Darwin Green

Foundation Peer Review, BDW1

BDW Trading Limited

Job No:	1038920
Doc ref:	BDW1-CDL-ZZ-XX-RP-GE-60200
Revision:	P01
Revision date:	16 June 2023

Project title	Darwin Green	**Job number**
Report title	Foundation Peer Review, BDW1	1038920

Document revision history

Revision ref	Issue date	Purpose of issue / description of revision
P01	14 June 2023	Final Issue
P02	16 June 2023	Final Issue

Document validation (latest issue)

16/06/2023

X

Principal author

Signed by: Gary Kellett

16/06/2023

X

Checked by

Signed by: Neil Dely

16/06/2023

X

Verified by

Signed by: Neil Dely

Contents

1.0

Introduction

1.0 Introduction

1.1 Site Context and Purpose of the Report

Cundall is a multi-disciplinary engineering practice with expertise in interpretation of ground conditions and foundation design. We work to all relevant current standards and are familiar with the NHBC guidelines for residential properties.

Cundall has been requested by BDW Trading Ltd trading as BDW Cambridgeshire (BDW Cambridgeshire) to review foundation design carried out by others for the BDW1 phase of the Darwin Green development in Cambridge. Cundall has also undertaken a review of the foundation design carried out by others for the BDW2 phase of the development.

The sub-structure (foundation and ground floor slab) design is different between the two phases of development. The designers for BDW1 and BDW2 are also noted to be different companies.

This memo represents observations related to foundation design following review of documents supplied by BDW Cambridgeshire for the Darwin Green BDW1 site (listed in Section 1.2). No review of other aspects of the BDW1 design has been undertaken such as the above ground structural design. It is assumed that the designs have been constructed as shown on the information provided. This review comprises an independent assessment of the drawn information.

1.2 Sources of Information

The following sources of information have been reviewed as part of this report:

1. GRM Development Solutions, Site Inspection Report – Beagle Road – Darwin Green Estate, Cambridge, P10083_SiteIns_1, 4th August 2022
2. Rolton Group, Phase 1 Foundation Layout, BHDG-RGL-00-FN-DR-S-120-001-A Revision C02, Feb 16
3. Rolton Group, Phase 2 Foundation Layout, BHDG-RGL-00-FN-DR-S-120-003 Revision P2, Feb 16
4. Rolton Group, Foundation: General Arrangement Block A&B BHDG-RGL-AB-PL-DR_S-121-001-A Revision C04, Feb 16
5. Rolton Group, Foundation: General Arrangement Block C, BHDG-RGL-C-PL-DR_S-121-001-A Revision C03, Feb 16
6. Rolton Group, Foundation: General Arrangement Block D, BHDG-RGL-D-PL-DR_S-121-001-A Revision C03, Feb 16
7. Rolton Group, Foundation: General Arrangement Block E&F, BHDG-RGL-EF-PL-DR_S-121-001-A Revision C03, Feb 16
8. Rolton Group, Foundation: General Arrangement Block G, BHDG-RGL-G-PL-DR_S-121-001-A Revision C03, Feb 16
9. Rolton Group, Foundation: General Arrangement Block H, J&K, BHDG-RGL-HJK-PL-DR_S-121-001-A Revision C2, Feb 16
10. Rolton Group, Foundation Details, BHDG-RGL-00-FN-DR-S-420-001 Revision C1, Feb 16
11. Rolton Group, Additional Investigation for Apartment Block at Darwin Green, 16-0045 XL002, 4th January 2018
12. RSK, 25459-01 (00), NIAB1 Phase 1, Report for Main Site Investigation, 25 October 2012
13. The Landscape Agency, GA & External Works Plan (01 of 02), 628.17-101 Revision A, 14.04.2016
14. The Landscape Agency, GA & External Works Plan (02 of 02), 628.17-102 Revision A, 14.04.2016

1.3 Nature of Development

The development comprises a range of residential units to the northwest of Cambridge city centre. It is understood that the BDW1 phase of development was constructed over a three year period and was completed in June 2021.

1.4 Limitations

The opinions provided and recommendations given in this report are based on the review of the data detailed in Section 1.2. The information contained in this report is to the best of our knowledge accurate. If new information becomes known

pertaining to the site, or the nature of the proposed development changes, Cundall reserves the right to review the information and revise the recommendations made in the report.

2.0

Ground Conditions

2.0 Ground Conditions

Cundall has been provided with a ground investigation for the site (Reference 12, Section 1.2) and a supplementary ground investigation (Reference 11, Section 1.2) that was undertaken for part of the BDW1 site for geotechnical design of the apartment blocks. The ground conditions identified include a limited thickness of Topsoil overlying River Terrace Deposits in turn overlying Gault Clay Formation.

The original ground investigation did not identify any signs of desiccation. The report notes that both the cohesive River Terrace Deposits and the Gault Clay are shrinkable materials of medium and high-volume change respectively. The shrinkable clay soils were identified as a geotechnical hazard with the proposed engineering mitigation to undertaken foundation design in line with NHBC standards section 4. A minimum foundation depth of 0.9m is recommended in the RSK report.

A site inspection report by GRM (Reference 1, Section 1.2) has also been provided. This considers plots 159, 160, 162 and 163. The GRM report provides details of the inspection of the external areas of these plots and notes the presence of cracking within gardens and movement to hard landscaping. Observations in relation to planting are also provided in the GRM report. The report concludes that the cracking and movement observed in the gardens was generally in line with expected influence from the planting.

3.0

Foundations

3.0 Foundations

3.1 Foundation Depths

Foundation layouts are shown on drawings (References 1 and 3, Section 1.2). These drawings provide details of foundations for house plots within the BDW1 development. Details of the apartment blocks are provided on separate drawings (References 4 to 9, Section 1.2).

The foundation layout drawings for houses and apartment blocks provide details on the depth of foundation, width of foundation and any required steps in base of foundations. Foundation depths shown are all in excess of the minimum depth defined in the RSK ground investigation report.

The foundation layout drawings provide tree influence rings in relation to proposed planting. This is to achieve enhanced foundation depths to mitigate the effect of existing and proposed planting in accordance with NHBC standards chapter 4.

Plots on the eastern and southern edge of the BDW1 phase are also shown to be within the zone influence of planting existing prior to development. As expected, foundation depths for these plots are shown to be the deeper of the requirements from existing and proposed planting to mitigate the effects of heave arising from potential desiccation.

The zone of influence for a sample of proposed trees has been reviewed by Cundall and confirms the tree influence rings drawn in the design. In addition, base of foundation shown on the layout drawings has been defined appropriately in relation to the tree influence rings shown.

3.2 Foundation Type and Designed Heave Precautions

NHBC standards require heave precautions to be deployed for trench fill foundations where the foundations are deeper than 1.5m depth unless NHBC is satisfied that the soil is not desiccated.

The foundation section drawing (Reference 10, Section 1.2) provides an indicative section for foundations with heave protection. The areas of the site requiring the heave protection is shown on the foundation layout drawing (Reference 3, Section 1.2) and relate to plots within the influence of existing trees. As noted in section 3.1 these are on the southern and eastern edge of the BDW1 development. In this situation the heave protection is provided to the internal face of external foundations where they are within the zone of influence of existing trees. The heave protection is shown to all foundations where the depth of foundation is 1.5m or greater. This is in compliance with current NHBC guidelines.

There are a limited number of plots without heave protection to foundations which are greater than 1.5m depth to account for proposed planting. As noted in section 2.0 the ground investigation did not identify any signs of desiccation in the areas of these plots. The foundation solution provided is in compliance with NHBC guidelines. The foundation design and geotechnical reports were submitted to NHBC as part of their technical review. Cundall has been provided with the confirmation that the NHBC technical review of plot specific foundation details was completed and approved for BDW1.

As noted in section 2.0 some of the BDW1 plots are noted to have encountered cracking and movement in external garden areas. The heave protection provided to these plots is appropriate engineering mitigation for the building but will not mitigate effects on external garden areas.

An active inspection process by NHBC during construction has been evidenced through the provision of extensive inspection details. This comprises in excess of 1700 inspections.

4.0

Ground Floor Slabs

4.0 Ground Floor Slabs

Ground floor slabs for the houses and apartment blocks are all shown to be beam and block floors with a subfloor void.

Typical foundation sections (Reference 10, Section 1.2) indicate an underfloor void of 300mm for all plots in line with NHBC recommendations for the ground conditions. The proposed floor slab solution is considered to be appropriate in relation to the ground conditions and potential for heave.

5.0

Conclusions

5.0 Conclusions

All the information we have reviewed in terms of engineering drawings and records from NHBC indicates that the foundations at Darwin Green BDW1 are appropriate for the particular ground conditions which are present on the development site. The sub-structure (foundation and ground floor slab) design for BDW1 phase is different to the BDW2 phase of the development.

About Cundall

About Cundall

24
Global offices

1976
Established

1000+
People worldwide

Projects delivered in
50+ Countries

500+
Awards won

All projects will be net zero carbon by
2030

We are a multi-disciplinary practice operating as a single team across all our global offices. We create fantastic built environments and positively impact our communities, as well as provide great opportunities for our people. Every project is Partner or Director-led to provide senior ownership across its lifespan, with ideas and solutions from all seniority levels. We strongly believe that is how to deliver best for our clients.

We are positioned at the forefront of sustainability, digital engineering and health and wellbeing, and are proud to be at the centre of pioneering design on some of the most exciting projects in the world.

Additionally, we are continually refining our internal processes to manage and reduce our environmental impact. In 2018, we launched a Sustainability Roadmap and in 2020 we were one of the first consultancies in the world to be certified as carbon neutral by the Carbon Trust. In 2021, we launched our Zero Carbon Design 2030 initiative, which is to have all our projects be net zero carbon by 2030. To achieve our goals and targets, we need to inspire everyone to collaborate and support our people, clients and industry to deliver buildings and infrastructure with the lowest possible carbon footprint.

We believe all projects offer a chance to bring meaningful change to the industry – business as usual is no longer enough.

Lack of diversity within the construction and engineering sectors is well-documented. However, we have taken significant steps in recent years to acknowledge and counter lack of diversity within our own practice. For example, in 2019 we hired our first Head of Diversity and Inclusion and undertook our first global diversity and inclusion survey. However, we are strongly against tokenism and using diversity and inclusion as a box-ticking exercise. We want to be transparent in the way we operate at all levels.

Cundall Johnston & Partners LLP
One Carter Lane London EC4V 5ER
Tel:+44 (0)20 7438 1600

Asia Australia Europe MENA UK and Ireland
www.cundall.com

ZERO CARBON DESIGN 2030