# Technical design note

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| Project name | Former Nestle Site Block B | | |
| Design note title | Structural Review of Geotechnical Feedback Report | | |
| Document reference | FNF-HYD-B-RE-300-0109 | | |
| Author | David Berry BEng CEng MIStructE | | |
| Reviewed by | Gavin Mak MEng CEng MICE | | |
| Revision | 01 | | |
| Date | 5 December 2024 | Approved | ✓ |

## Structural Review of Geotechnical Feedback Report for Block B

## 1. Introduction

Block B is the largest accommodation block on the Former Nestle Factory (providing circa 532 apartments) located to the north of the site. The plan area is 140m x 75m. It comprises one basement level, of car parking (326 spaces), which covers the full footprint of the block, over which is up to 11 storeys of flat slab construction for the apartments Blocks B1 to B9.

The basement construction comprises a sheet piled wall to the perimeter (providing both temporary excavation support and permanent wall constriction, i.e. a steel intensive basement) with raft slab foundations that are 900mm thick beneath apartment superstructures and 600mm to the area supporting landscaping/car parking.

The raft foundation is located wholly within the undisturbed dense Granular Lynch Hill Gravel Members (SPT > 25). Formations have been taken down below basement raft level to allow for a minimum thickness of 600mm of selected granular fill (6N) placed beneath the rafts to provide a generally consistent platform across the raft. This formation level is 3.75m below original ground level.

In order to set structural design parameters for the raft and facilitate the earthworks operations, Hydrock's geotechnical team undertook a review of the CGL site investigation report (ref FNF-PH4-G-R-3849B-002 dated June 2021) and produced a Geotechnical Design Report with accompanying Earthworks Specification (ref FNF-HYD-XX-GD-RP-GE-0005).

In accordance with the requirements of the Geotechnical Design Report, a Geotechnical Feedback Report has been written to review the earthworks undertaken to excavate the basement and place the 6N material - a relatively simple earthworks operation.

Barratts appointed Henry Construction as the earthworks sub-contractor. The earthworks for the basement raft construction were managed and undertaken by Henry. It should be noted that Henry Construction ceased trading upon completion of the works and as such there are limitations on the available data gathered for the Geotechnical Feedback Report.

This Technical Note reviews the factual findings of the Geotechnical Feedback Report from a structural perspective and any potential implications on the basement raft foundations.

## 2. Findings of Geotechnical Feedback Report

Hydrock's structures team have reviewed the Geotechnical Feedback Report ref FNF-HYD-XX_GD-RP-GE-0010.

It is clear from this report, following the liquidation of Henry Construction, that some records and data has not been made available. However, there are several photographic records, including our own site inspections, that show the correct excavation level and depth of 6N, along with an appropriate spread of plate loading testing for the 6N material. A summary of the findings is provided below:

- Based on the findings of the geotechnical investigations, made ground was encountered from 0.3 to 2.7m below ground level, overlying the natural Lynch Hill Gravels. With a basement excavation depth to 3.75m below ground level, any made ground encountered would have been removed.
- The source material provided by Rye on demolition was graded and tested to 6F2. This is acceptable granular fill and meets the geotechnical performance requirements for the 6N material - in fact it is just reclassified as 6N by virtue of being placed for a structure.
- There was no testing for OMC nor angle of friction, however, the material is granular and its geotechnical properties effectively tested after placement as part of the plate load testing regime.
- A suite of chemical testing was undertaken for this material, all of which passed the criteria.
- A suitable level of plate bearing tests was undertaken for the compacted 6N material. The Geotechnical Feedback Report assesses the level of compaction from a dual cycle test where the ratio of the stiffnesses is calculated from two cycles of testing. This measures the effectiveness of the compaction, but also provides the stiffness of the material. By the criteria set, the pass rate for level of compaction was 87%. However, the modulus calculated in all locations, for both cycles, passed the requirement that was the basis of the stiffness parameters assumed in the Geotechnical Design Report when calculating settlements. It should be noted that an 100% pass rate would be abnormal given the idiosyncrasies of site conditions/testing. The Geotechnical Feedback Report states that the pass rate and stiffness of the 6N/6F2 material is acceptable.

## 3. Implications of Findings on the Structural Design of the Raft

Although some data is not available that we would normally expect, the in-situ strength/stiffness testing undertaken is acceptable and in line with the parameters provided for raft design in the Geotechnical Design Report. Key considerations/mitigations for the structural design are listed below:

- There is negligible risk of made ground being encountered beneath the raft given the 3.75m basement excavation depth and the recorded depths of made ground of between 0.3 and 2.7m.
- No basements, tanks nor other significant obstructions were encountered during demolition of former buildings that would suggest made ground could be deeper.
- Based on the SI data, all formations across the raft would have consistently been within the natural Lynch Hill Gravels as required in the Geotechnical Design Report for the raft design.
- The plate test data for the 6N/6F2 placed material met or exceeded the stiffness parameters required for the settlement assumptions in the Geotechnical Design Report.
- Notwithstanding the above, the depth of 600mm for the selected granular fill is not significant and any residual settlement would have occurred during the construction of the raft and superstructure. At completion, 90% of the building load is applied and therefore any further settlement of this material (and underlying Lynch Hill Gravels) will be negligible - there is no long-term consolidation of this material as it is granular - settlement is immediate.
- The Geotechnical Design Report predicts maximum long-term settlements (including consolidation of the underlying London Clays) of up to 18mm. This is a small amount of settlement for a raft (primarily as a consequence of the basement construction and therefore overburden removal). The risk of significant post-construction settlement that could result in problems for the basement construction, superstructure or finishes is therefore negligible. Note the maximum net bearing pressure beneath the raft under SLS is only 90 kN/m$^2$.

- The structural design incorporated a sensitivity check for the spring stiffness for the raft of +/-25% as highlighted in the Structural Basis of Design Document (report ref FNF-HYD-B-RE-300-0010). This was to accommodate any inaccuracy in site conditions, modelling assumptions, etc. As a result the ULS design for the raft was conservatively undertaken using a modulus of subgrade reaction (spring stiffness) 25% less than the that calculated from the settlements derived in the Geotechnical Design Report (as this resulted in slightly more onerous moments in the raft).

## 4. Summary

In accordance with our analysis of the findings above, Hydrock (both geotechnical and structures) are satisfied that the earthworks undertaken for the raft is satisfactory and has negligible risk for the structure of the building. No further action is recommended.