

Our Ref: 80818098-01 L002 SSD  
report:KL

Contact Kevin Leedow

31<sup>st</sup> July 2019

Billard Leece Partnership  
72-80 Cooper Street  
Surry Hills NSW 2010

**Cardno (NSW/ACT) Pty Ltd**  
ABN 95 001 145 035

Level 9  
The Forum  
203 Pacific Highway  
St Leonards NSW 2065  
Australia

**Phone: 61 2 9496 7700**  
**Fax: 61 2 9499 3902**

[www.cardno.com.au](http://www.cardno.com.au)

Dear Sir,

**THE NEW PRIMARY SCHOOL AT WARNERVALE – STRUCTURAL  
ENGINEERING SSD STATEMENT**

The Director General's Environmental Assessment Requirements nominates a structural report for the development.

**Geotechnical Considerations**

A Geotechnical report has been carried out by carried out by Douglas Partners numbered 83313.00 dated July 2018.

Ground conditions consist of up to 350mm of filling over sand and sandy clay with sand at the surface in some boreholes. The clays are of medium to high plasticity. No ground water has been encountered in any of the boreholes.

All but two of the boreholes encountered sandstone at depths varying from 0.75m to 1.5m. The limit of investigation at 2.5m depth has been reached in BH 1 and 9. BH 1 is positioned in the watercourse of the overland flow path from the north, which is the likely explanation why rock was not found within 2.5m from surface. BH 9 is positioned near the SW corner of the site, and is not critical for the proposed development.

Footings will consist of piers to rock and tender pier depths of 2.5m (when measured from the natural ground surface) are considered to be sufficient. We note that these lengths may increase in certain areas where fill platforms for the proposed buildings have been constructed.

On this basis, excavation conditions, slope stability and excavation support would be generally typical for this area without any abnormal geotechnical conditions. The natural clays will be suitable as a subgrade for the roads. The building would be founded on the underlying rock due to the close proximity and strength of the rock to provide a cost effective foundation solution.

Based on the maps available on the Central Coast Council (CCC) website, acid sulphate soils of Class 5 are located on the south of the site where it is not proposed to construct any buildings near Warnervale Public School. Construction of the proposed buildings will not be affected by the acid sulphate soils.

### **Structural Considerations**

The design of the structural elements for the above project shall conform to the relevant SAA Codes, in particular the following:

AS 1170	Structural Design Actions Part 1 Permanent, Imposed and other Actions Part 2 Wind Actions Part 4 Earthquake Loads
AS 1720	Timber Structures
AS 2159	Piling Code
AS 2870	Residential Slabs and Footings
AS 3600	Concrete Structures
AS 3700	Masonry Structures
AS 4100	Steel Structures
DMR FORM 76	Pavement Thickness Design
Building Code of Australia	- Section B - Structure

The building structure will have the Fire Resistance Level as noted in the Building Code of Australia.

The proposed footing system would consist of bored piers or screw piles to rock supporting an edge footing beam to account for external level differences. Where proposed site levels permit shallow excavations or for minor independent structures (e.g. covered walkways), the foundations could alternatively be designed as shallow pad footings.

The ground floor would consist of a flat slab with piers at 3.5 metre centres fully suspended. Subject to final regrading of the site, and the recommendations of the geotechnical investigation regarding the 'cut to fill' suitability of the existing soils to be used as subgrade/general fill, slab on ground construction of the floor slabs would also be considered.

The proposed structural system for the first floor would consist of a concrete framed structure with edge beams and concrete columns. The main advantage is to have non load bearing internal walls which can be easily relocated in the future without extensive structural reinforcement to ensure future proofing of the building. The concrete columns would be supported on piers to rock.

The first floor could be either reinforced or prestressed concrete with the decision based on the anticipated spans. A prestressed floor may allow a flat slab without internal beams to facilitate a simple ceiling system, although routing of services would not be critical in this type of low rise structure.

The roof system would be a steel framed structure. An option could be to use a steel external framing beam with braced columns supporting a trussed roof. The option will depend on the needs of the architectural treatment of the building.

Substation footings will be in accordance with the Level 3 design of the substation footings.

Hard landscaping elements such as retaining walls will be designed in accordance with engineering principles.

On site detention tanks will be designed for the relevant water pressure (regulated by the level of the overflow/surge device) and ground pressure.

**Bush Fire Considerations**

The Bush Fire Assessment Report has noted that the structural requirements will be in accordance with BAL 12.5 construction standard as follows:

Element	Comments
Sarking	Not relevant to the structural requirements
Subfloor supports	Not relevant as the ground floor slabs will be on grade
Floors	Elevated floors will be concrete and will comply
External walls	External walls will be constructed of non combustibile materials
Windows and doors	Not relevant to the structural requirements
Roofs	Roof sheets shall be non combustibile
Verandah, Decks, steps, ramps and landings	Will meet the requirements of BAL 12.5 particularly with regard to decking and subfloor spaces
Water and gas supply pipes	Not relevant to the structural requirements
Bush fire resisting species	Not relevant to the structural requirements

We trust that this report is sufficient for your purposes.

Yours faithfully



Kevin Leedow BE, MEngSc, FIE(Aust), NPER  
Senior Principal NSW Building Structures  
for **Cardno**