,16,13,8)	0.30	75.07		Grass over TOPSOIL - Brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, angular to sub-angular of chert.	1
		0.40 - 0.50	D					Structureless CHALK composed of loose white mottled orange silty gravel. Gravel is consists of weak medium density angular to sub-angular, fine to coarse chalk.	
		1.00 - 1.20	D					Structureless CHALK composed of loose white silty gravel. Gravel is consists of weak medium density angular to sub-angular, fine to coarse chalk.	
		1.00	SPT		1.50	73.87		End of Borehole at 1.50m	
									2
									3
									4
									5

Remarks
No groundwater encountered.





Windowless Sample Log

Project Name:	Baldock (Multi-Modal Bridge SI 2024)	Project No.	2899 (MMB 2024)	Co-ords:	526202E - 234693N	Hole Type	WLS
Location:	Baldock	Level:	73.72	Scale	1:25	Logged By	RK
Client:		Dates:	09/07/2024				

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10 - 0.15	D		0.30	73.42		Grass over TOPSOIL - Brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, angular to sub-angular of chert.	
		0.50 - 0.60	D					Light brown friable slightly gravelly slightly sandy SILT. Gravel is fine to coarse, angular to sub-angular of flint and chalk	
		0.90 - 1.20	D		0.80	72.92		Structureless CHALK composed of very weak low to medium density white and occasionally orangish brown gravelly SILT. Gravel is fine to coarse., Grade D.	1
		1.00	SPT	N=18 (3,3/2,3,6,7)					
		2.00	SPT	N=25 (3,6/5,6,7,7)	2.30	71.42		Structureless CHALK composed of very weak low to medium density white silty GRAVEL. Gravel is fine to coarse of chalk. Grade D.	2
		2.40 - 2.50	D						
		3.00	SPT	N=14 (2,2/3,3,2,6)	3.45	70.27		End of Borehole at 3.45m	3
									4
									5

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.

RO-VB-01

Sheet 1 of 3

Hole Type
RC

Project Name: Baldock (Multi-Modal Bridge
SI 2024)

Project No.
2899 (MMB 2024)

Co-ords: 526218.34 - 234835.85

Location: Baldock

Level:

Scale
1:25

Client:

Dates: 13/11/2024 - 14/11/2024

Logged By
SJF

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.30			TOPSOIL: Brown friable gravelly sandy SILT with low root content. Gravel is angular to sub-angular fine to coarse chalk.	
							0.80			Structureless CHALK composed of white mottled orange brown silty GRAVEL of fine to medium, angular extremely weak low to medium density chalk. Grade Dc	
		N=50 (5,10/50 for 285mm) 0.80 - 1.60		44	0	0				Extremely weak white occasionally mottled light orange brown low to medium density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are very closely to closely spaced planar to undulating rough tight to partly open clean locally with silty gravel infill, with light orange brown staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade B3-B5 <u>Assessed Zone of Core Loss.</u> <u>Non-intact Core Recovery.</u> <u>Non-intact Core Recovery.</u> <u>Non-intact Core Recovery.</u>	1
		N=50 (2,4/50 for 276mm) 1.60 - 3.10		91	70	0					2
		3.10 - 4.30		83	53	0				<u>Assessed Zone of Core Loss.</u> <u>Non-intact Core Recovery.</u>	3
										<u>Assessed Zone of Core Loss.</u> <u>Non-intact Core Recovery.</u> <u>Non-intact Core Recovery.</u>	4
											5
Continued on Next Sheet											

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.

RO-VB-01

Sheet 2 of 3

Hole Type
RC

Project Name: Baldock (Multi-Modal Bridge
SI 2024)

Project No.
2899 (MMB 2024)

Co-ords: 526218.34 - 234835.85

Location: Baldock

Level:

Scale
1:25

Logged By
SJF

Client:

Dates: 13/11/2024 - 14/11/2024

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		4.30 - 5.80		95	40	0				Extremely weak white occasionally mottled light orange brown low to medium density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are very closely to closely spaced planar to undulating rough tight to partly open clean locally with silty gravel infil, with light orange brown staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade B3-B5	6
		5.80 - 7.30		100	16	16				<u>Non-intact Core Recovery.</u>	
										<u>Assessed Zone of Core Loss.</u>	
										<u>Non-intact Core Recovery due to vertical fracturing.</u>	
										7.30 - 8.80	
<u>Non-intact Core Recovery.</u>											
<u>Non-intact Core Recovery.</u>											
8.80 - 10.30	100	30	30	<u>Assessed Zone of Core Loss.</u>	9						
				<u>Non-intact Core Recovery due to vertical fracturing.</u>							
Continued on Next Sheet											10

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.

RO-VB-01

Sheet 3 of 3

Hole Type
RC

Project Name: Baldock (Multi-Modal Bridge
SI 2024)

Project No.
2899 (MMB 2024)

Co-ords: 526218.34 - 234835.85

Location: Baldock

Level:

Scale
1:25

Logged By
SJF

Client:

Dates: 13/11/2024 - 14/11/2024

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		10.30 - 11.80		97	78	50				Extremely weak white occasionally mottled light orange brown low to medium density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are very closely to closely spaced planar to undulating rough tight to partly open clean locally with silty gravel infill, with light orange brown staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade B3-B5 <u>Non-intact Core Recovery.</u>	11
										<u>Non-intact Core Recovery.</u>	
										<u>Assessed Zone of Core Loss.</u>	
											12
		11.80 - 13.30		75	68	10				<u>Non-intact Core Recovery.</u>	
										<u>Assessed Zone of Core Loss.</u>	
											13
		13.30 - 14.80		95	43	36				<u>Non-intact Core Recovery.</u>	
										<u>Assessed Zone of Core Loss.</u>	
											14
							14.80			<u>Assessed Zone of Core Loss.</u> End of Borehole at 14.80m	15

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.

RO-VB-02

Sheet 1 of 3

Hole Type
RC

Project Name: Baldock (Multi-Modal Bridge
SI 2024)

Project No.
2899 (MMB 2024)

Co-ords: 526173.24 - 234811.84

Location: Baldock

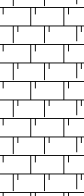
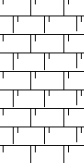
Level:

Scale
1:25

Client:

Dates: 14/11/2024 - 15/11/2024

Logged By
SJF

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.30			TOPSOIL: Brown friable gravelly sandy SILT with low root content. Gravel is angular to sub-angular fine to coarse chalk.	1
							0.70			Structureless CHALK composed of white mottled orange brown silty GRAVEL of fine to medium, angular extremely weak low to medium density chalk. Grade Dc	
		N=29 (4,5/6,10,7,6)								Non-intact Core Recovery: Extremely weak white mottled orange brown sandy GRAVEL of fine to coarse, sub-angular low to extremely weak medium density chalk. Grade Dc	
		0.70 - 1.70	73	0	0					Assessed Zone of Core Loss.	
		N=15 (1,3/4,4,4,3)									
		1.70 - 2.80	71	0	0					Assessed Zone of Core Loss.	
		N=43 (4,6/8,10,12,13)								Extremely weak white occasionally mottled light orange brown low to medium density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are very closely to closely spaced planar to undulating rough tight to partly open clean locally with silty gravel infil, with light orange brown staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade B3-B5	
		2.80 - 4.30	89	30	0					Non-intact Core Recovery. Non-intact Core Recovery.	
										Assessed Zone of Core Loss.	
										Non-intact Core Recovery.	
Continued on Next Sheet											5

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.

RO-VB-02

Sheet 2 of 3

Hole Type
RC

Project Name: Baldock (Multi-Modal Bridge
SI 2024)

Project No.
2899 (MMB 2024)

Co-ords: 526173.24 - 234811.84

Location: Baldock

Level:

Scale
1:25

Logged By
SJF

Client:

Dates: 14/11/2024 - 15/11/2024

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description					
				TCR	SCR	RQD									
		4.30 - 5.80		94	65	13				Extremely weak white occasionally mottled light orange brown low to medium density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are very closely to closely spaced planar to undulating rough tight to partly open clean locally with silty gravel infil, with light orange brown staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade B3-B5					
		5.80 - 7.30		93	39	8				<u>Assessed Zone of Core Loss.</u>					
										<u>Non-intact Core Recovery.</u>					
										<u>Non-intact Core Recovery.</u>					
										<u>Non-intact Core Recovery.</u>					
		7.30 - 8.80		83	44	30				<u>Non-intact Core Recovery.</u>					
										<u>Assessed Zone of Core Loss.</u>					
										<u>Non-intact Core Recovery.</u>					
										<u>Non-intact Core Recovery.</u>					
		8.80 - 10.30		99	11	7				<u>Non-intact Core Recovery.</u>					
										<u>Non-intact Core Recovery.</u>					
										<u>Non-intact Core Recovery.</u>					
										<u>Non-intact Core Recovery.</u>					
										<u>Non-intact Core Recovery.</u>					
										<u>Non-intact Core Recovery.</u>					
										<u>Non-intact Core Recovery.</u>					
Continued on Next Sheet															

Continued on Next Sheet

Remarks

No groundwater encountered.





Rotary Core Log

Borehole No.

RO-VB-02

Sheet 3 of 3

Hole Type
RC

Project Name: Baldock (Multi-Modal Bridge
SI 2024)

Project No.
2899 (MMB 2024)

Co-ords: 526173.24 - 234811.84

Location: Baldock

Level:

Scale
1:25

Logged By
SJF

Client:

Dates: 14/11/2024 - 15/11/2024

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		10.30 - 11.80		78	63	24				Extremely weak white occasionally mottled light orange brown low to medium density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are very closely to closely spaced planar to undulating rough tight to partly open clean locally with silty gravel infill, with light orange brown staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade B3-B5 <u>Assessed Zone of Core Loss.</u> <u>Non-intact Core Recovery.</u>	11
										<u>Assessed Zone of Core Loss.</u>	
										<u>Non-intact Core Recovery due to vertical fracturing.</u>	12
		11.80 - 13.30		98	36	9				<u>Non-intact Core Recovery.</u>	
										<u>Non-intact Core Recovery due to vertical fracturing.</u>	13
										<u>Assessed Zone of Core Loss.</u>	
										<u>Non-intact Core Recovery.</u>	
										<u>Non-intact Core Recovery.</u>	
		13.30 - 14.80		86	58	22				<u>Non-intact Core Recovery.</u>	14
										<u>Non-intact Core Recovery.</u>	
										<u>Non-intact Core Recovery.</u>	
										<u>Non-intact Core Recovery.</u>	
							14.80			<u>Assessed Zone of Core Loss.</u>	
										End of Borehole at 14.80m	15

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.
RO-VB-03

Sheet 1 of 3
Hole Type
RC

Project Name:	Baldock (Multi-Modal Bridge SI 2024)	Project No.	2899 (MMB 2024)	Co-ords:	526176.58 - 234733.21
Location:	Baldock	Level:	74.71	Client:	Dates: 09/07/2024 - 10/07/2024
					Scale 1:25 Logged By SJF

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.30	74.41		Grass over TOPSOIL: Brown slightly sandy slightly gravelly CLAY with low root content. Gravel is fine to coarse, angular to sub-angular of chert.	
		N=30 (6,7/7,9,7,7)								Structureless CHALK composed of white mottled orange brown silty GRAVEL of fine to medium, angular extremely weak low to medium density chalk. Grade Dc	1
		1.00 - 2.50		83	0	0	1.50	73.21		Extremely weak white occasionally mottled light orange brown low to medium density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are closely to medium spaced planar to undulating rough locally striated tight to partly open clean locally with light orange brown silt infil, with light orange brown and grey staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade A3-A5	2
		2.50 - 4.00		69	17	0				<u>Non-intact Core Recovery.</u> <u>Assessed Zone of Core Loss.</u> <u>Non-intact Core Recovery.</u>	3
		4.00 - 5.50		100	63	49				<u>Non-intact Core Recovery.</u> <u>Non-intact Core Recovery.</u>	4
Continued on Next Sheet											5

Remarks	No groundwater encountered.	
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Rotary Core Log

Borehole No.
RO-VB-03

Sheet 2 of 3
Hole Type
RC

Scale
1:25

Logged By
SJF

Project Name: Baldock (Multi-Modal Bridge SI 2024) Project No. 2899 (MMB 2024) Co-ords: 526176.58 - 234733.21
Location: Baldock Level: 74.71
Client: Dates: 09/07/2024 - 10/07/2024

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										Extremely weak white occasionally mottled light orange brown low to medium density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are closely to medium spaced planar to undulating rough locally striated tight to partly open clean locally with light orange brown silt infil, with light orange brown and grey staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade A3-A5	6
		5.50 - 7.00		100	93	79					
		7.00 - 8.50		100	95	83					
		8.50 - 10.00		100	56	22					
Continued on Next Sheet											10

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.

RO-VB-03

Sheet 3 of 3

Hole Type
RC

Project Name: Baldock (Multi-Modal Bridge
SI 2024)

Project No.
2899 (MMB 2024)

Co-ords: 526176.58 - 234733.21

Location: Baldock

Level: 74.71

Scale
1:25

Client:

Dates: 09/07/2024 - 10/07/2024

Logged By
SJF

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		10.00 - 11.50		85	32	9				Extremely weak white occasionally mottled light orange brown low to medium density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are closely to medium spaced planar to undulating rough locally striated tight to partly open clean locally with light orange brown silt infil, with light orange brown and grey staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade A3-A5 <i>Non-intact Core Recovery.</i>	11
		11.50 - 13.00		100	68	53				<i>Assessed Zone of Core Loss.</i>	12
		13.00 - 14.50		100	92	92				<i>Non-intact Core Recovery.</i>	13
		14.50 - 15.00		94	72	38				<i>Assessed Zone of Core Loss.</i>	14
							15.00	59.71		End of Borehole at 15.00m	15

Remarks

No groundwater encountered.





Rotary Core Log

Borehole No.

RO-VB-04

Sheet 1 of 4

Hole Type
RC

Project Name: Baldock (Multi-Modal Bridge
SI 2024)

Project No.
2899 (MMB 2024)

Co-ords: 526221.49 - 234755.72

Location: Baldock

Level: 75.77

Scale
1:25

Client:

Dates: 08/07/2024 - 09/07/2024

Logged By
SJF

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		N=43 (9,11/9,9,13,12)					0.40	75.37		Grass over TOPSOIL: Brown slightly sandy slightly gravelly CLAY with low root content. Gravel is fine to coarse, angular to sub-angular of chert.	1
										Structureless CHALK composed of white mottled orange brown silty GRAVEL of fine to medium, angular extremely weak low to medium density chalk. Grade Dc	
		1.00 - 2.50		63	40	0	1.50	74.27		Extremely weak white occasionally mottled light orange brown low to high density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are closely to medium spaced planar to undulating rough tight to partly open clean, with light orange brown and grey staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade A3-A5 <u>Assessed Zone of Core Loss.</u>	2
										<u>Non-intact Core Recovery.</u>	
		2.50 - 4.00		92	19	7				<u>Non-intact Core Recovery.</u>	3
										<u>Non-intact Core Recovery.</u>	
		4.00 - 5.50		93	55	28				<u>Assessed Zone of Core Loss.</u>	4
										<u>Non-intact Core Recovery.</u>	
										Continued on Next Sheet	5

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.
RO-VB-04

Sheet 2 of 4
Hole Type
RC

Scale
1:25

Logged By
SJF

Project Name: Baldock (Multi-Modal Bridge SI 2024) Project No. 2899 (MMB 2024) Co-ords: 526221.49 - 234755.72
Location: Baldock Level: 75.77
Client: Dates: 08/07/2024 - 09/07/2024

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		5.50 - 7.00		33	73	53				Extremely weak white occasionally mottled light orange brown low to high density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are closely to medium spaced planar to undulating rough tight to partly open clean, with light orange brown and grey staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade A3-A5 <u>Assessed Zone of Core Loss.</u> <u>Non-intact Core Recovery.</u> <u>Assessed Zone of Core Loss.</u>	6
		7.00 - 8.50		92	81	40					7
		8.50 - 10.00		100	0	0				<u>Non-intact Core Recovery.</u> <u>Assessed Zone of Core Loss.</u>	8
											9
										Continued on Next Sheet	10

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.

RO-VB-04

Sheet 3 of 4

Hole Type
RC

Project Name: Baldock (Multi-Modal Bridge
SI 2024)

Project No.
2899 (MMB 2024)

Co-ords: 526221.49 - 234755.72

Location: Baldock

Level: 75.77

Scale
1:25

Client:

Dates: 08/07/2024 - 09/07/2024

Logged By
SJF

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		10.00 - 11.50		100	0	0				Extremely weak white occasionally mottled light orange brown low to high density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are closely to medium spaced planar to undulating rough tight to partly open clean, with light orange brown and grey staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade A3-A5	11
		11.50 - 13.00		100	0	0					12
		13.00 - 14.50		93	0	0					13
											14
										Assessed Zone of Core Loss.	15
Continued on Next Sheet											

Remarks
No groundwater encountered.





Rotary Core Log

Borehole No.
RO-VB-04

Sheet 4 of 4
Hole Type
RC

Project Name:	Baldock (Multi-Modal Bridge SI 2024)	Project No.	2899 (MMB 2024)	Co-ords:	526221.49 - 234755.72
Location:	Baldock	Level:	75.77	Scale 1:25 Logged By SJF	
Client:	Dates:				

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		14.50 - 16.00		91	0	0	16.00	59.77		Extremely weak white occasionally mottled light orange brown low to high density CHALK with localised core disturbance due to steeply inclined fracture. Horizontal fractures are closely to medium spaced planar to undulating rough tight to partly open clean, with light orange brown and grey staining and black speckling. Inclined fractures are planar to undulating rough tight to partly open clean with light orange brown staining and black speckling. Grade A3-A5 <u>Assessed Zone of Core Loss.</u>	16
										End of Borehole at 16.00m	17
											18
											19
											20

Remarks	No groundwater encountered.
---------	-----------------------------



APPENDIX D

CHEMICAL ANALYSIS



The Shadbolt Group
18 Bewick Road
Gateshead
NE8 4DP

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

e: stephenf@shadboltgroup.net

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 24-055057

Project / Site name:	Baldock - MMB - North	Samples received on:	19/11/2024
Your job number:	2899	Samples instructed on / Analysis started on:	19/11/2024
Your order number:	3146	Analysis completed by:	27/11/2024
Report Issue Number:	1	Report issued on:	28/11/2024
Samples Analysed:	4 soil samples		

Signed: _____

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-055057
 Project / Site name: Baldock - MMB - North
 Your Order No: 3146

Lab Sample Number	385786	385787	385788	385789
Sample Reference	TP-VB-01	TP-VB-03	TP-VB-06	WS-VB-02
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix	N/A	N/A	N/A	N/A
Depth (m)	0.10-0.20	0.05-0.15	0.15-0.25	0.10-0.20
Date Sampled	15/11/2024	15/11/2024	15/11/2024	15/11/2024
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status	

Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	16	17	14	16
Total mass of sample received	kg	0.1	NONE	1.3	1.3	1.2	1.3

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	KWB	KWB	KWB	KWB

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	8	8	8.2	8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	100	62	21	41
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	50.9	31	10.5	20.4
Organic Matter (automated)	%	0.1	MCERTS	3.9	4.7	1.8	4.3

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.22	0.07	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.53	< 0.05	< 0.05	0.13
Pyrene	mg/kg	0.05	MCERTS	0.42	0.09	< 0.05	0.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.26	0.07	< 0.05	0.06
Chrysene	mg/kg	0.05	MCERTS	0.26	0.06	< 0.05	0.06
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.38	0.1	< 0.05	0.1
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.14	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.33	0.07	< 0.05	0.06
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.18	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.18	0.06	< 0.05	0.06

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	2.9	< 0.80	< 0.80	< 0.80
-----------------------------	-------	-----	-----------	-----	--------	--------	--------

Analytical Report Number: 24-055057
 Project / Site name: Baldock - MMB - North
 Your Order No: 3146

Lab Sample Number				385786	385787	385788	385789
Sample Reference				TP-VB-01	TP-VB-03	TP-VB-06	WS-VB-02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A
Depth (m)				0.10-0.20	0.05-0.15	0.15-0.25	0.10-0.20
Date Sampled				15/11/2024	15/11/2024	15/11/2024	15/11/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status				

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.4	8.8	6.9	7.6
Boron (water soluble)	mg/kg	0.2	MCERTS	1.8	1	1.3	2.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	0.5	0.3	0.4
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	17	16	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	27	27	13	28
Lead (aqua regia extractable)	mg/kg	1	MCERTS	46	37	12	35
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	13	13	10
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	1.3	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	67	66	41	58

Petroleum Hydrocarbons

TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	20	< 10	< 10	< 10
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U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 24-055057

Project / Site name: Baldock - MMB - North

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
385786	TP-VB-01	None Supplied	0.10-0.20	Brown loam and clay with gravel
385787	TP-VB-03	None Supplied	0.05-0.15	Brown loam and sand with gravel and vegetation
385788	TP-VB-06	None Supplied	0.15-0.25	Brown loam and sand with gravel and vegetation
385789	WS-VB-02	None Supplied	0.10-0.20	Brown loam and sand with gravel and vegetation

Analytical Report Number : 24-055057

Project / Site name: Baldock - MMB - North

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)

Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088-PL	D/W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080-PL	W	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099-PL	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution



Certificate of Analysis

Certificate Number 24-14370

Issued: 17-Jul-24

Client Shadbolt Group
18 Bewick Road
Gateshead
NE8 4DP

Our Reference 24-14370

Client Reference ~ 2899

Order No ~ po2987

Contract Title ~ VB BRIDGE BADDOCK

Description 4 Soil samples.

Date Received 12-Jul-24

Date Started 12-Jul-24

Date Completed 17-Jul-24

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Kirk Bridgewood
General Manager



2139

Normec DETS Limited

Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY

Symbol key at end of report Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

Page 1 of 4

Summary of Chemical Analysis

Soil Samples

Our Ref 24-14370

Client Ref ~ 2899

Contract Title ~ VB BRIDGE BADDOCK

Lab No	2363403	2363404	2363405	2363406
Sample ID ~	TP-VB-03	TP-VB-04	TP-VB-08	TP-VB-09
Depth ~	0.10-0.15	0.10-0.15	0.40-0.50	0.10-0.15
Other ID ~				
Sample Type ~	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	10/07/2024	10/07/2024	10/07/2024	10/07/2024
Sampling Time ~	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Preparation							
Stones >20mm	DETSC 1003*	1	% m/m	< 1.0	< 1.0	< 1.0	< 1.0
Moisture Content	DETSC 1004	0.1	%	18	13	16	14
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	5.4	7.8	8.3	5.7
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.7	0.9	0.7	0.6
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.4	0.4	0.2
Chromium	DETSC 2301#	0.15	mg/kg	6.1	10	9.5	7.4
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	16	20	20	11
Lead	DETSC 2301#	0.3	mg/kg	26	46	37	18
Mercury	DETSC 2325#	0.05	mg/kg	0.14	0.17	0.16	0.08
Nickel	DETSC 2301#	1	mg/kg	6.6	9.2	9.5	7.2
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	46	55	56	47
Inorganics							
pH	DETSC 2008#		pH	8.0	8.3	8.1	8.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.2	0.2	0.2	< 0.1
Organic matter	DETSC 2002#	0.1	%	3.3	2.7	2.6	1.8
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	19	13	19	< 10
Petroleum Hydrocarbons							
EPH (C10-C40)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.07	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.21	0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.19	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.07	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.07	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.10	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.07	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.05	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	0.87	< 0.10

Summary of Asbestos Analysis Soil Samples

Our Ref 24-14370

Client Ref ~ 2899

Contract Title ~ VB BRIDGE BADDOCK

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2363403	TP-VB-03 0.10-0.15	SOIL	NAD	none	Vicky Convery
2363404	TP-VB-04 0.10-0.15	SOIL	NAD	none	Vicky Convery
2363405	TP-VB-08 0.40-0.50	SOIL	NAD	none	Vicky Convery
2363406	TP-VB-09 0.10-0.15	SOIL	NAD	none	Vicky Convery

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 24-14370
 Client Ref ~ 2899
 Contract ~ VB BRIDGE BADDOCK

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Hold time exceeded for tests	Inappropriate container for tests
2363403	TP-VB-03 0.10-0.15 SOIL	10/07/24	GJ 250ml, PT 1L		
2363404	TP-VB-04 0.10-0.15 SOIL	10/07/24	GJ 250ml, PT 1L		
2363405	TP-VB-08 0.40-0.50 SOIL	10/07/24	GJ 250ml, PT 1L		
2363406	TP-VB-09 0.10-0.15 SOIL	10/07/24	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:

~ Sample details are provided by the client and can affect the validity of the results

* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report

APPENDIX E

GEOTECHNICAL ANALYSIS



TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022,
cl 5.3.14, 5.5, Fall Cone Method, 1 Pt Test, BS 1377-2:2022,
cl 5.3, 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock VB Bridge

Client Reference: 2899
Job Number: 24-031127-2
Date Sampled: Not Given
Date Received: 11/07/2024
Date Tested: 25/07/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

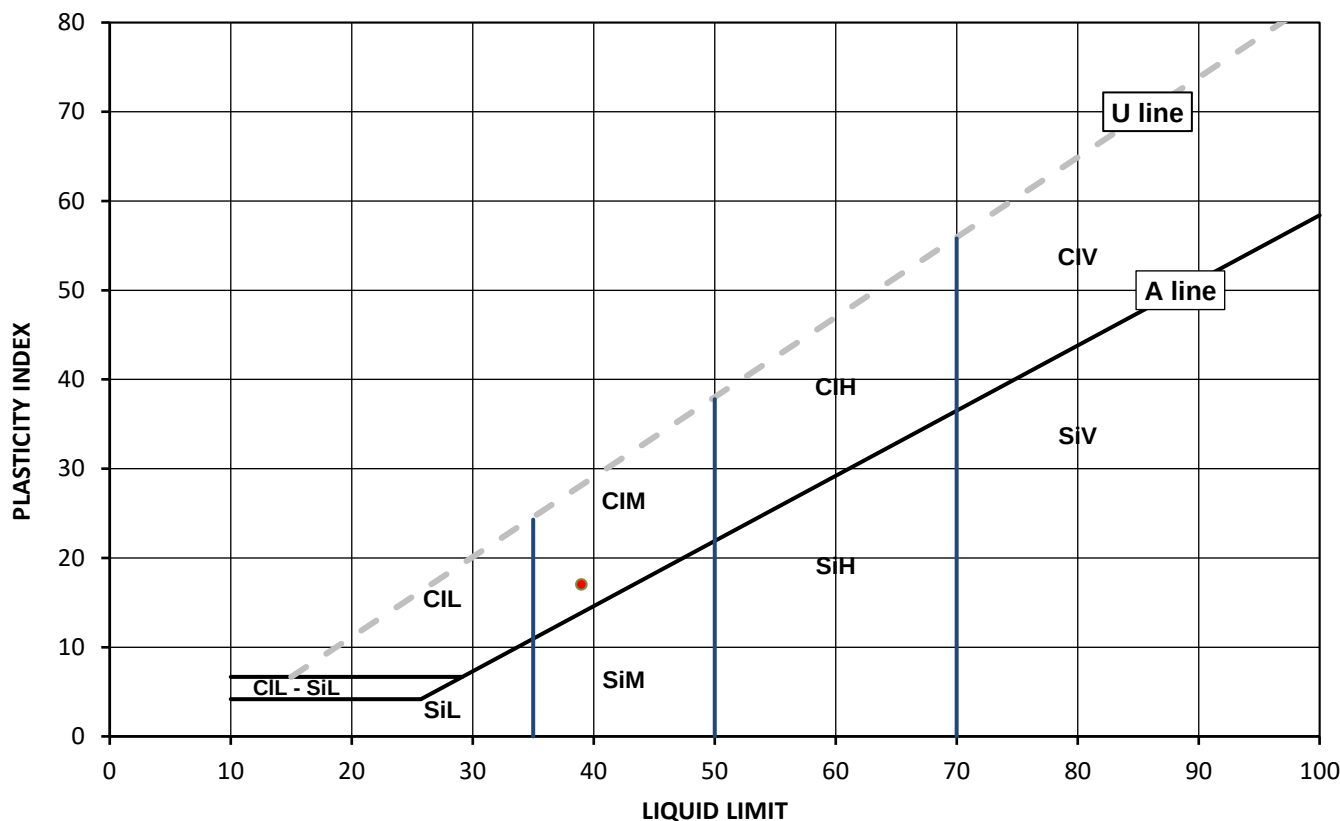
Test Results:

Laboratory Reference: 259138
Hole No.: TP-VB-08
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 0.40
Depth Base [m]: 0.50
Sample Type: B

Sample Preparation: Tested after washing to remove >0.425 mm;
Cone Type: 80g/30deg

As Received Water Content [W] %	Corrected Liquid Limit [WL] %	Correlation Factor	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity index [IL] % #	Consistency index [IC] % #	% Passing 425µm BS Test Sieve
16.3	39	1.000	22	17	-0.35	1.35	77



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	
Si	Silt	
L	Low	below 35
M	Medium	35 to 50
H	High	50 to 70
V	Very high	exceeding 70
O	Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS EN 17892-1: 2014; Correlation Factor by Clayton C.R.I and Jukes A.W (1978); # Non accredited

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022,
cl 5.3.14, 5.5, Fall Cone Method, 1 Pt Test, BS 1377-2:2022,
cl 5.3, 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock VB Bridge

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 2899
Job Number: 24-031127-2
Date Sampled: Not Given
Date Received: 11/07/2024
Date Tested: 25/07/2024
Sampled By: Not Given

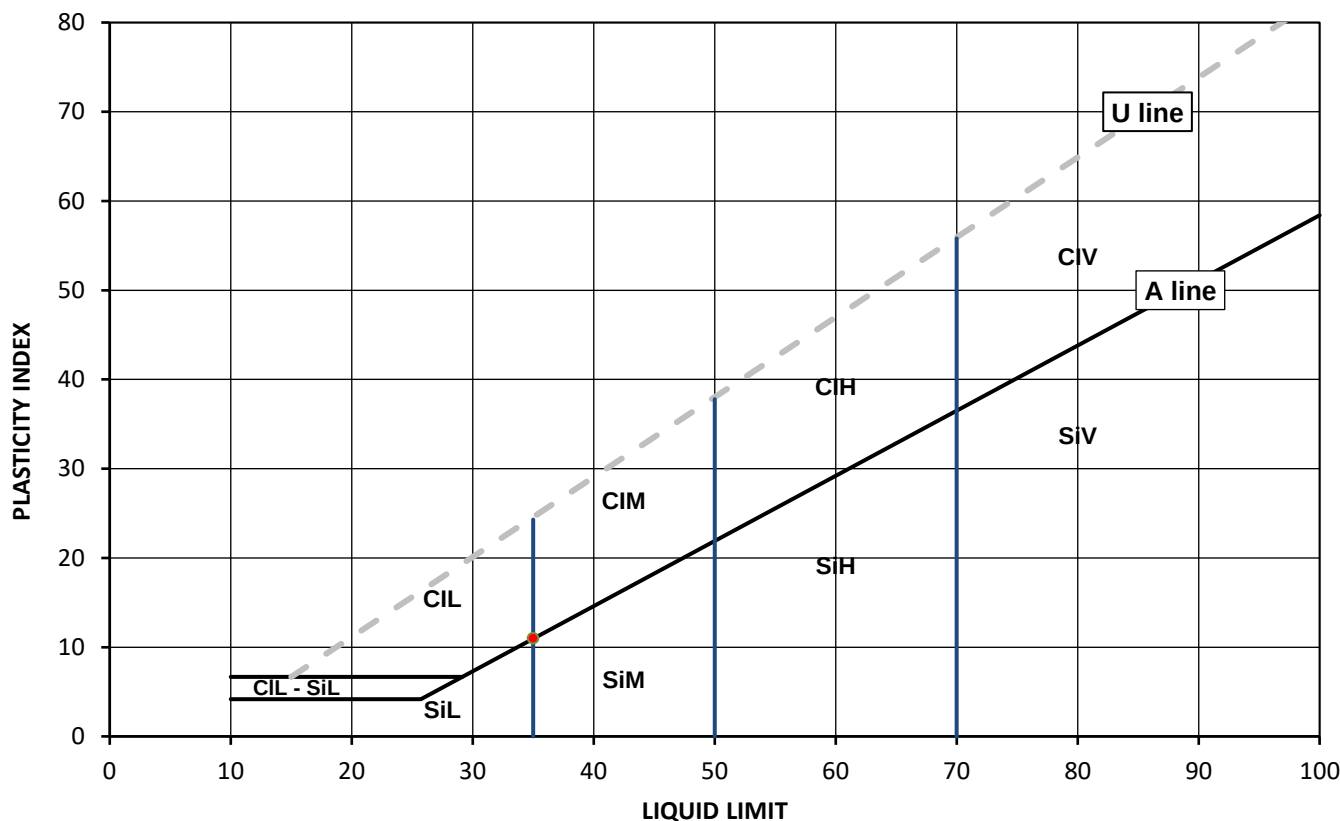
Test Results:

Laboratory Reference: 259140
Hole No.: TP-VB-09
Sample Reference: Not Given
Sample Description: Cream colour CHALK with fragments of flintstones

Depth Top [m]: 0.40
Depth Base [m]: 0.50
Sample Type: B

Sample Preparation: Tested after washing to remove >0.425 mm;
Cone Type: 80g/30deg

As Received Water Content [W] %	Corrected Liquid Limit [WL] %	Correlation Factor	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity index [IL] % #	Consistency index [IC] % #	% Passing 425µm BS Test Sieve
25.3	35	1.042	24	11	0.09	0.91	77



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; Correlation Factor by Clayton C.R.I and Jukes A.W (1978); # Non accredited

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022,
cl 5.3.14, 5.5, Fall Cone Method, 1 Pt Test, BS 1377-2:2022,
cl 5.3, 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock VB Bridge

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 2899
Job Number: 24-031127-2
Date Sampled: Not Given
Date Received: 11/07/2024
Date Tested: 24/07/2024
Sampled By: Not Given

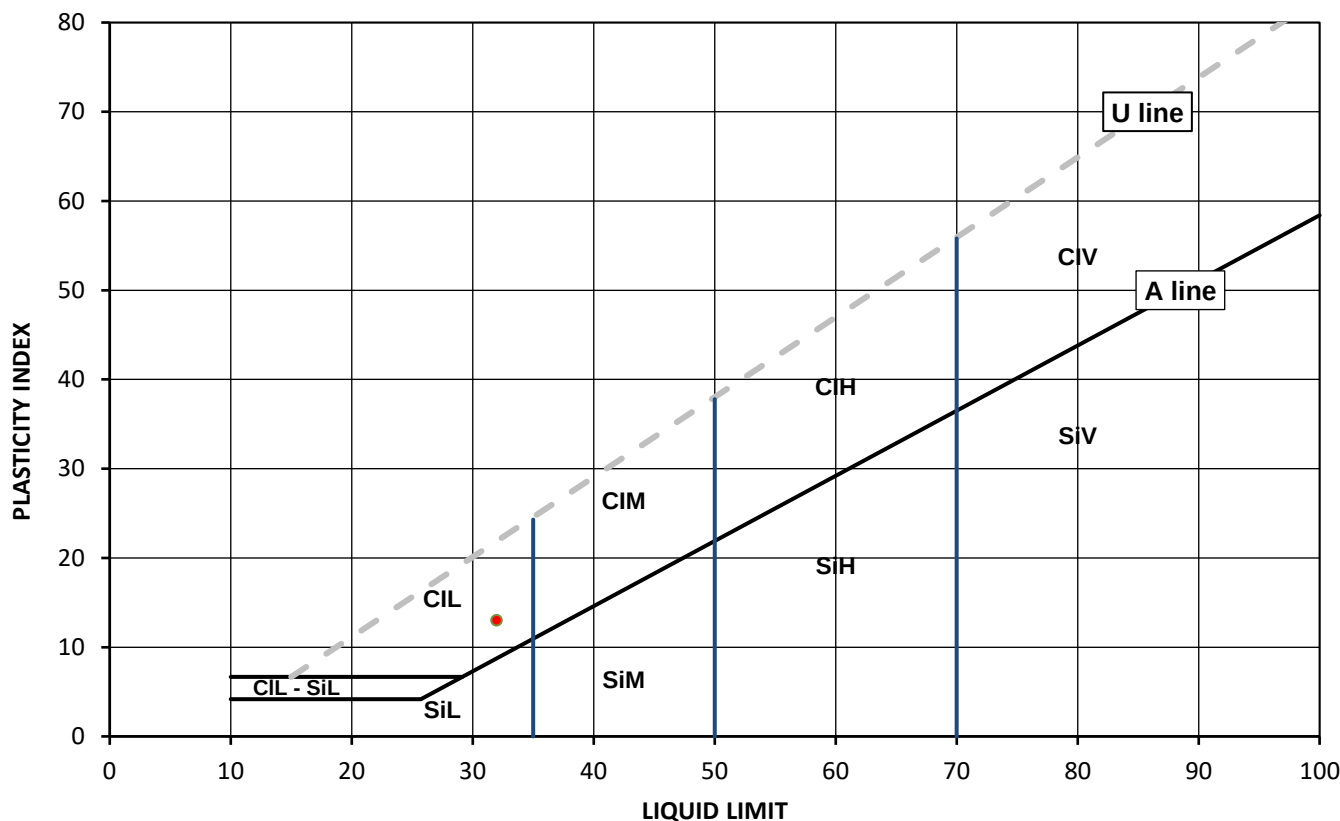
Test Results:

Laboratory Reference: 259142
Hole No.: TP-VB-10
Sample Reference: Not Given
Sample Description: White slightly gravelly CHALK

Depth Top [m]: 0.40
Depth Base [m]: 0.50
Sample Type: D

Sample Preparation: Tested after washing to remove >0.425 mm;
Cone Type: 80g/30deg

As Received Water Content [W] %	Corrected Liquid Limit [WL] %	Correlation Factor	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity index [IL] % #	Consistency index [IC] % #	% Passing 425µm BS Test Sieve
13.1	32	0.984	19	13	-0.46	1.46	96



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; Correlation Factor by Clayton C.R.I and Jukes A.W (1978); # Non accredited

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Tested in Accordance with:

BS EN ISO 17892-12:2018+A2:2022, cl 5.3.14, 5.5, Fall Cone Method, 1 Pt Test, BS 1377-2:2022, cl 5.3, 6. Correlation Factor by Clayton C.R.I and Jukes A.W (1978). W by BS EN ISO 17892-1:2014+A1:2022.

Client Reference: 2899

Job Number: 24-031127-2

Date Sampled: Not Given

Date Received: 11/07/2024

Date Tested: 25/07/2024

Sampled By: Not Given

4041

Client: The Shadbolt Group

Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk

Site Address: Baldock VB Bridge

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	W	Liquid & Plastic Limit							Density		
		Reference	Depth Top	Depth Base	Type				% Passing 425um	WL*	Correlation Factor	Wp	Ip	Cone type	Sample Preparation	bulk	dry	PD
			m	m					%	%		%	%			Mg/m3	Mg/m3	Mg/m3
259136	TP-VB-07	Not Given	0.50	0.60	B	Creamy CHALK		23.1										
259137	TP-VB-07	Not Given	1.00	1.20	B	Creamy CHALK		27.8										
259138	TP-VB-08	Not Given	0.40	0.50	B	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	16.3	77	39	1.000	22	17	80g/30 deg	W			
259139	TP-VB-08	Not Given	1.50	1.60	B	Creamy CHALK		25.3										
259140	TP-VB-09	Not Given	0.40	0.50	B	Cream colour CHALK with fragments of flintstones	Atterberg 1 Point	25.3	77	35	1.042	24	11	80g/30 deg	W			
259141	TP-VB-09	Not Given	1.00	1.20	B	Creamy CHALK		18.9										
259142	TP-VB-10	Not Given	0.40	0.50	D	White slightly gravelly CHALK	Atterberg 1 Point	13.1	96	32	0.984	19	13	80g/30 deg	W			
259143	TP-VB-10	Not Given	1.00	1.20	B	Creamy CHALK		29.2										
259144	TP-VB-10	Not Given	1.40	1.50	B	Creamy CHALK		31.5										

Note: # Non accredited; NP - Non plastic; N - Tested in natural condition, R - Tested after >0.425mm removed by hand, W - Tested after washing to remove >425mm; * - One point liquid limit corrected as per the report Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Comments:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF DRY DENSITY/WATER CONTENT RELATIONSHIP METHOD USING 4.5 KG RAMMER

Tested in Accordance with: BS 1377-2:2022, Cl. 11.5, 11.6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock VB Bridge

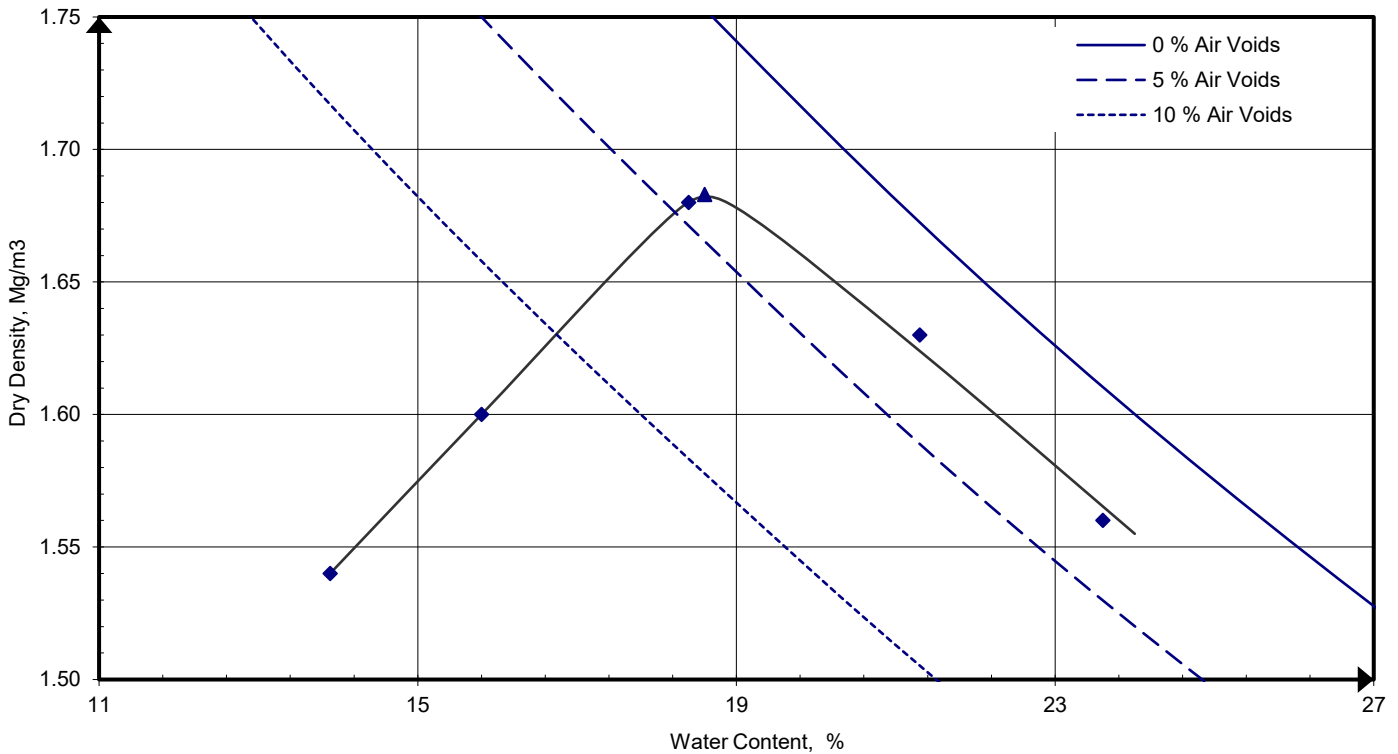
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 2899
Job Number: 24-031127-2
Date Sampled: Not Given
Date Received: 11/07/2024
Date Tested: 30/07/2024
Sampled By: Not Given

Test Results:

Laboratory Reference: 259136
Hole No.: TP-VB-07
Sample Reference: Not Given
Sample Description: Creamy CHALK
Sample Preparation: Sample was quartered and broken down by hand. Material used was natural.

Depth Top [m]: 0.50
Depth Base [m]: 0.60
Sample Type: B



Compaction Point No.	1	2	3	4	5	
Water Content	%	13.9	15.8	18.4	21.3	23.6
Dry Density	Mg/m³	1.54	1.60	1.68	1.63	1.56

Grading Zone		X
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	22
Material Retained on 20.0 mm Sieve	%	54
Particle Density - Assumed	Mg/m³	2.60
As received Water Content	%	24
Maximum Dry Density	Mg/m³	1.68

Optimum Water Content	%	19
-----------------------	---	----

Remarks: Zone X - test carried out with clients consent.
Replaces Analytical Report Number 24-031127, issue no. 1; Additional results of Compaction Heavy

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF DRY DENSITY/WATER CONTENT RELATIONSHIP METHOD USING 4.5 KG RAMMER

Tested in Accordance with: BS 1377-2:2022, Cl. 11.5, 11.6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock VB Bridge

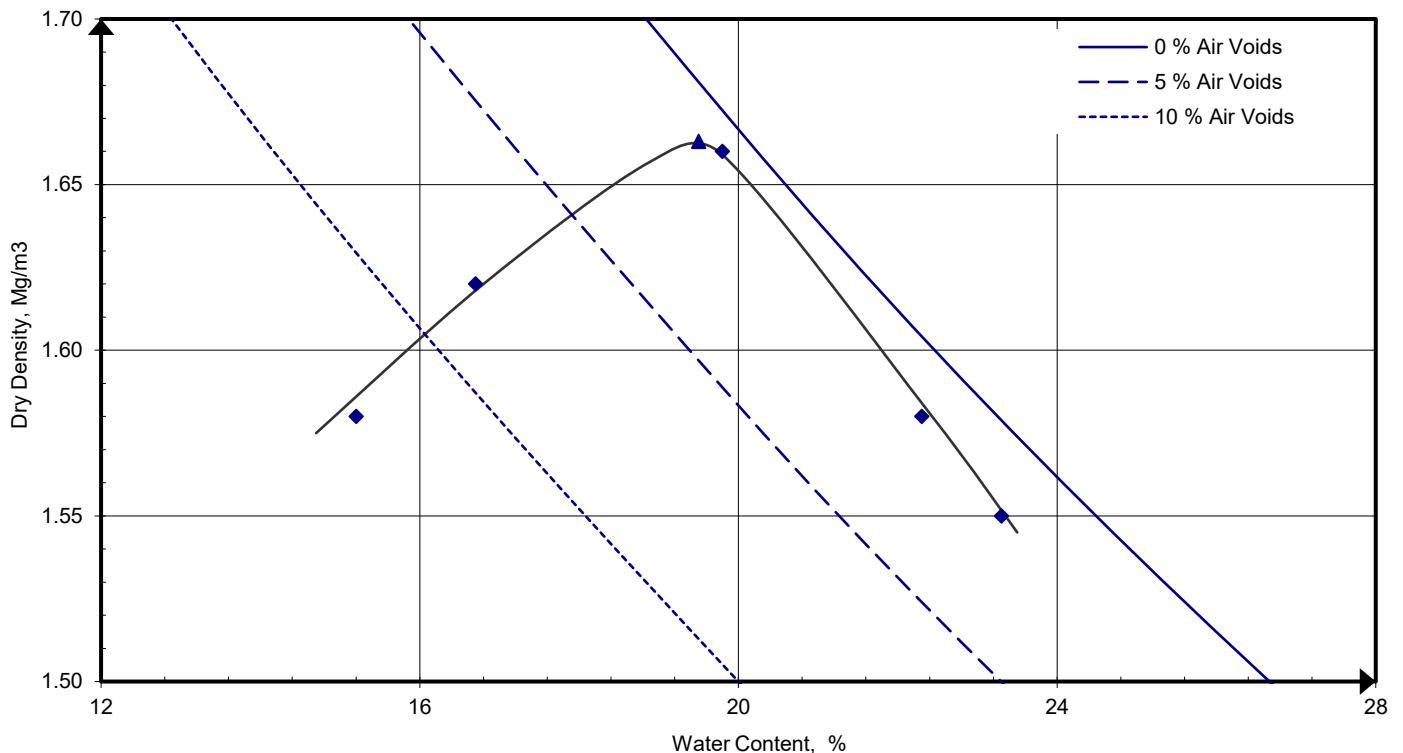
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 2899
Job Number: 24-031127-2
Date Sampled: Not Given
Date Received: 11/07/2024
Date Tested: 30/07/2024
Sampled By: Not Given

Test Results:

Laboratory Reference: 259143
Hole No.: TP-VB-10
Sample Reference: Not Given
Sample Description: Creamy CHALK
Sample Preparation: Sample was quartered and broken down by hand. Material used was natural.

Depth Top [m]: 1.00
Depth Base [m]: 1.20
Sample Type: B



Compaction Point No.	1	2	3	4	5	
Water Content	%	15.2	16.7	19.8	22.3	23.3
Dry Density	Mg/m³	1.58	1.62	1.66	1.58	1.55

Grading Zone		X
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	72
Material Retained on 20.0 mm Sieve	%	79
Particle Density - Assumed	Mg/m³	2.50
As received Water Content	%	29
Maximum Dry Density	Mg/m³	1.66

Optimum Water Content	%	20
-----------------------	---	----

Remarks: Zone X - test carried out with clients consent.
Replaces Analytical Report Number 24-031127, issue no. 1; Additional results of Compaction Heavy

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT
DETERMINATION OF THE CHALK CRUSHING VALUE (CCV)

Tested in Accordance with: BS 1377-2:2022 Cl. 14

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock VB Bridge

Client Reference: 2899
Job Number: 24-031127-2
Date Sampled: Not Given
Date Received: 11/07/2024
Date Tested: 30/07/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Material >10 mm	Specimen Water Content	Saturated Water Content	Chalk Crushing Value	Preparation
		Reference	Depth Top	Depth Base	Type							
			m	m				%	%	%		
259137	TP-VB-07	Not Given	1.00	1.20	B	Creamy CHALK		34	29	30	3.3	
259144	TP-VB-10	Not Given	1.40	1.50	B	Creamy CHALK		97	29	-	3.3	

Comments:

Signed: Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

METHOD FOR SATURATION WATER CONTENT OF CHALK

Tested in Accordance with: BS EN ISO 17892-2:2014, clause 5.2 and BS 1377: Part 2:2022, clause 4.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock VB Bridge

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 2899
Job Number: 24-031127-2
Date Sampled: Not Given
Date Received: 11/07/2024
Date Tested: 25/07/2024
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	SWC	Bulk density	Dry density	WC	Preparation
		Reference	Depth Top	Depth Base	Type							
			m	m				%	Mg/m3	Mg/m3	%	
259136	TP-VB-07	Not Given	0.50	0.60	B	Creamy CHALK		30.8	1.91	1.47	29.3	
259137	TP-VB-07	Not Given	1.00	1.20	B	Creamy CHALK		30.0	1.93	1.49	29.0	
259139	TP-VB-08	Not Given	1.50	1.60	B	Creamy CHALK		25.4	1.93	1.60	20.7	
259141	TP-VB-09	Not Given	1.00	1.20	B	Creamy CHALK	Supplied lump of chalk fails to comply with volume requirements as per BS EN ISO 17892-2: 2014, clause 5	31.8	1.74	1.45	20.0	
259143	TP-VB-10	Not Given	1.00	1.20	B	Creamy CHALK		31.4	1.90	1.46	30.1	

Note: SWC - Saturation Water Content; WC - Water Content by BS EN ISO 17892-1:2014+A1:2022, BS 1377-2: 2022 clause 4.1

Comments:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022,
cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022,
cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock-MMB-North

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 3173
Job Number: 24-055117-1
Date Sampled: Not Given
Date Received: 19/11/2024
Date Tested: 27/11/2024
Sampled By: Not Given

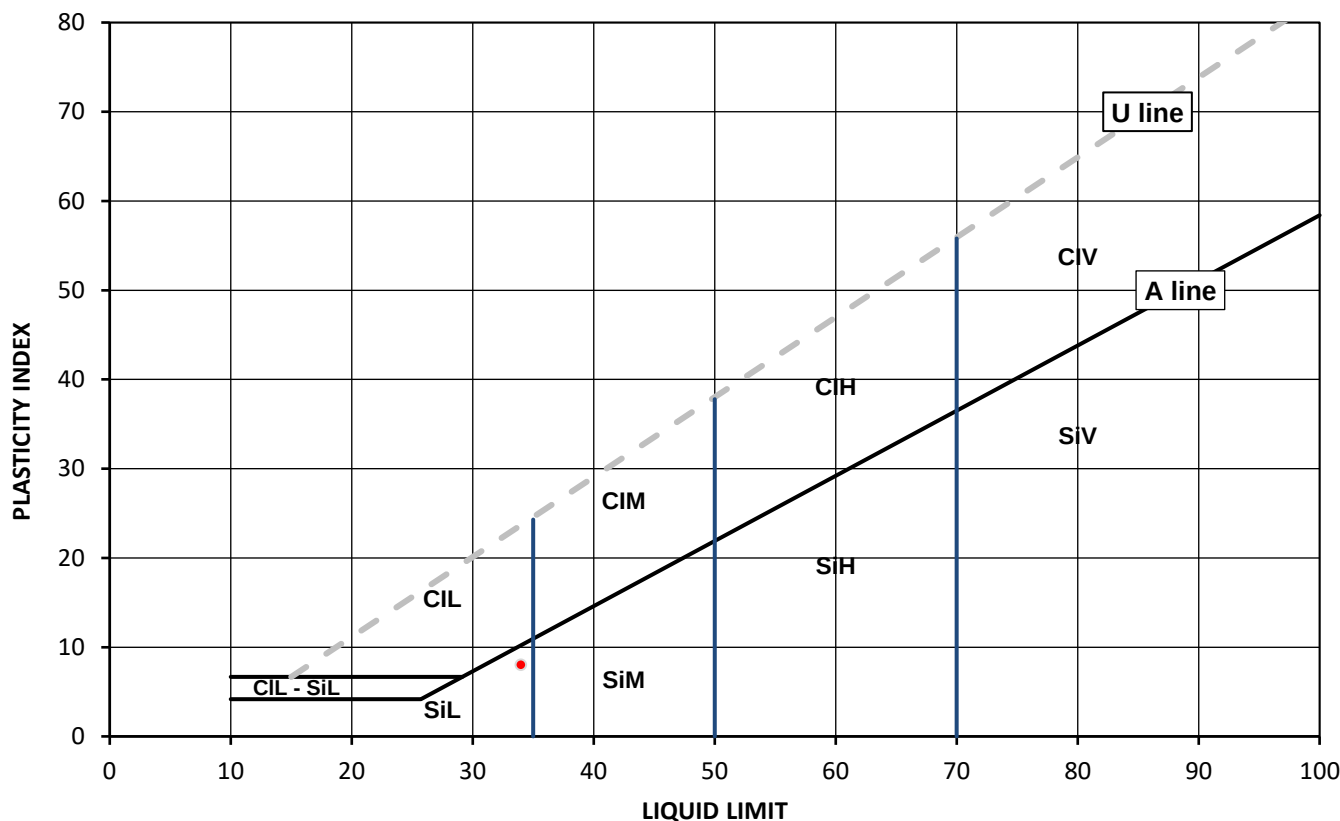
Test Results:

Laboratory Reference: 386149
Hole No.: TP-VB-02
Sample Reference: Not Given
Sample Description: White CHALK

Depth Top [m]: 0.50
Depth Base [m]: 0.60
Sample Type: B

Sample Preparation: Tested in natural condition; The water content in the sample was increased
Cone Type: 80g/30deg

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
28.6	34	26	8	0.38	0.63	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity	Liquid Limit
Cl	Clay	L Low	below 35
Si	Silt	M Medium	35 to 50
		H High	50 to 70
		V Very high	exceeding 70
		O Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN ISO 17892-1:2014+A1:2022, BS 1377-2:2022; # Non accredited

Remarks:

Signed:

Katarzyna Koziel
Geotechnical Reporting Team Leader
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS EN ISO 17892-1:2014+A1:2022, BS 1377-2: 2022, clause 4.1

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041
Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock-MMB-North

Client Reference: 3173
Job Number: 24-055117-1
Date Sampled: Not Given
Date Received: 19/11/2024
Date Tested: 27/11/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC											
		Reference	Depth Top m	Depth Base m	Type														
386149	TP-VB-02	Not Given	0.50	0.60	B	White CHALK		28.6											

Comments:

Signed: Katarzyna Koziel
Geotechnical Reporting Team Leader
for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**DETERMINATION OF DRY DENSITY/WATER
CONTENT RELATIONSHIP COMPACTION METHOD
USING 2.5 KG RAMMER**

Tested in Accordance with: BS 1377-2: 2022, cl.11

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock-MMB-North

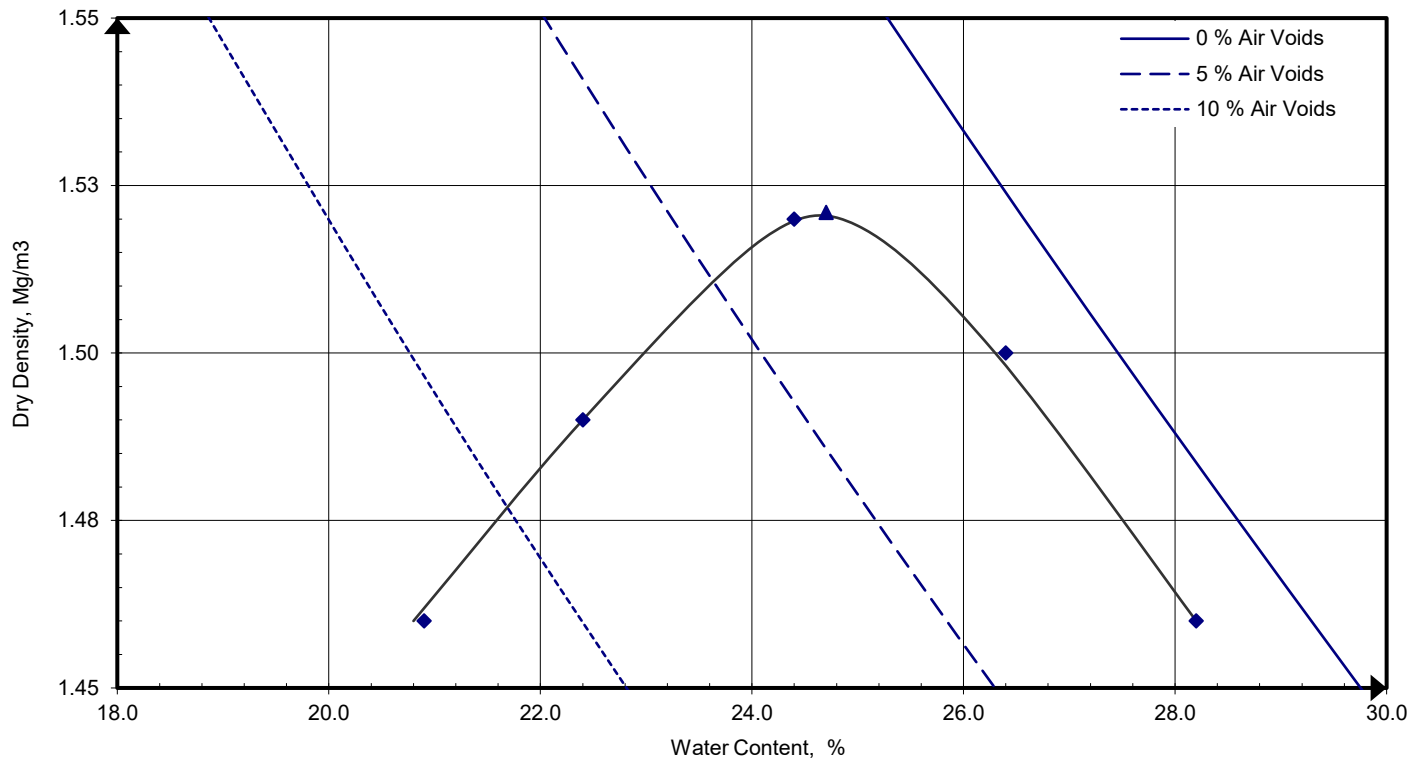
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 3173
Job Number: 24-055117-1
Date Sampled: Not Given
Date Received: 19/11/2024
Date Tested: 04/12/2024
Sampled By: Not Given

Test Results:

Laboratory Reference: 386147
Hole No.: Combined Sample 1
Sample Reference: Not Given
Sample Description: White CHALK
Sample Preparation: Sample was quartered and broken down by hand. Material used was natural.

Depth Top [m]: 0.60
Depth Base [m]: 2.00
Sample Type: B



Compaction Point No.	1	2	3	4	5	
Water Content	%	20.9	22.4	24.4	26.4	28.2
Dry Density	Mg/m³	1.46	1.49	1.52	1.50	1.46

Grading zone	5
Mould Type	CBR
Samples Used	Single sample tested

Material Retained on 37.5 mm Sieve	%	8
Material Retained on 20.0 mm Sieve	%	15
Particle Density - Assumed	Mg/m³	2.55
As received Water Content	%	28.2
Maximum Dry Density	Mg/m³	1.52

Optimum Water Content	%	25
-----------------------	---	----

Note: BS 1377-2:2022, CL 11.4

Remarks:

Signed:

Katarzyna Koziel
Geotechnical Reporting Team Leader
for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR)**

Tested in Accordance with: BS 1377-2:2022 Cl. 15

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock-MMB-North

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 3173
Job Number: 24-055117-1
Date Sampled: Not Given
Date Received: 19/11/2024
Date Tested: 06/12/2024
Sampled By: Not Given

Test Results:

Laboratory Reference: 386149
Hole No.: TP-VB-02
Sample Reference: Not Given
Sample Description: White CHALK

Depth Top [m]: 0.50
Depth Base [m]: 0.60
Sample Type: B

Specimen Preparation:

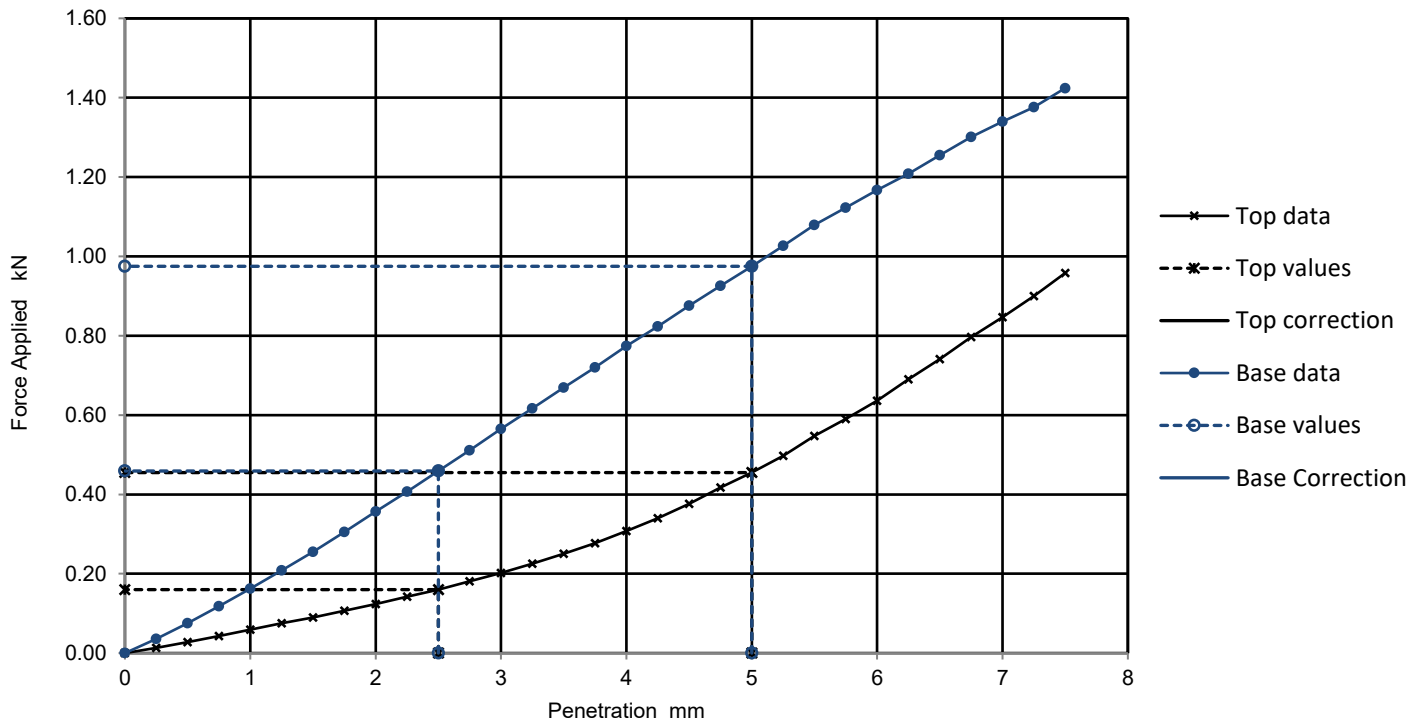
Condition Remoulded
Details Recompacted with specified standard effort using 2.5kg rammer

Soaking details Not soaked
Period of soaking days
Time to surface days
Amount of swell recorded mm
Dry density after soaking Mg/m3

Material retained on 20mm sieve removed 5 %

Initial Specimen details Bulk density 1.86 Mg/m3
Dry density 1.45 Mg/m3
Water content 28 %

Surcharge applied 8 kg
4.8 kPa

Force v Penetration Plots**Results**

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	1.2	2.3	2.3	
No	3.5	4.9	4.9	

Water Content %
28
29

Remarks:

Test/ Specimen
specific remarks:

Signed:

Katarzyna Koziel
Geotechnical Reporting Team Leader
for and on behalf of i2 Analytical Ltd

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DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR)

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock-MMB-North

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 3173
Job Number: 24-055117-1
Date Sampled: Not Given
Date Received: 19/11/2024
Date Tested: 06/12/2024
Sampled By: Not Given

Laboratory Reference: 386152
Hole No.: TP-VB-04
Sample Reference: Not Given
Sample Description: White CHALK

Depth Top [m]: 0.80
Depth Base [m]: 1.00
Sample Type: B

Condition	Remoulded			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking	days	
				Time to surface	days	
				Amount of swell recorded	mm	
				Dry density after soaking	Mg/m3	
Material retained on 20mm sieve removed		17	%			
Initial Specimen details	Bulk density	1.86	Mg/m3	Surcharge applied	8	kg
	Dry density	1.48	Mg/m3		4.8	kPa
	Water content	26	%			

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	3.8	9.9	9.9	10
No	8.1	11	11	

Water Content %
27
27

Remarks:

Test/ Specimen
specific remarks:

Signed:

Katarzyna Koziel
Geotechnical Reporting Team Leader
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4041

TEST CERTIFICATE**DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR)**

Tested in Accordance with: BS 1377-2:2022 Cl. 15

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock-MMB-North

Client Reference: 3173
Job Number: 24-055117-1
Date Sampled: Not Given
Date Received: 19/11/2024
Date Tested: 09/12/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 386154
Hole No.: TP-VB-05
Sample Reference: Not Given
Sample Description: White CHALK

Depth Top [m]: 0.40
Depth Base [m]: 0.60
Sample Type: B

Specimen Preparation:

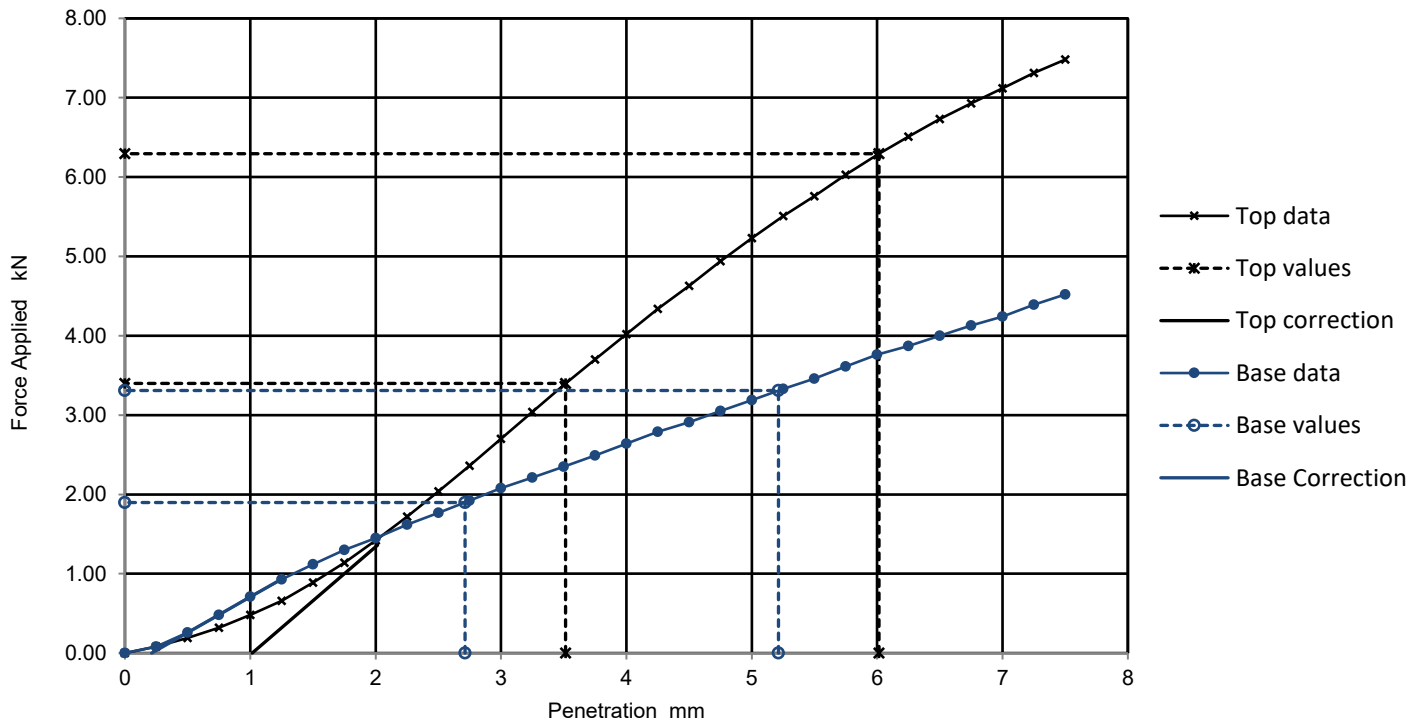
Condition Remoulded
Details Recompacted with specified standard effort using 2.5kg rammer

Soaking details Not soaked
Period of soaking days
Time to surface days
Amount of swell recorded mm
Dry density after soaking Mg/m3

Material retained on 20mm sieve removed 23 %

Initial Specimen details Bulk density 1.79 Mg/m3
Dry density 1.45 Mg/m3
Water content 23 %

Surcharge applied 8 kg
4.8 kPa

Force v Penetration Plots**Results**

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
Yes	26	31	31	
Yes	14	17	17	

Water Content %
24
23

Remarks:

Test/ Specimen
specific remarks:

Signed:

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Geotechnical Reporting Team Leader
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SUMMARY REPORT
DETERMINATION OF THE CHALK CRUSHING VALUE (CCV)

Tested in Accordance with: BS 1377-2:2022 Cl. 14

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock-MMB-North

Client Reference: 3173
Job Number: 24-055117-1
Date Sampled: Not Given
Date Received: 19/11/2024
Date Tested: 06/12/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Material >10 mm %	Specimen Water Content %	Saturated Water Content %	Chalk Crushing Value	Preparation
		Reference	Depth Top m	Depth Base m	Type							
386148	TP-VB-01	Not Given	2.00	2.20	B	White CHALK	Water ooze after 40 blows	10	28	28	3.3	
386149	TP-VB-02	Not Given	0.50	0.60	B	White CHALK	Water ooze after 50 blows	28	29	N/A	3.2	
386150	TP-VB-02	Not Given	2.00	2.20	B	White CHALK	Water ooze after 30 blows	19	29	27	3.9	
386152	TP-VB-04	Not Given	0.80	1.00	B	White CHALK		15	27	N/A	3.2	
386155	TP-VB-05	Not Given	1.00	1.20	B	White CHALK	Water ooze after 20 blows	17	30	29	3.7	

Comments:

Signed:

Katarzyna Koziel
Geotechnical Reporting Team Leader
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

METHOD FOR SATURATION WATER CONTENT OF CHALK

Tested in Accordance with: BS EN ISO 17892-2:2014, clause 5.2 and BS 1377: Part 2:2022, clause 4.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock-MMB-North

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: 3173
Job Number: 24-055117-1
Date Sampled: Not Given
Date Received: 19/11/2024
Date Tested: 27/11/2024
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	SWC	Bulk density	Dry density	WC	Preparation
		Reference	Depth Top m	Depth Base m	Type							
386148	TP-VB-01	Not Given	2.00	2.20	B	White CHALK		28.4	1.94	1.53	27.1	
386150	TP-VB-02	Not Given	2.00	2.20	B	White CHALK		27.4	1.95	1.55	25.9	
386151	TP-VB-03	Not Given	1.60	1.80	B	White CHALK		32.2	1.82	1.44	26.2	
386153	TP-VB-04	Not Given	1.80	2.00	B	White CHALK		30.5	1.91	1.48	29.1	
386155	TP-VB-05	Not Given	1.00	1.20	B	White CHALK		29.1	1.94	1.51	28.2	
386156	TP-VB-05	Not Given	2.00	2.20	B	White CHALK		26.4	1.98	1.58	25.5	
386158	TP-VB-06	Not Given	2.40	2.60	B	White CHALK		26.4	1.99	1.58	25.9	

Note: SWC - Saturation Water Content; WC - Water Content by BS EN ISO 17892-1:2014+A1:2022, BS 1377-2: 2022 clause 4.1

Comments:

Signed:

Katarzyna Koziel
Geotechnical Reporting Team Leader
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

DETERMINATION OF POINT LOAD STRENGTH

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041
Client: The Shadbolt Group
Client Address: 18 Bewick Road, Gateshead,
NE8 4DP

Contact: Stephen Fisk
Site Address: Baldock-MMB-North

Client Reference: 3173
Job Number: 24-055117-1
Date Sampled: Not Given
Date Received: 19/11/2024
Date Tested: 09/12/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index	
		Reference	Depth Top	Depth Base	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)
			m	m															
386156	TP-VB-05	Not Given	2.00	2.20	B	White CHALK	WC = 22.7%	1	I	U	YES	41.3	63.4	36.0	27.0	1.8	46.7	0.80	0.78
386158	TP-VB-06	Not Given	2.40	2.60	B	White CHALK	WC = 27.0%	1	I	U	YES	49.8	71.2	42.0	35.0	2.3	56.3	0.71	0.75

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Equipment No.: i2 4341 Calibration Date: 15/03/2024 - 15/03/2025

Comments:

Signed: Katarzyna Koziel
Geotechnical Reporting Team Leader
for and on behalf of i2 Analytical Ltd

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APPENDIX F

GROUNDWATER AND GROUND GAS MONITORING RECORDS

The Shadbolt Group

18 Bewick Road, Gateshead, Tyne & Wear, NE8 4DP Tel: 0191 478 3330 Email:
admin@shadboltgroup.net



SHADBOLT
ENVIRONMENTAL

GROUNDWATER MONITORING RECORD SHEET

Site:	Baldock					
Client:	Urban & Civic				Job No:	2899
					Date:	12/07/2024
Monitored by:	SJF				Weather:	Overcast and windy but dry
					Instruments Used:	Dipmeter
Borehole	Borehole surface level (as surveyed)	Depth to Groundwater	Depth to Base of Standpipe	Groundwater Level (mAOD)	Base Level (mAOD)	Remarks
RC-VB-03	74.71	DRY	15.02	DRY	59.69	
RC-VB-04	75.77	DRY	14.51	DRY	61.26	
Notes:						
1 The peak reading is the maximum recorded level during a monitoring event.						
2 The steady reading is the level which remained constant after approximately 1 minute.						

The Shadbolt Group

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admin@shadboltgroup.net



SHADBOLT
ENVIRONMENTAL

GROUNDWATER MONITORING RECORD SHEET

Site:	Baldock					
Client:	Urban & Civic				Job No:	2899
					Date:	15/08/2024
Monitored by:	SJF				Weather:	Cloudy, warm and dry
					Instruments Used:	Dipmeter
Borehole	Borehole surface level (as surveyed)	Depth to Groundwater	Depth to Base of Standpipe	Groundwater Level (mAOD)	Base Level (mAOD)	Remarks
RC-VB-03	74.71	DRY	14.97	DRY	59.74	
RC-VB-04	75.77	DRY	14.52	DRY	61.25	

Notes:

- 1 The peak reading is the maximum recorded level during a monitoring event.
- 2 The steady reading is the level which remained constant after approximately 1 minute.

The Shadbolt Group

18 Bewick Road, Gateshead, Tyne & Wear, NE8 4DP Tel: 0191 478 3330 Email:
admin@shadboltgroup.net



SHADBOLT
ENVIRONMENTAL

GROUNDWATER MONITORING RECORD SHEET

Site:	Baldock					
Client:	Urban & Civic				Job No:	2899
					Date:	15/11/2024
Monitored by:	SJF				Weather:	Overcast with showers
					Instruments Used:	Dipmeter
Borehole	Borehole surface level (as surveyed)	Depth to Groundwater	Depth to Base of Standpipe	Groundwater Level (mAOD)	Base Level (mAOD)	Remarks
RC-VB-01	74.71	DRY	15.03	DRY	59.68	
RC-VB-02	75.77	DRY	14.86	DRY	60.91	
RC-VB-03	74.71	14.20	15.00	60.5	59.71	
RC-VB-04	75.77	DRY	14.53	DRY	61.24	
Notes:						
1 The peak reading is the maximum recorded level during a monitoring event.						
2 The steady reading is the level which remained constant after approximately 1 minute.						

The Shadbolt Group

18 Bewick Road, Gateshead, Tyne & Wear, NE8 4DP Tel: 0191 478 3330 Email:
admin@shadboltgroup.net



SHADBOLT
ENVIRONMENTAL

GROUNDWATER MONITORING RECORD SHEET

Site:	Baldock					
Client:	Urban & Civic				Job No:	2899
					Date:	04/12/2024
Monitored by:	SJF				Weather:	Overcast but mild
					Instruments Used:	Dipmeter
Borehole	Borehole surface level (as surveyed)	Depth to Groundwater	Depth to Base of Standpipe	Groundwater Level (mAOD)	Base Level (mAOD)	Remarks
RC-VB-01	74.71	DRY	15	DRY	59.71	
RC-VB-02	75.77	DRY	14.84	DRY	60.93	

Notes:

- 1 The peak reading is the maximum recorded level during a monitoring event.
- 2 The steady reading is the level which remained constant after approximately 1 minute.

The Shadbolt Group

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admin@shadboltgroup.net



SHADBOLT
ENVIRONMENTAL

GROUNDWATER MONITORING RECORD SHEET

Site:	Baldock					
Client:	Urban & Civic				Job No:	2899
					Date:	19/12/2024
Monitored by:	SJF				Weather:	Overcast and cold but dry
					Instruments Used:	Dipmeter
Borehole	Borehole surface level (as surveyed)	Depth to Groundwater	Depth to Base of Standpipe	Groundwater Level (mAOD)	Base Level (mAOD)	Remarks
RC-VB-01	74.71	DRY	15.03	DRY	59.68	
RC-VB-02	75.77	DRY	14.81	DRY	60.96	

Notes:

- 1 The peak reading is the maximum recorded level during a monitoring event.
- 2 The steady reading is the level which remained constant after approximately 1 minute.



SHADBOLT GROUP

DESIGN | MANAGE | CONSTRUCT