Project No: S16017

14 October 2016

Mirvac
Level 28, 200 George St
SYDNEY NSW 2000

Attention: Mr Amar Prashant

Dear Sir,

2 FIGTREE DRIVE, SYDNEY OLYMPIC PARK
DESIGN INTENT CERTIFICATION

BG&E Pty Limited, being chartered consulting engineers and members of Consult Australia, hereby confirm that this practice has reviewed the current architectural design for the building works covered in the latest documents by BVN for the Development Application.

Based on our review we believe that there is a structural solution for this building which will enable the construction of the proposed building design intent.

We will carry out the structural design and checking in accordance with the structural provisions of the Building Code of Australia, SAA Codes AS 1170, AS 3600, AS 3700 and AS 4100 together with accepted engineering principles and practice.

As part of the assessment, Transport for New South Wales (TfNSW) standard T HR CI 12080 ST Version 1 dated 5th February 2015 was reviewed and will be used as a guide for the layout of the structure such that any items which may affect the rail corridor will be negated or minimised wherever possible. Please refer attached Rail Corridor Interface Summary.

Please do not hesitate to contact the undersigned for any queries related to the above.

Yours sincerely,
for BG&E Pty Limited

VINCE BETRO
Associate Director
enc.

Sydney *Office*—

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BG&E Pty Limited
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RAIL CORRIDOR INTERFACE SUMMARY

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APPENDIX

- BVN architectural sketches AR-SK-3400 & AR-SK-3401

1 INTRODUCTION

Mirvac has requested BG&E to provide a letter to assess the interface requirements of the rail corridor which adjoins the proposed development in Sydney Olympic Park (SOP).

The project has street frontage to Figtree Drive and Australia Avenue, with an adjacent rail corridor to the south.

BG&E understand the rail corridor design consideration to be as follows;

- 25m offset from the rail corridor line for structures more than 2 metres below ground level, and
- 20m offset from the rail corridor line for structures above ground level,

as shown on the BVN architectural sketches AR-SK-3400 & AR-SK-3401.

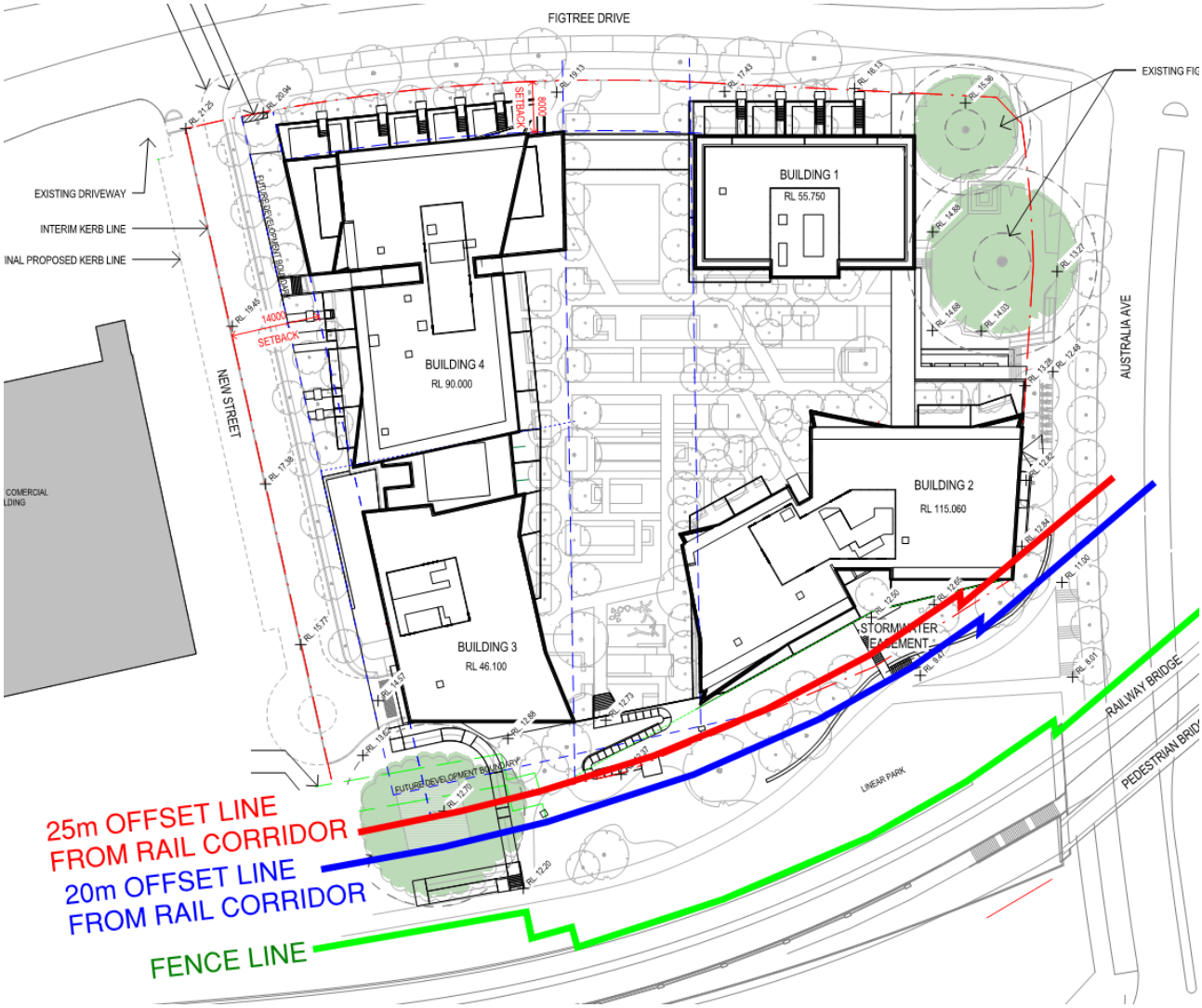


Image *Caption*—
01/ Site Layout

1.1 Terms and definitions

The following terms and definitions were extracted from the Transport for NSW (TfNSW) External Developments Standard (T HR CI 12080 ST):

External Development:
The demolition, extension to or construction of any new public or private infrastructure adjacent to TfNSW rail property.

Rail Corridor:
Comprises the full volume, both above and below ground, between the outer face of opposing boundary fences (i.e. within Sydney Trains property boundaries encompassing Sydney Trains Facilities). If no boundary fences are present, the extent of the rail corridor shall be taken as 15m from the centre-line of the outer most rail.

Railway Infrastructure:
Facilities other than rolling stock necessary for a railway to operate safely including railway track, associated track structures, over-track or under-track structures, supports (including supports for railway equipment or items associated with the sue of a railway), tunnels, bridges, stations, platforms, train control systems, signalling systems, communication systems, electric traction infrastructure, buildings, workshops and associated equipment

1.2 Scope

The scope of this letter is as follows:

- Determine the structural features of the SOP Site 53 redevelopment at the Rail Interface
- Identify the key constraints of each structural feature in accordance with Transport for NSW Standards; and
- Propose design recommendations which will address the requirements outlined in the 'External Developments' standard

1.3 SOP Site 53 Redevelopment Description

The Sydney Olympic Park development consists of four (4) discreet residential towers with a single retail tenement on a shared podium. The height of the development will vary between approximately 8 and 30 levels, with five (5) basement levels.

2 IMPACTS BY SOP SITE 53 REDEVELOPMENT

The requirements for external developments outside but adjacent to the rail corridor is covered by the Asset Standards Authority (ASA) (an independent unit within Transport for NSW) Standard No. T HR CI 12080 ST "External Developments" Version 1.0, Feb 2015. This document states that generally developments adjacent to the railway corridor shall be planned so that there will be no adverse effects on the railway infrastructure or rail operations across the full life cycle of the asset.

For specific corridors, requirements reside with the operator and maintainer of the rail network (Sydney Trains). The main specific protection guidelines of the above standard are:

Temporary components
Temporary components of shoring systems whose stability may impact the rail corridor shall have a service life of 10 years, excluding any considerations of the permanent structure. –Temporary shoring to comply with 10 years' service life.

Ground Anchors
Temporary or permanent soil or rock anchors which extend into the rail corridor are not permitted. – BG&E structural documentation to note this restriction to the D+C contractor responsible for design of the basement shoring walls.

Boundary Definition
Location of proposed developments with respect to the rail corridor shall be clearly identified on design, construction and as built drawings. Boundaries between external developments and the rail corridor shall be considered as side or rear boundaries in terms of the National Construction Code (NCC) compliance.

Geotechnical and Structural Stability and Integrity
The design of the development shall not affect the stability and integrity of railway infrastructure through loading from the development and ground deformation. – It is recommended that comments be sought from Sydney Trains and Transport for NSW so they can be satisfied that the excavation and supporting structure will not adversely affect impact on their infrastructure.

Foundations

- Foundations for external developments shall not physically intrude into the rail corridor. – Building 2 foundations in south-east corner within the 25m offset line from the rail corridor. Despite this being outside the Rail Corridor, we recommend comments be sought from Sydney Trains and TfNSW so they can be satisfied with the current scheme.
- Foundations for external developments shall not rely upon passive earth pressure from rail corridor land.

Building Setbacks and Design
The ongoing ability to access the rail corridor for maintenance and emergency situations is critical to the safety, integrity and operation of the NSW rail network.

Demolition and Earthworks
Demolition and earthworks shall not adversely affect railway infrastructure over the full life cycle. - It is recommended that comments be sought from Sydney Trains and Transport for NSW so they can be satisfied that the excavation and supporting structure will not adversely affect impact on their infrastructure.

Crane and other Aerial Operations

a) When in operation, cranes and other construction equipment such as concrete pumps and access equipment shall not intrude into the rail corridor. When not in operation cranes are permitted to 'weathervane' into the rail corridor subject to the approval of the maintainer and operator and the Lead Electrical Engineer, ASA. The requirements of SMS-06-GD-0268, Section 9 *Work above exposed electrical equipment shall be observed*.

b) No loads are to pass over any overhead wiring or HV aerial lines located within the rail corridor. – No crane loads are permitted to pass over the rail corridor.

3 PROPOSED STRUCTURAL FEATURES BELOW GROUND LEVEL

The current concept design for SOP Site 53 redevelopment requires the demolition of the existing structures and is proposed to have a five (5) level basement carpark structure, accessed via a ramp from a new street to west of the site. The alignment of the basement structure to the south is approximately setback a minimum of 4500mm from the 25m rail corridor line, refer BVN architect sketches AR-SK-3400 & AR-SK-3401.

3.1 Basement Walls

The Douglas Partners Geotechnical Investigation Report (No. 73946.02) dated July 2016, recommends soldier pile walls with infill shotcrete panels to be suitable for the site. Temporary ground anchors will be required to provide lateral restraint for the walls until the basement floor slabs have been constructed to prop the walls in the permanent condition. – BG&E structural documentation to note this restriction to the D+C contractor responsible for design of the basement shoring walls.

4 PROPOSED STRUCTURAL FEATURES ABOVE GROUND LEVEL

The current concept design for SOP Site 53 redevelopment is for the construction of four (4) residential towers on a shared podium. The alignment of the superstructure to the south is setback minimum 1500mm from the 20m rail corridor line, refer BVN architect sketches AR-SK-3400 & AR-SK-3401.

4.1 Structural Columns

Derailment Collision Protection

In the design of buildings or structures adjoining the rail corridor, the potential risks from a possible derailment should be considered. Sites adjacent to curves, on high speed tracks, or at rail line junctions are at higher risks. The need for derailment protection must be considered for the design of piers, columns and structures within, or which interface, the rail corridor.

Table 1 provides the relevant derailment protection zones and the requirements to protect structures within that zone. Refer to AS 5100.2 for further clarification of loading requirements.

Table 1: Derailment Zones

Distance to nearest track centreline	Reference	Requirement
5m	ESC 215 Table 1	Horizontal distance between nearest rail centreline and face of structure closest to the track.
10m	AS5100.2 Cl 10.4.3 and 10.4.4	Any part of the structure within this zone must be designed for a 500kN force acting in any direction. Any supports within this zone must be designed for the following loads acting simultaneously: 3000kN parallel to rails 1500kN normal to rails
20m	AS5100.2 Cl 10.4.3	Any supports within this zone must be designed for a 1500kN load acting in any direction in the horizontal plane.

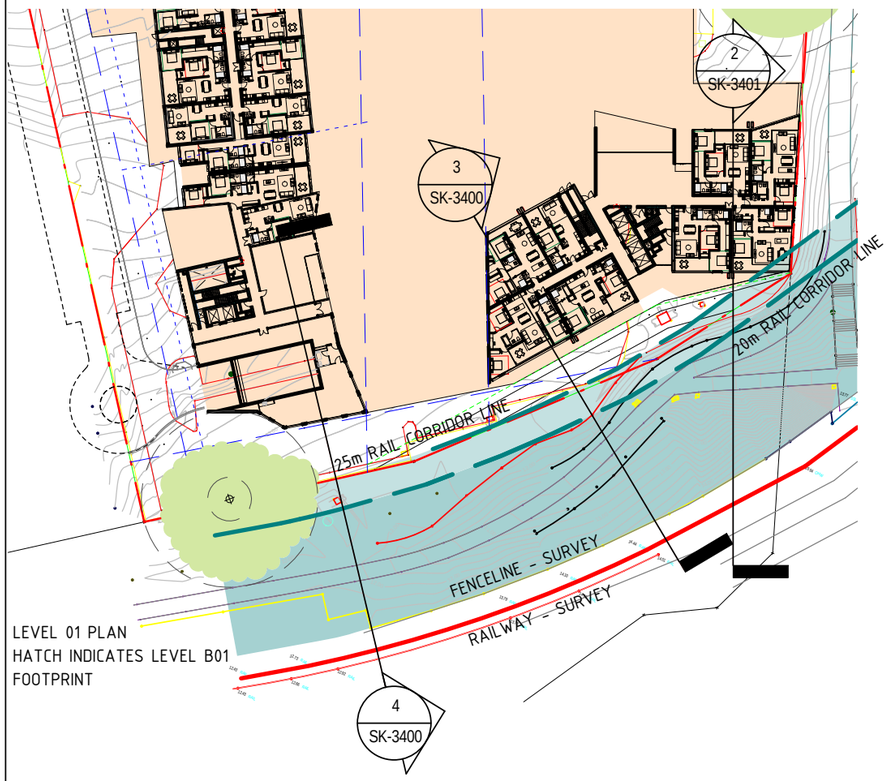
The site layout plan above shows that there are **no** supporting columns within the 20m derailment protection zone, therefore protection against train derailment does not appear to be required.

5 CONCLUSION

The structural features of the proposed redevelopment of Site 53 in Sydney Olympic Park does not appear to have any structural impact on the interface requirements with the adjacent rail corridor. However, the design development and construction methodology of Site 53 will be required to address:

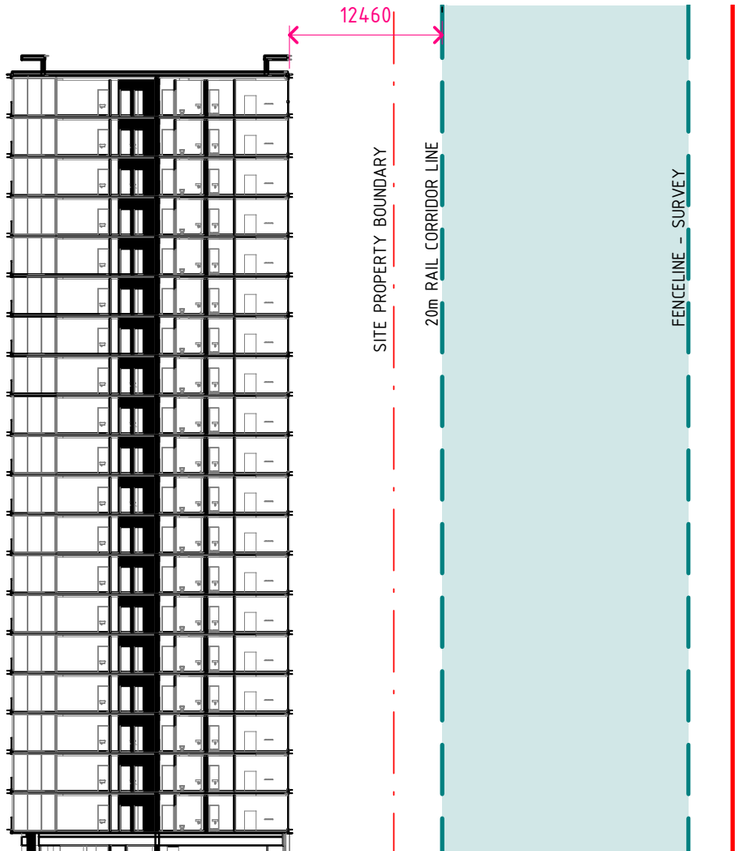
- Design of the basement shoring adjacent to the rail corridor. Consideration to be made by D+C contractor responsible for temporary condition and use of temporary anchors.
- Temporary shoring to comply with 10 years' service life.
- Comments be sought from Sydney Trains and Transport for NSW so they can be satisfied that the excavation and supporting structure will not adversely affect impact on their infrastructure.
- The position of Building 2 foundations in south-east corner within the 25m offset line from the rail corridor to be discussed/coordinated with Sydney Trains and TfNSW so they can be satisfied with the current scheme.
- Location of construction equipment such as cranes, concrete pumps, access equipment, etc.

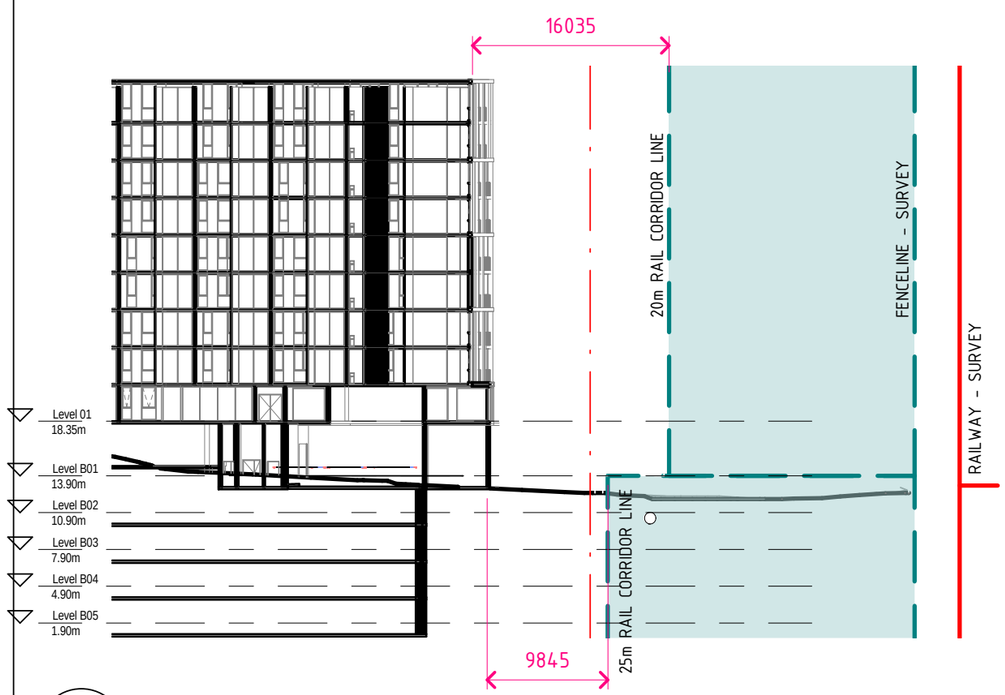
APPENDIX



LEVEL 01 PLAN
HATCH INDICATES LEVEL B01 FOOTPRINT

ALL DIMENSIONS ARE APPROXIMATE





4 SK-2338 RAIL CORRIDOR SECTION - BUILDING 3
1 : 500

3 SK-3400 RAIL CORRIDOR SECTION 2 - BUILDING 2
1 : 500

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NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

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MIRVAC DESIGN
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PROJECT
2 FIGTREE DRIVE
SYDNEY OLYMPIC PARK

BVN PROJECT NUMBER
S1502006

TRUE NORTH | PROJECT NORTH

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STATUS
SCHEMATIC DESIGN

DRAWING
RAIL CORRIDOR SECTIONS 1

DRAWING NUMBER	ISSUE
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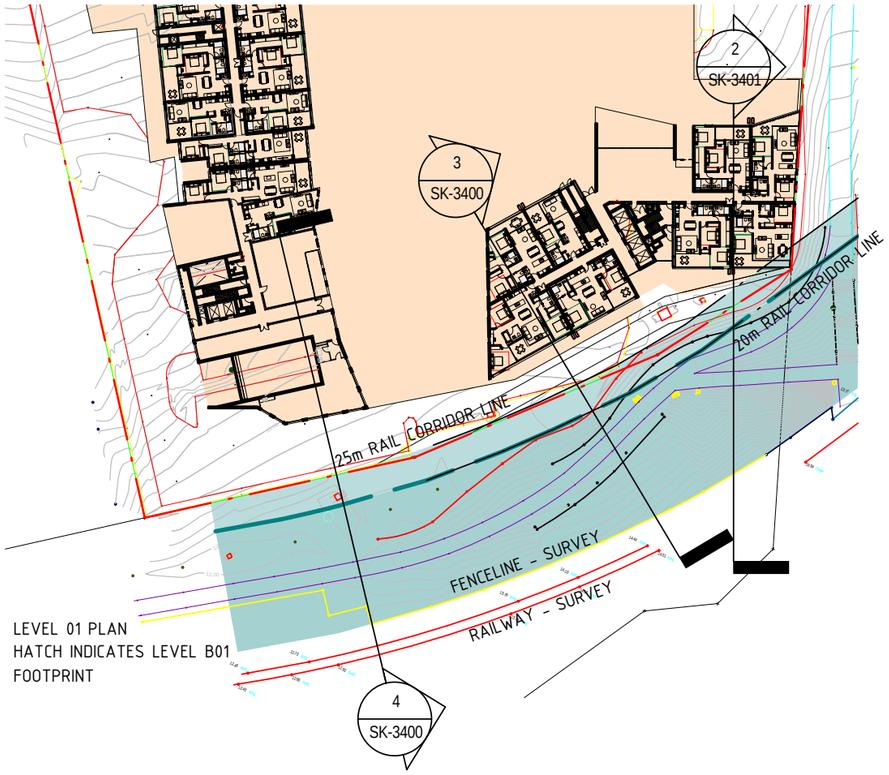
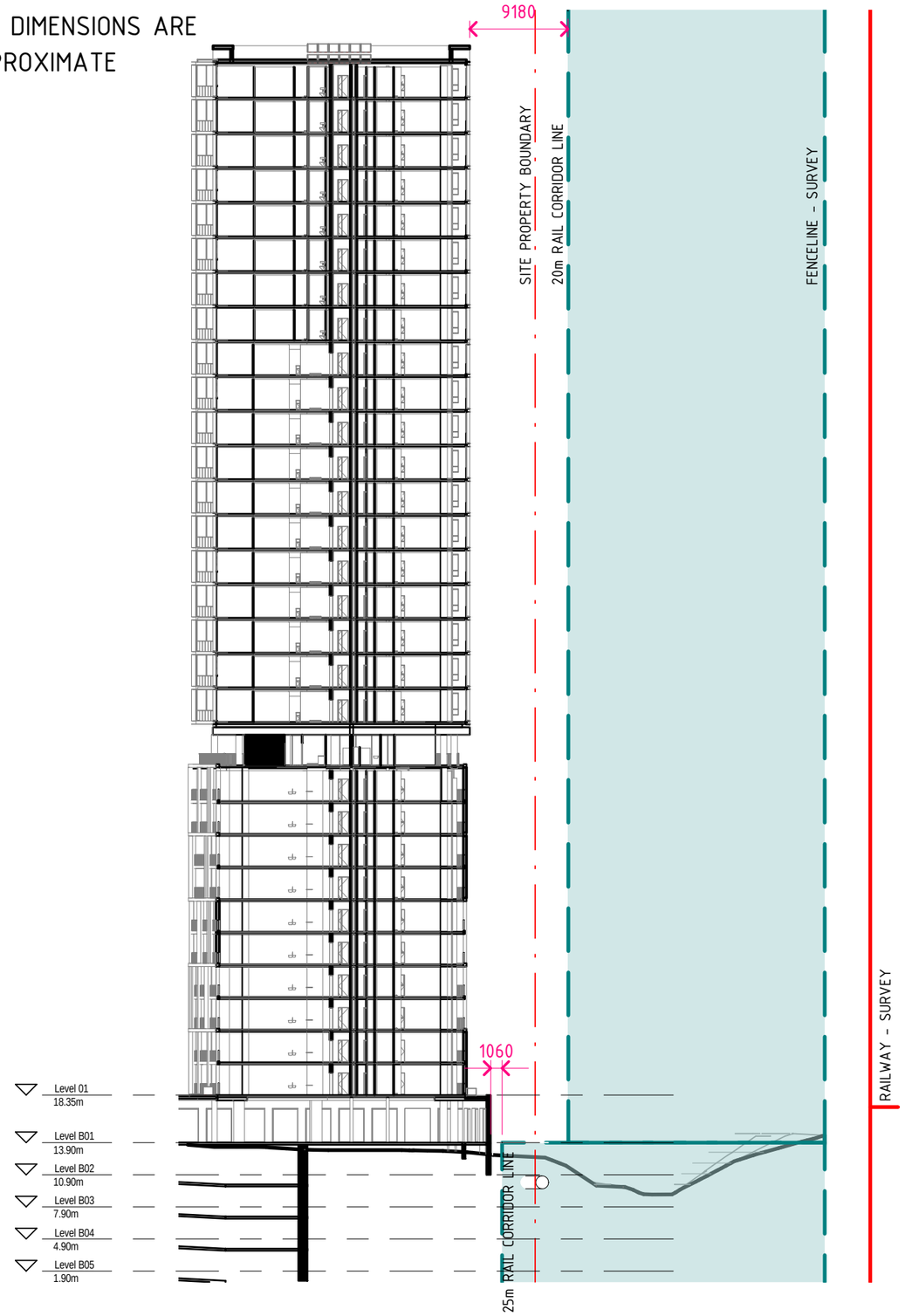


LEVEL 01 PLAN
HATCH INDICATES LEVEL B01
FOOTPRINT

ALL DIMENSIONS ARE
APPROXIMATE



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SK-3400

RAIL CORRIDOR SECTION 1 - BUILDING 2

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STATUS
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DRAWING
RAIL CORRIDOR SECTIONS 2

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