University of Sydney

Remedial Action Plan

Darlington Road Terraces Mixed Use Building
Additions & Alterations to the Darlington Road
Terraces & Public Domain Improvements
Darlington Road, Darlington NSW 2008

16 June 2016

When you
think with a
global mind
problems
get smaller

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Remedial Action Plan

Prepared for
University of Sydney

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Abbreviations

ACM	Asbestos Containing Materials
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
bgs	below ground surface
BH	borehole
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C6-C36	Hydrocarbon chainlength fraction
COPC	Chemical of potential concern
HIL	Health Investigation Level
HSL	Health Screening Level
LOR	Limit of Reporting
NATA	National Association of Testing Authorities
NSW EPA	Environment Protection Authority of New South Wales
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
QA	Quality Assurance
QC	Quality Control
RAP	Remedial Action Plan
RPD	Relative Percent Difference
TP	Test Pit
TRH	Total Recoverable Hydrocarbon
VOC	Volatile Organic Compounds
USYD	University of Sydney
SEPP 55	State Environmental Planning Policy No. 55 – Remediation of Land
UST	Underground Storage Tank
UFP	Unexpected Finds Protocol
SWMS	Safe Work Method Statement
OCP	Organochlorine Pesticide
EIL	Ecological Investigation Level
ESL	Ecological Screening Level
TEQ	Toxicity Equivalent Quotient
ACL	Added Contaminant Limit
VENM	Virgin Excavated Natural Material
ENM	Excavated Natural Material
SAQP	Sampling Analysis & Quality Plan
UCL	Upper Confidence Limit
DQI	Data Quality Indicators
PPE	Personal Protective Equipment

1. Introduction

1.1. Overview

Coffey Geotechnics Pty. Ltd. (Coffey) was commissioned by the University of Sydney (USYD) to prepare a Remedial Action Plan (RAP) to support a Development Application (DA) to refurbish Darlington House and a number of existing terraces along Darlington Road, and construct four new buildings within the rear gardens of the Terraces (herein referred to as the 'site'). The location of the site is shown on Figure 1.

The RAP is required to mitigate potential health risks from fill materials contaminated with heavy metals and Polycyclic Aromatic Hydrocarbons (PAH). The extent of contamination within the site is discussed further in Section 4.

The work was commissioned by Ms. Lena Louangkhoth of USYD. The works were undertaken in accordance with our fee proposal dated 23rd May 2016 (ref: GEOTLCOV25176AB-AA).

1.2. Proposed Development

The University of Sydney is proposing building additions and alterations to the existing Darlington Road terraces and Darlington House (H66) for mixed uses integrating affordable student accommodation and other educational establishments. The development will also include adaptive reuse of the existing Terraces and construction of four separate mixed use buildings within the rear yards for use by residents and the wider University community.

Once completed the mixed use development will provide:

- Approximately, 337 mixed single and twin dormitory style bedrooms;
- Other educational establishment facilities including:
  - Bookable meeting / tutorial rooms;
  - Computer labs/E Learning;
  - Lecture/theatre;
  - Multi-function learning spaces;
  - Study areas;
  - Maker Spaces; and
  - Meeting rooms and informal spaces.
- Communal areas including:
  - Self-catered kitchen;
  - Main dining hall;
  - Lounge;
  - Breakout spaces;
  - Laundry facilities; and

  - Music Rooms.
- Central courtyards
- Roof top terraces with courtyard views,
- Ground level waste and bike storage,
- Basement level with plant rooms,
- External areas – soft and hard, and
- Operator administration office.

Information describing the proposed development within the site is provided in Appendix A. From the information provided, Coffey understands that this redevelopment comprises:

- Refurbish the existing terraces, including the demolition of existing structures attached to the rear of the terraces.
- Construct four, three-storey buildings within the rear garden of the terraces. These buildings are referred to as Buildings A, B, C and D.
- Refurbish Darlington House, located on the western boundary of the site, for storage uses.

Minor works are proposed to the public domain surrounding the site including minor road modifications and landscaping. This will include a small area of landscaped public open space within the site at the corner of Darlington Road and Codrington Street.

1.3. Objectives

The overall objective of the RAP is to outline a strategy which demonstrates that identified contamination on the site can be practically managed so that the site can be made suitable for the proposed uses in accordance with State Environmental Planning Policy No. 55 – Remediation of Land (SEPP55).

This document also presents a procedure to manage unexpected finds which may be encountered during the implementation of the proposed development.

1.4. Scope of Works

To achieve the objective of the RAP, the following activities were completed:

- Review of available investigation reports for the site;
- Selection of the preferred remediation and/or management methods from appropriate remediation options;
- Outline procedures for the preferred remediation and/or management method;
- Outline procedures for validation, site control and occupational health and safety, as required for the remediation and/or management works;
- Review of the environmental measures to be undertaken during the remedial works to protect the health and safety of site workers, the general public surrounding the site, and the surrounding environment;

- Development of validation criteria and scope of the unexpected finds management plan.

1.5. Available Assessments

Information from the following reports was used to prepare this RAP:

- Coffey (Mar 2015); *Geotechnical Investigation, Student Accommodation Development, 000-02 Darlington Road Terraces, The University of Sydney, Darlington* (GEOTLCOV25176AA-AF; final)
- Coffey (Apr 2015); *Stage 2 Detailed Site Contamination Investigation, Darlington Road Terraces Mixed Use Building Additions & Alterations to the Darlington Road Terraces & Public Domain Improvements, Darlington Road, Darlington* NSW (GEOTLCOV25176AA-AD; final)
- SKM (Sept 2010); *Phase 1 Environmental Assessment for the 3.6Ha Abercrombie Precinct* (Ref: EN02867, Final).

2. Site Description & Setting

2.1. Site Identification

The site is located within the suburb of Darlington, which falls within the Local Government Area of the City of Sydney. The location of the site is shown in Figure 1. General location information relating to the site is summarised in Table 2.1.

Table 2.1: Site Identification

Site Location:	Residential dwellings situated between Darlington Road and Darlington Lane, Darlington, NSW.
Site Area	Approximately 0.8Ha
Current Land Use:	Accommodation for students attending USYD
Site Co-ordinates:	33°53'30.00"S 151°11'23.76"E (based on the central location of the site. Source: Google Earth)

For the purposes of this document, the site was divided into four separate sub-areas (denoted as Areas 1 to 4), which comprise the following existing residential dwellings:

Area 1: Darlington House (H66) and terrace no. 121 – 131 Darlington Road

Area 2: Terraces no. 98 – 119 Darlington Road

Area 3: Terraces no. 94 – 96 Darlington Road

Area 4: Terraces no. 86 – 87 Darlington Road

It is noted that existing residential terrace dwellings situated between the Areas noted above do not form part of the site. This includes residential dwellings at no. 88-93, 97 and 120 Darlington Road.

The boundary of the site is shown in Figure 2.

2.2. Site Description

The site comprises a rectangular piece of land bound by Darlington Road to the north, Codrington Street to the east, Darlington Lane to the south and Golden Grove Street to the west.

The western part of the site is occupied by Darlington House, which comprises a four to five storey building currently used as student accommodation, with an undercroft car park facility.

The remainder of the site is occupied by thirty eight (38) terraced-style residential dwellings which are currently used for student accommodation. Areas to the rear (south) of the terraces are substantially covered with hard surfaces (e.g. concrete, brick paving etc.). Various annexes and car ports structures are present in a number of dwellings. Small areas of soft landscaping also present, typically along the southern boundary of the site.

An L-shaped grass covered area is present in the eastern end of site, which is currently used as publicly accessible recreation space.

The topography of the site slopes down from the northwest to the south east.

No visual or olfactory indications of contamination were reported by Coffey during the walkover conducted as part of the Detailed Site Investigation (Coffey, Apr 2015).

2.3. Surrounding Land Uses

The following uses are noted surrounding the site:

Table 2.2: Summary of Land Uses Surrounding the Site

Direction	Summary of Land Uses
North	Darlington Road beyond which lies a triangular piece of land which comprises university buildings such as Merewether Building, The Sci-Tech Library, Institute Building, The Darlington Centre School Building, The Darlington Centre and Sydney University Regiment Building.
East	Codrington Street, beyond which lies the Sydney University Sport and Fitness Building.
West	Golden Grove Street and Darlington Public School are situated further to the west.
South	Darlington Lane, beyond which lies the Abercrombie Precinct, which comprises USYD's business school and student accommodation. The University Garage and playing fields are situated to the southwest beyond Darlington Lane.

2.4. Geology

The Sydney 1:100,000 Geological Series Sheet (Ref: 9130; Edition 1, 1983) indicates that the site is underlain by Ashfield Shale of the Wainamatta Group. Ashfield Shale typically consists of dark grey to black shale and laminate. The Botany Bay 1:25,000 Acid Sulfate Soil Risk Map (Ref: 9130S3, Edition 2, 1997) indicates that the site is within the area of no known occurrence of acid sulfate soils.

The generalised subsurface conditions encountered across the site during previous investigations is summarised in Table 2.3.

Table 2.3: Summary of Ground Conditions Encountered

Soil Unit	Description
Fill Material	Fill materials were encountered in all investigation locations to depths ranging between 0.1m and >1.0m and typically comprised a sandy Silt to sandy silty Gravel, underlain by, orange brown mottled Clay or silty or gravelly Clay in some locations. Gravels typically comprised fine to coarse grained, pale brown, pale grey, dark brown to orange brown, sub-angular to angular gravels. In some locations within the southern part and western end of site, fill material comprised predominantly silty to sandy Clay. Anthropogenic materials encountered within the fill included fragments of brick, glass, ceramic, concrete and plastic. No ash or asbestos containing material was observed to be present within the fill encountered at sampling locations during previous investigations. With the exception of an organic odours noted in fill material at BH1, BH3 and TP06, no distinct odours or visible discolouration of fill materials were noted.

Soil Unit	Description
Residual Soils	Residual soils were encountered beneath the fill materials in the borehole and test pit investigation locations and typically comprised medium plasticity, orange-pale brown/mottled to grey dry to moist, stiff Clay, with traces of sand, gravel and ironstone gravel noted in some locations within the western part of site. Residual soil in BH4 showed red-brown iron staining. No visible or olfactory indications of potential contamination were noted in the residual soils encountered in this investigation.
Bedrock	Bedrock was encountered in boreholes only at depths of 1.6mbgs to 3.0mbgs and comprised extremely weathered, red-brown to mottled pale grey extremely weathered Shale. No visible or olfactory indications of potential contamination were noted within the Shale bedrock.

2.5. Hydrogeology

Groundwater seepage was encountered in two of the four boreholes positioned on site at depths ranging between 0.65m and 3.0mbgs, which generally correlated with the base of the fill or interface of the residual soil and shale bedrock. No olfactory/visible indications of potential groundwater contamination were observed where seepage was noted.

No seepage was observed within other sampling locations. In consideration of the depth and discontinuous nature of the seepage encountered, and the poor well recharge rates noted during sampling, it is assessed that the water encountered during previous investigation works was a perched water body, rather than the aquifer within the underlying shale bedrock.

Insufficient data was obtained during the previous investigation to confirm groundwater flow direction. However, based on the site topography, groundwater was assessed to flow in an easterly direction (Coffey, Apr 2015).

2.6. Hydrology

The closest surface water body to the site is Lake Northam, located 800m north east of the site. Another surface water body named Orphan School Creek and stormwater channel is located approximately 1km north west of site, which discharges into Johnston's Creek located approximately 2km north west of site, which finally flows out into Rozelle Bay located approximately 2.4km north west of site. It is expected that precipitation would either percolate into sub-surface soils (where permeability allows) or enter the stormwater drainage services via off-site kerbside drains along Darlington Road and Darlington Lane.

3. Site History

Aerial photographs indicate that the terrace style housing on site was present from as far as 1930 and that these buildings have remained on site since that time, in a relatively unaltered configuration (Coffey, Apr 2015). Available parish maps for the area indicate that these dwellings were present on site from c.1880 although the use of the site remains unclear prior to this time.

The 1886 Municipality Map for the Glebe, Camperdown and Newtown indicates that land use to the west, south and east of the site comprised similar style terraced housing, with land to the north (beyond Darlington Road) occupied by the Deaf, Dumb & Blind Asylum. USYD was established further to the north at this time.

The earliest available aerial photograph shows residential land uses predominate, with some larger buildings (possibly commercial/industrial uses) noted to the south and east. Land to the north appeared sparsely developed at this time, with areas of grass/landscaping noted.

Between 1930 and 1970 saw the expansion of USYD, with several buildings established on land to the north of Darlington Road, and the University Garage structure established immediately to the southwest of site in c.1943.

A number of USYD buildings around the site were demolished during the early 1980s and these plots remained vacant or used for car parking until the early 1990s where several new USYD buildings were established within the surrounding land to the north, east and west of the site. Around 2000, land immediately south of the site, beyond Darlington Lane, was substantially cleared of buildings to allow the development of the Economics, Business School and student accommodation Buildings within the Abercrombie Precinct.

4. Previous Investigations

4.1. Phase 1 Environmental Assessment (SKM, Sept 2010)

The Phase 1 Environmental Assessment Report prepared by SKM for the Abercrombie Street Economics Precinct Development considered the site, and was prepared based on a site walkover and desk-based review of information held by the University and other publicly available data.

The Phase 1 Environmental Assessment identified a number of Areas of Interest, including:

- Fill materials around the borders of existing buildings – particularly relating to weathered hazardous building products such as heavy metals and asbestos, but also the historic use of pesticides/herbicides, and the unknown origin of fill materials;
- University Garage located offsite to the southwest where fuel was stored in two underground storage tanks (UST) that were subsequently abandoned in 1998. SKM also note the storage of oils and other chemicals occurred in this facility.
- Fertilizer storage in the former Recycling Centre shed - offsite to the south; and
- Joiners Shop Paint located offsite to the south where up to 300L of paint/lacquer/varnish and up to 30L of thinners were stored.
- Transformer and generator – offsite to the south.

The location of the Areas of Interest identified by SKM is shown on Figure 2. SKM recommended an intrusive Stage 2 investigation to be carried out within the subject area to further characterise the potential risks associated with the areas of interest identified.

4.2. Phase 2 Detailed Site Investigation (Coffey, Apr 2015)

Coffey prepared a Phase 2 Detailed Site Investigation, which included a programme of intrusive investigation to collect soil and groundwater samples and assess the contamination status of the site.

The scope of the investigation included:

- Six test pits (TP01 to TP06) and four boreholes (BH1 to BH4) established across the site.
- Nine hand augured boreholes (HA1 to HA9) targeting shallow fill surrounding the building façade.
- Collection of groundwater samples from two monitoring wells (BH1 and BH4).

Figure 3 shows the position of these sampling locations within the site. The key findings from the investigation are summarised below:

- Variable fill materials were encountered in all investigation locations established across the site. No significant visual or olfactory indications of contamination were noted during the investigation fieldworks. No materials suspected to contain asbestos were observed.
- The investigation did not identify significant impacts considered to be attributable to the Areas of Interest located off site to the south; namely fuel storage within the University Garage, fertilizer storage in the former Recycling Centre shed, Volatile Organic Compounds (VOC) within the former Joiners Shop, and fuel/oil residues associated with the generator and transformer.

- The soil analytical results reported soil concentrations below the adopted health assessment thresholds, with the exception of lead and PAH compounds in samples of shallow fill collected from areas surrounding the building façade and rear gardens. The lead impacts are anticipated to derive from the weathering of lead-based paint. The PAH compounds were assessed to derive from ash. These soils were assessed to have the potential to pose health risks via the dermal contact and inhalation/ingestion pathways.
- Shallow soil samples reported concentrations of copper, zinc, TRH C_{16}-C_{34} above the adopted ecological investigation levels, indicating that fill materials on site may pose risks to landscaping introduced as part of the proposed development.
- The soils encountered during the investigation were assessed to classify as General Solid Waste (non-putrescible) according to the Waste Classification Guidelines (NSW EPA, 2014).
- The groundwater analytical results reported groundwater concentrations below the adopted health assessment thresholds, with the exception of zinc, which was assessed to be attributable to diffuse sources from the surrounding urban environment, rather than a specific source within the site, hence representative of background conditions. As such, it was assessed that the potential risks to groundwater quality and surface water bodies located off site from ground conditions on site are low.

Field and laboratory data collected from this investigation were also used to prepare the Geotechnical Investigation report for the proposed development (Coffey, Mar 2015).

4.3. Review of Sampling Pattern and Density

A review of the Detailed Site Investigation report (Coffey, Apr 2015) indicates that the soil sampling pattern adopted comprises a combination of judgemental and systematic sampling, which is considered consistent with the recommendations made within the Sampling Design Guidelines (NSW EPA, 1995). It is assessed that the sampling density achieved within Areas 1 to 3 is appropriate.

It is noted that no investigation has been previously conducted within the footprint of Darlington House (Building H66) located on the western extent of the site, or Area 4 which is located on the eastern extent of the site.

Given that the residential dwellings present within Area 4 are of a similar age to those present within the remainder of the site, it is considered reasonable to assume that the fill in Area 4 is of a similar quality to that encountered within the remainder of the site. Section 7.3 outlines the validation assessment to demonstrate this part of the site is suitable for continued residential and public open space uses.

No further assessment is proposed for Darlington House for the following reasons:

- Darlington House historically comprised terraced residential dwellings, similar to those on the remainder of the site. It is assessed that the construction of the undercroft car park beneath Darlington House would have substantially removed the shallow fill materials.
- The development proposes only internal refurbishment to Darlington House. As such, construction workers involved with the redevelopment of the site will not be exposed to fill materials (if present) within this part of the site.
- Open spaces within the Darlington House plot sit above the undercroft car park. As such, students residing within the building would not be exposed to fill materials (if present) within this part of the site.

Similarly, no further investigation is proposed within the footprint of the existing residential dwellings, given that these structures will be retained as part of the development, thereby restricting future site users being exposed to fill present within the footprint of these structures.

Two groundwater monitoring wells were installed in bores were groundwater seepage was noted. The seepage was assessed to be indicative of perched water rather than the aquifer present within the underlying shale bedrock. In consideration that site has historically been used for residential purposes (i.e. which is less likely to result in groundwater contamination), and the Areas of Interest identified offsite are positioned across or down the likely hydraulic gradient, it is assessed that this does not represent a significant data gap.

Coffey considers that uncertainty associated with the presence of potentially unidentified contamination between investigation positions and limitations of the investigation methods are such that can be addressed as part of contingency planning to manage unexpected finds of contamination during the proposed development works.

4.4. Reliability Assessment of Existing Data

The investigation programme implemented by Coffey adopted a range of quality control measures to assess the reliability of field and laboratory procedures, in accordance with recommendations provided within Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (the 'ASC NEPM') (NEPC, 2013). In summary, the Detailed Site Investigation report concluded that the field and laboratory data overall met predetermined Data Quality Objectives (Coffey, Apr 2015), and as such, was considered to be usable for the purposes of developing a RAP.

5. Conceptual Site Model

5.1. Source Zone Characteristics

The primary sources of contamination impact at the site are considered to be:

- Fill material that contains lead and PAH compounds at concentrations that exceed the health assessment criteria. The source of lead and PAH detected are assessed to derived from lead-based paint residues and ash, respectively. Laboratory data indicates the impact extends to a depth of 0.2mbgs, which is considered to be consistent with the likely source and associated mode of deposition, historically.
- Fill material that contains copper, lead, zinc, TRH C_{16}-C_{34} and benzo(a)pyrene at concentrations which exceed the ecological assessment criteria. The depth of impact was typically 0.2mbgs, although benzo(a)pyrene was detected at concentrations exceeding the ecological assessment criteria at depths up to 0.5mbgs, locally.

5.2. Identification of Potential Receptors

The following potentially sensitive areas and possible receptors for the proposed site use have been considered:

- Current and future users of the site. These receptors are assessed to be tertiary students residing within the existing/proposed accommodation, visitors who attend site for short periods on an intermittent basis, and recreational users accessing the public open space being retained on the eastern extent of the site.
- Future maintenance and construction workers involved in subsurface excavations during site redevelopment.
- Users of adjoining land, including construction workers and students within the university campus.
- Landscaping currently present within the site and adjoining the site.

5.3. Source – Pathway – Receptor Relationships

Table 5.1 summarises plausible pollutant linkages between the contamination sources and receptors identified in relation to the site. Figure 4 presents the Conceptual Site Model graphically.

Table 5.1: Conceptual Site Model

Source	Exposure Pathway	Receptors
Shallow fill containing Lead & PAH	• Dermal contact • Inhalation of soil • Ingestion of soil	• Current/future student residents • Construction/maintenance workers • Site visitors • Recreational users (eastern extent of site)
	• Inhalation of airborne dusts	• Users of adjoining land
Shallow fill containing TRH C_{16}-C_{34} benzo(a)pyrene copper, lead, and zinc,	• Plant uptake mechanisms	• Existing landscaping • Proposed landscaping

6. Remedial Strategy

6.1. Remediation Goals

The goals for the proposed remediation works are:

a) that the potential risks associated with the impacted fill materials have been mitigated to an acceptable level, and

b) the site is suitable for the proposed high density residential land use with minimal access to soil, and the continued recreation use of the public open space that exists on the eastern extent of the site (i.e. Area 4).

6.2. Remediation Requirements

The site has been subject to a previous phase of investigation to assess the historical uses of the site and surrounding land, and the contamination status of the site. These investigations identified shallow fill material which had been impacted with lead and PAH, at concentrations that have the potential to pose health risks via dermal contact, ingestion/inhalation of soil and dust. Similarly, shallow fill materials were assessed to be unsuitable as a planting medium for landscaping that will be introduced as part of the proposed development.

Available investigation data indicates that the impact extends to a depth of 0.2mbgs, with deeper fill reporting concentrations exceeding ecological based criteria at depths up to 0.5mbgs, locally.

In consideration of the likely origin of the contamination identified and associated mode of deposition, it is considered reasonable to assume that available laboratory data is representative of shallow fill adjacent existing dwellings and rear garden areas, rather than indicative of localised areas where elevated contaminant concentrations (i.e. hot spots) exist. Figure 3 illustrates the anticipated extent of fill material requiring remediation as part of the proposed development.

In consideration that there is currently insufficient data to conclude that the residential dwellings and adjoining area of public open space in Area 4 are suitable for use, it is proposed to conduct further investigations. The findings of these works shall be used to assess whether additional remediation works are required to make Area 4 suitable for the continued residential and recreational use.

6.3. Remediation Options Assessment

The following remediation options were considered for management of soil materials within the remediation area shown in Figure 3.

6.3.1. ‘Do Nothing’ Approach

Given that the overall remedial goal is to make the site suitable the proposed use, a ‘do nothing’ option is not considered to be acceptable as potentially unacceptable health and ecological risks have been identified.

6.3.2. Hazard Removal and Validation

This option would comprise the removal of impacted fill and disposal of these materials at a licensed landfill facility.

The advantages of this option include the removal of the contaminant, negating the need for on-going management of the land, as well as restrictions on future land use following remediation and validation. The disadvantages of utilising this option include increased costs and environmental impacts associated with waste transport and disposal, and importation of appropriate materials to backfill the voids created by the removal of contaminated fill to construction formation level (if required), or support landscaping introduced as part of the development.

6.3.3. Isolation of Impacted Fill and On-site Management

Lead and PAH compounds within fill materials pose potential health risks where exposure can occur via dermal contact and inhalation/ingestion of soil/dust. Retention of impacted fill materials beneath a suitable cover layer that separates future site users from impacted fill material is an effective risk mitigation approach. The cover layer could comprise buildings, hard paved areas or suitable thickness of clean soil in areas where landscaping is proposed.

This remedial option does not remove the hazard from the site and relies upon a Cover Layer to separate users from asbestos impacted fill. The option would require long term management of the Cover Layer to maintain its effectiveness. The benefits of this remedial option are reduced environmental impacts and costs associated with waste transport and disposal, and importation of clean fill.

6.4. Preferred Remediation Option

The preferred remediation option to mitigate potential risks from impacted fill is hazard removal followed by validation to demonstrate successful removal of the subject fill. The primary factors considered during the appraisal of the options outlined above are as follows:

- Hazard removal provides improved confidence in the attainment of the remediation goals, programme and cost.
- Hazard removal removes the need for longer term management measures.
- The fill material has been assessed to be unsuitable engineering properties to form a suitable platform to construct the new mixed use development along the southern boundary of the site, and hence requires removal (Coffey, Mar 2015).
- Import clean soil as a planting medium to support landscaping introduced as part of the proposed development.
- The option would allow the site to be made suitable for the proposed use without the need of implementation of an environmental management plan.

6.5. Proposed Sequence of Works

6.5.1. Preliminaries

Prior to any works commencing on the site, notifications to third parties and obtaining any licences, approvals and permits will need to be undertaken. Further information regarding notifications, licenses, approvals and permits is presented in Section 10.

Prior to the commencement of the proposed remediation works, an unexpected finds protocol (UFP) will be prepared by the parties implementing the demolition and remediation works. The UFP should be implemented during the remediation and construction / development works and should include a protocol for managing unexpected finds of contamination. It is noted that the UFP should be reviewed following the completion of the remediation works to ensure that it remains relevant to the construction/site redevelopment works proposed. Some considerations in relation to an UFP are presented in Section 8.

6.5.2. Site Establishment

Site establishment will include:

- Work area fencing, warning signage and temporary site facilities.
- Occupational health and safety controls.
- Environmental monitoring and controls.
- Preparing stockpiling areas.
- Vehicular haul roads and transit routes onto and off the site.
- Location, isolation, relocation, protection and/or termination of services potentially affected by the development, if any.
- Establishing contingency planning and controls to address unexpected finds.

As the remediation work will be undertaken as part of the proposed site development, it is envisaged that many of the items listed above will already be in place.

6.5.3. Demolition and Site Clearance

It is anticipated that remedial works would commence following the demolition/removal of existing structures and landscaping required as part of the proposed redevelopment works. AJ+C Drawings DA1103 to DA1108 show the extent of the demolition proposed.

6.5.4. Excavation of Impacted Fill

Existing pavements, landscaping and fill materials and under the proposed new building footprints will be removed for engineering purposes (Coffey, Mar 2015). Fill materials and existing landscaping present within the remediation area and outside of the proposed building footprints shall be excavated to a minimum depth of 0.3mbgs. The remediation excavation will be limited by the depth of fill, over the extent shown in Figure 3.

Fill materials have been assessed to be unsuitable as a planting medium for landscaping introduced as part of the development. Where landscaping is proposed that will be planted direct into existing site

soils (i.e. rather than planter box, or engineered tree pit), fill materials shall be completely removed, and replaced with imported soil.

Excavated fill material will be stockpiled separately from the underlying soils

6.6. Roles and Responsibilities

The key responsibilities for personnel in relation to remediation and validation activities are summarised in Table 6.1.

Table 6.1: Roles and Responsibilities in relation to this RAP

Personnel	Responsibilities
Principal Contractor	• Facilitate the implementation of this RAP. • Provision of safe working environment in relation to contamination. • Provide an appropriate induction for all persons working on this site, and check that personnel have undertaken appropriate occupational health and safety training relevant to their role on this project. • Keep the training and induction records relevant to this RAP for persons involved in this project. • Ensure that a site specific site safety plan is prepared for the site, which should cover contamination at the site. • Ensure that any subcontractors provide adequate Safe Work Method Statement (SWMS), which should cover contamination at the site. • Monitor the compliance with this RAP, and other relevant regulations, standards and codes related to contamination. • Control access into area where contamination is identified. • Be responsible for the contamination issues within the project at all times until work completed. • Maintain the Unexpected Finds register for this project. • Manage accident and emergency procedures related to contamination. • Manage workplace injury management and rehabilitation, in relation to contamination. • Inform the environmental consultant of all unexpected finds. • Maintain material tracking records relating to the excavation, stockpiling and disposal of waste material, as well as importation of materials to site and make this available to environmental consultant following completion of the project. • Compliance with all other applicable statutory responsibilities related to management of asbestos in the workplace.
Subcontractor(s) or their Supervisor(s)	• Comply with this RAP. • Understand the requirements of this RAP. • Prepare SWMS, as required by the Principal Contractor, for specific activities undertaken within the project where contamination may be encountered. • Take reasonable care for their own safety and the safety of others, with respect to contamination. • Attend site induction contamination awareness training and identification of contamination, follow all site rules and work instructions.

Personnel	Responsibilities
	• Take immediate action to rectify contamination hazards that should arise during the course of the work. • Immediately report unexpected finds of contamination to site supervisor or Principal Contractor. • Compliance with all other applicable statutory responsibilities related to management of contamination in the workplace.
Environmental Consultant	• Provision of safe working environment with respect to contamination. • Issue this RAP and coordinate works to review/update the RAP, as necessary. • Provide onsite supervision of all potential contamination works. • Engage suitably qualified and competent staff and/or contractors to manage works in areas impacted with contamination. • Provide advice on handling, management and treatment of potentially contaminated material. • Provide validation of excavation, waste classification and other advice in relation to contamination. • Other activities related to contamination that may be required by the Principal Contractor from time to time.

7. Validation Plan

7.1. Validation Objective

The intent of the soil validation works is to collect suitable and adequate data to assess whether the remediation objectives have been achieved.

7.2. Validation Strategy

The contamination identified on site is assessed to derive from lead-based paint residues or ash, which have been deposited within shallow fill material. Excavation is proposed to remove shallow fill material that is contaminated such that soil remaining within the remediation area meets the remediation criteria. As such, it is proposed that the removal of fill within the remediation area will be validated using visual means by the environmental consultant using photographs and detailed notes, referenced to a site inspection plan and/or site grid reference.

For areas within the remediation area and outside of the proposed building footprints, representative samples of fill materials[1] shall be collected for laboratory analysis to demonstrate that fill remaining in these areas are suitable for use. Samples will be analysed for Lead and PAH.

As a guide, soil samples will be collected on a regular 10m by 10m grid although the sampling density shall be adjusted to ensure that a sufficient number of samples are collected from each area to provide a dataset that enables comparison with the remediation criteria, which can be supported by statistics, where appropriate. Similarly, soil samples of fill along the boundary of each area at 10m intervals to record site boundary conditions.

7.3. Supplementary Investigation & Validation Assessment: Area 4

As noted in Section 4.3, insufficient investigation has been previously undertaken within Area 4 to demonstrate that this part of the site is suitable for continued residential and recreational uses. As part of the validation assessment, a programme of supplementary investigation is proposed to collect suitable and adequate data to assess whether the remediation objectives.

It is proposed that the environmental consultant undertakes a walkover survey of Area 4, and collect samples of fill materials to demonstrate that areas of open space are suitable for use. It is envisaged that samples could be collected using hand tools (e.g. hand auger, shovel etc.). Samples will be collected from two discrete depths; namely near surface (0.0-0.2m) and deeper soils (0.8-1.0m). The sampling depths proposed consider residents, members of the public, and construction/maintenance workers involved in shallow excavation works in Area 4. Samples will be analysed for heavy metals, TRH, BTEX, PAH, OCP, PCB and asbestos.

[1] Refers to fill materials below the current depth of 0.3mbgs that will remain in-situ following development. The validation plan for topsoil and/or engineered fill materials imported to site is provided in Section 7.5.

As a guide, soil samples will be collected on a regular 10m by 10m grid although the sampling density may need to be adjusted to avoid below ground services, and actual conditions in the occupied residential courtyards and small recreational area adjoining Codrington Street.

7.4. Remediation Criteria

The criteria proposed for this project were sourced from:

- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (the ASC NEPM).
- Friebel and Nadebaum (2011); CRC CARE Technical Report No. 10 – Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater

The proposed development is considered to be broadly consistent with the generic residential land use with minimal access to soils (HIL B) described within Schedule B7 of the ASC NEPM. Table 7.1 summarises the remediation criteria adopted for areas of the site where these land uses are proposed.

Table 7.1: Remediation Criteria – Areas 1 to 3

Contaminant	Residential Use with Minimal Access to Soil Source: HIL B & HSL B[1] (mg/kg)
Lead	1,200
Naphthalene	3
Carcinogenic PAH as Benzo(a)pyrene TEQ [2]	4
Total PAHs	400

Notes:

1. *Table 1A(1) - Schedule B1, ASC NEPM (NEPC, 2013)*
2. *TEQ = Toxicity Equivalent Quotient*

Similarly, data from the supplementary investigation described in Section 7.3 shall be compared to the assessment criteria in Tables 7.2 and 7.3. Where concentrations of contaminants of potential concern are reported above the criteria outlined below, further management and/or remediation may be required to mitigate the health risks.

Table 7.2: Soil Investigation Levels – Human Health (Area 4)

Contaminant	Residential Use with Minimal Access to Soil Source: HIL B & HSL B[1] (mg/kg)	Public Open Space Source: HIL C & HSL C[1] (mg/kg)
Arsenic	500	300
Cadmium	150	90
Chromium (VI)	500 [4]	300 [4]
Copper	30,000	17,000
Nickel	1,200	1,200

Contaminant	Residential Use with Minimal Access to Soil Source: HIL B & HSL B[1] (mg/kg)	Public Open Space Source: HIL C & HSL C[1] (mg/kg)
Lead	1,200	600
Zinc	60,000	30,000
Mercury	120	80
F1 (TRH C_6-C_9 – BTEX)	45 [2]	5,100 [3]
F2 (TRH C_{10}-C_{16} – Naphthalene)	110 [2]	3,800 [3]
F3 TRH C_{16}-C_{34}	5,800 [3]	5,300 [3]
F4 TRH C_{34}-C_{40}	8100 [3]	7,400 [3]
Benzene	0.5 [2]	120 [3]
Toluene	160 [2]	18,000 [3]
Ethylbenzene	55 [2]	5,300 [3]
Total Xylene	40 [2]	15,000 [3]
Naphthalene	3	1,900 [3]
Carcinogenic PAH as Benzo(a)pyrene TEQ	4	3
Total PAHs	400	300
Asbestos (as Bonded ACM Fibrous asbestos and Asbestos fines)	No form of asbestos detected	No form of asbestos detected
Aldrin and Dieldrin	10	10
Chlordane	90	70
DDT/DDE/DDD	600	400
Endosulfan I / II	400	340
Endrin	20	20
Heptachlor	10	10
Hexachlorobenzene	15	10
Methoxychlor	500	400
Toxaphene	30	30
Total PCB	1	1

Notes:

1. *Table 1A(1) - Schedule B1, Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 1999)*
2. *Table 1A(3) - Schedule B1, Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 1999)*
3. *Table A4 – Soil Health Screening Levels for Direct Contact (CRC Care Technical Report No.10 (Friebel and Nadebaum; 2011)*
4. *Soils were tested for Total Chromium, which comprises both Chromium (III) and Chromium (VI) valence states. The HIL for Chromium (VI) has been adopted as a conservative assessment threshold.*

Table 7.3: Soil Investigation Levels – Ecological (Area 4)

Chemical Constituent	Urban Residential/Public Open Space (mg/kg)
Arsenic	100 [1]
Chromium (III) [7]	190 [2]
Copper[7]	240 [3]
Nickel[6]	310 [4]
Lead	1100 [5]
Zinc[8]	950 [6]
F1 (TPH C_6-C_9 – BTEX)[7]	180
F2 (TPH C_{10}-C_{16} – Naphthalene) [7]	120
F3 (TPH C_{16}-C_{34}) [7]	1300
F4 (TPH C_{34}-C_{40}) [7]	5600
Benzene[7]	65
Toluene[7]	105
Ethylbenzene[7]	125
Xylenes[7]	45
Naphthalene	170
Benzo(a)pyrene[7]	0.7
DDT	180

Notes:

1. Table 1B(5) - Schedule B(1), Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 2013). The EIL/ESL presented above have been modified using soil pH, Cation Exchange Capacity (CEC) and Total Organic Carbon (TOC) measured within the DSI report (Coffey, Apr 2015).
2. The Added Contaminant Limit (ACL) selected for Chromium III conservatively assumes a clay content of 1%.
3. The ACL selected for Copper uses the mean soil pH of 7.2, CEC of 25cmol$_c$/kg and of 1%.
4. The ACL selected for Nickel uses the mean CEC of 25cmol$_c$/kg.
5. Table 1B(4) - Schedule B(1), Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 2013)
6. The ACL selected for Zinc uses the mean soil pH of 7.2, CEC of 25cmol$_c$/kg.
7. EIL for TPH F1 to F4, BTEX and Benzo(a)pyrene compounds assume soils are fine grained.
8. ABC were adopted for NSW assuming high traffic volume, where relevant.

7.5. Imported Fill Criteria

Materials imported to site must be either:

- Virgin Excavated Natural Material (VENM),
- Excavated Natural Material (ENM) and subject to the specific requirements stipulated within the Excavated Natural Material Exemption (NSW OEH, 2012), or
- Similar material certified in accordance with an exemption issued by the NSW EPA.

Prior to importing material to site, the following fill sampling plan will be implemented:

- A visual inspection of the source site and the proposed fill material (must be exposed); and
- Collection and laboratory analysis of the minimum number of samples of the fill material per source, as required by the Schedule B2 of the ASC NEPM (NEPC, 2013) or Excavated Natural Material Exemption (NSW OEH, 2012), whichever is greater.

Subject to receipt of adequate VENM certification documentation from the appointed contractor, the environmental consultant will advise the Principal Contractor or their appointed subcontractor of the suitability of the material (from a contamination perspective) for importation to the site.

Where ENM is imported to site as fill the Generator must provide a written statement of compliance that this material complies with relevant conditions of the ENM general exemption, and shall provide a copy of the relevant sampling plan and test results for the imported ENM.

The source site, volume, associated chemical test certificates and placement locations of the imported fill material will be tracked by the appointed contractor. These records will be presented within the Validation Report.

It is noted that other non-contamination related criteria may also need to be met (e.g. engineering or geotechnical requirements) although such issues are considered beyond the scope of this document.

7.6. Re-use of Site Won Fill Material On-site

Fill materials excavated from the remediation area shall not be reused as fill elsewhere on site.

If excavated natural material is considered for re-use on any part of the site, then these materials will be assessed to demonstrate that they are suitable for use within the site. This assessment should consider the presence of chemical and aesthetic characteristics of the materials taking account of the historic land uses and available data presented within the Detailed Site Investigation report (Coffey, Apr 2015).

8. Quality Assurance / Quality Control

8.1. Data Quality Objectives

Validation of remediation will be undertaken in accordance with a Sampling, Analytical and Quality Plan (SAQP). The approach to developing the SAQP is presented below, which have been developed generally in accordance with the Data Quality Objectives outlined in Schedule B2 of the ASC NEPM (2013).

Table 8.1: Summary of Data Quality Objectives

Data Quality Objective	Outcome
State the Problem	The overall objective is to assess if the remediation areas has been made suitable for the proposed land use. The main problems are: • What areas and depth of soil require remediation? • How should site soils be validated? • What validation sampling density should be used? • What contaminants should be analysed for?
Identify the Decision	Is the data suitable for assessing whether the known contamination impacts have been remediated? Is the remediation area suitable for the proposed land uses?
Identify Inputs to the Decision	The inputs to the decisions are: • Current understanding of site's current and historical uses. • Results and findings of previous investigation. • The remediation assessment criteria. • Data collected during remediation and validation works, including field measurements, observations, laboratory results and survey records. • Outcome of quality assessment of relevant data. • Applicable regulatory guidelines.
Define the Study Boundaries	The lateral boundary of the remediation area is shown on Figure 3. The suggested vertical study boundary is the base of fill materials within the site, whichever occurs first.

Data Quality Objective	Outcome
Develop a Decision Rule	The decision rules for the project will be as follows: • If the results of the analytical data quality control assessment are acceptable, then the data will be deemed suitable for the purposes of the project. In this regard, data will be assessed against completeness, comparability, representativeness, precision and accuracy; and • If the reported assessment and validation results are below the assessment criteria, then the site soils will be considered suitable for proposed uses.
Specify Limits on Decision Errors	There are two types of error: • Deciding that the soils are suitable for the proposed land use when they are not; and • Deciding that the soils are not suitable for the proposed land use when they are. Where practicable, the assessment will aim to conclude with 95% confidence that the site soils are suitable for the proposed land use. Consequently, the 95% UCL of the mean concentrations of chemicals of potential concern will be used where applicable and where sufficient data is available to support this statistical method. Confidence in reliability of other validation methods (e.g. field observations) will be based on: • appropriate levels of qualification and experience in the personnel undertaking the relevant validation task; and • use of Coffey standard operating procedures and other considerations described in NSW DEC (2006) and NEPC (2013).
Optimise the Design for Obtaining Data	Validation will be undertaken in accordance with the validation plan outlined within Section 7, over the remediation area shown in Figure 3.

8.2. Fieldwork QA/QC

In accordance with Schedule B2 of the ASC NEPM (NEPC, 2013), the following DQIs will be assessed for both field and laboratory procedures:

- Completeness
- Comparability
- Representativeness
- Precision
- Accuracy (bias)

In relation to the field considerations, an important element of the proposed field QA/QC is the works being undertaken under the presence of a competent environmental consultant who will also conduct the walk over and visual validation required in Areas 1 to 3.

The following procedures will be used as a guide in undertaking sampling to validate aspects of the proposed remediation works. These procedures are based on the recommendations presented within AS 4482 (2005): *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soils* (Australian Standard; Parts 1 and 2).

8.2.1. Preparation

Sampling equipment required for fieldwork will include the following (where appropriate):

- notebook/indelible marker pens;
- sampling trowel, shovel or hand auger;
- deionised or distilled water and Decon 90 detergent to decontaminate non-disposable sampling equipment.
- decontamination buckets
- laboratory prepared sample containers appropriate to the analysis requested.
- insulated containers and ice;
- disposable latex gloves;
- personal protective equipment (PPE); and
- camera, GPS and field tape.

8.2.2. Soil Sampling, Preservation and Storage Procedure

Samples will be collected using a decontaminated trowel/shovel/hand auger, or scooped directly into the laboratory prepared container using a new pair of nitrile gloves. Samples proposed for asbestos analysis will be placed into a separate zip lock bags, or laboratory supplied bulk bags and sealed using an elastic band or tape.

Soil samples collected for chemical analysis shall be lightly packed into glass container with headspace minimised to avoid the loss of volatiles. The glass sample container will be sealed using a Teflon-lined lid.

The sample containers will be labelled with a project number, sample location, sample depth (where applicable) and date the sample was collected.

Sample storage and preservation will be undertaken in accordance with Table 8.2.

Table 8.2: Soil Sample Preservation and Storage

Analyte	Sample Volume and Container Type	Sample Container Preservative	Storage / Transport
Chemical Parameters	1 x 250ml glass & Teflon lined lid	None	Minimal headspace Attempt to cool to 4˚C
Forms of Asbestos	Double zip lock bag (Grab Samples for fragments of bonded ACM) 1 x 500mL sample volume in plastic bulk bag (Sample for asbestos fines analysis)	None	Air tight and labelled for asbestos analysis No special requirements

8.2.3. Decontamination Procedures

Non-disposable sampling equipment coming into in contact with soils will be decontaminated before and between sampling events to minimise the possibility of cross contamination between samples and minimise the risk of impacting sample integrity. The decontamination process will include the following procedure:

- removal of soil residue from the equipment with a clean plastic brush in potable water;
- washing the equipment in a solution of Decon 90 (or similar) detergent and potable water; and
- rinsing the equipment in potable water.

8.2.4. Storage and Transport Procedures

The sample containers will be transported to the NATA accredited analytical laboratory with the Chain of Custody form recording the following information:

- project reference;
- date of sampling;
- sample identifications;
- matrix and container details;
- preservation methods (if any);
- name of sampler;
- required analysis;
- turnaround times required; and
- signatures of sender and receiving laboratory.

A copy of the Chain of Custody record will be kept in the project file. Samples will be transported to the laboratory with sufficient time to perform analysis within the applicable recommended holding period.

8.2.5. Quality Control Samples

The following QA/QC samples shall be collected for sampling events where chemical analysis is required:

- Intra-laboratory and Inter-laboratory duplicates samples should be collected at a rate of one sample per twenty primary samples collected for chemical analysis (5%). The analytical results of the two spilt samples will be compared to assess the precision of the sampling protocol and to provide an indication of variation in the sample source and accuracy of the primary laboratory.
- Rinsate samples will be on a 'spot check' frequency to check the efficacy of field procedures used to decontaminate non-disposable sampling equipment.
- Trip spike and trip blank samples will not be carried into the field on a 'spot check' frequency to assess the potential for cross contamination or loss of volatile contaminant of concern during transit between site and the laboratory.

Due to the random distribution of asbestos in soils, it is not proposed to collect and analyse blind duplicate samples for analysis.

Data Quality Indicators that will be adopted for quality control samples are presented in Table 7.3

Table 8.3: Data Quality Indicators for Quality Control Samples

Type of Quality Control Sample	Control Limit – Chemical Analysis
Duplicate Samples	RPD within 30% and 50%for inorganic and organic analytes respectively. Where the reported soil concentration is less than 10 times LOR, no limit applies.
Rinsate Samples	Analytes not detected above the Limit of Reporting (LOR).
Trip Blank	
Trip Spike	70% to 130%

8.3. Laboratory QA/QC

8.3.1. Laboratory Selection

The primary and secondary laboratories selected for this project will hold NATA-accredited methods for the analyses to be undertaken. Laboratory Quality Control would include the following:

- the laboratory analysis of samples will be undertaken by a laboratory holding NATA accredited analytical methods.

- the NATA accredited environmental testing laboratory will implement a quality control plan conforming to Schedule B3 Guideline for Analysis of Potentially Contaminated Soils of the ASC NEPM (NEPC, 2013);
- where appropriate, the laboratory will include reagent blanks, spike samples, duplicate spikes, matrix spikes, and surrogates spikes and duplicates to assess the laboratory quality control.

8.3.2. Data Assessment

The laboratory quality control data will be checked to confirm the reporting limits and procedures are satisfactory. For samples subject to chemical analysis:

- checking that the samples are analysed within holding times;
- checking that laboratory blanks / reagent blanks are less than the laboratory reporting limits;
- checking the reproducibility of samples by calculating the Relative Percentage Differences (RPDs) between primary and duplicate laboratory samples submitted for chemical analysis; and
- checking that spikes, surrogate spikes, matrix spikes and duplicate matrix spike recoveries are within acceptable control limits.

9. Data Gaps, Uncertainties & Contingency Planning

9.1. Data Gaps & Uncertainties

The site has been subject to a previous phase of investigation to assess historic site uses, and the contamination status of the site. Following the review of the available site history information and investigation data, the following potential data gaps and uncertainties have been identified:

- The presence of potentially unidentified contamination between investigation positions, or in areas where no, or limited investigation data is currently available, or constraints have prevented access for appropriate assessment.
- Limitations associated with the investigation methods employed during previous investigations.

The above data gaps and uncertainties have been used to develop the Unexpected Finds Protocol presented in the following Sections.

9.2. Unexpected Finds Contingency Plan

An unexpected finds protocol must be prepared for the site by a competent environmental consultant prior to the commencement of the site redevelopment works. The following presents a discussion regarding the management of unexpected finds.

9.2.1. Management of Unexpected Finds

In the event that unexpected contamination or aesthetically unacceptable material is encountered on site as assessed by the environmental consultant monitoring the remediation activities, works will stop in the affected part of the site. This area will be isolated to minimise potential for disturbance. The Principal Contractor and their sub-contractors on site will be notified of the unexpected find.

Due to the potential variability in both the nature and extent of an unexpected find, it is not considered reasonable to define specific remedial strategies for contamination associated with the unexpected find. However, it is considered reasonable to follow the preferred method for remediation option assessment, similar to that discussed in Section 6.2.

If wastes are likely to be generated as a result of managing unexpected finds, a methodology for waste classification is presented in Section 12.

9.2.2. Training and Induction of Personnel

Personnel involved in earthworks on site are to be inducted on the identification of potential unexpected finds. The induction can be undertaken at the time of general site induction and refreshed periodically at toolbox meetings.

Induction to provide awareness of all types of possible unexpected finds is not practicable. In general, a precautionary approach will be employed and the unexpected finds procedure outlined in the following section will be implemented.

Additionally, it is noted that some forms of potential contamination may not be associated with any visual or olfactory indications in the field. The unexpected finds procedure will not provide protection against such impacts.

9.2.3. Unexpected Finds Procedure

If unexpected contamination is encountered, or suspected during the remediation or site redevelopment works, the following procedure applies:

1. Stop work in the potentially hazardous area as soon as it is safe to do so and move to the upwind side of the area, or away from the area.
2. Assess the potential immediate risk to human health posed by the unexpected find and assess if evacuation or emergency services need to be contacted.
3. Delineate an exclusion zone around the affected area using fencing and/or appropriate barriers and signage. Additional control measures may be required for odours and/or volatile compounds.
4. Contact the environmental consultant for advice and request a site visit to undertake an assessment of the unexpected find.
5. The environmental consultant will assess the unexpected find and provide advice regarding:
   a) Preliminary assessment of the contamination and need for immediate management controls;
   b) What further assessment and/or remediation works are required and how such works are to be undertaken in accordance with contaminated site regulations and guidelines;
   c) Preparation of an addendum to the remediation action plan (if necessary) or provide clean up advice;
   d) Remediation works required (where applicable);
   e) Validation works required following remediation works (if applicable).
6. Works are not to recommence in the affected area until appropriate advice has been obtained from the environmental consultant.
7. If it is deemed safe to do so by the Principal Contractor or appointed Subcontractor, works may resume in the affected area.

9.2.4. Potential Unexpected Finds

Based on findings of previous investigations and site history, potential unexpected finds which could reasonably be expected within the site are summarised in Table 9.1.

Table 9.1: Summary of Non-specific Unexpected Finds

Potential Unexpected Find	Observed Characteristic	Key Contaminant of Concern
Buried dry waste materials	May include a variety of waste materials including wood, plastic, metal fragments, building rubble (e.g. concrete, brick, asphalt, cement fibre sheeting containing asbestos etc.).	Heavy metals, TPH, PAH, forms of asbestos
Structures or conduits containing deleterious materials	Could be identified as follows: • A septic buried tank associated pipelines. • Deeper sand fill sometimes with stained or odorous characteristics; • Presence of small concrete footings surrounding by odorous or visually impacted soils and/or groundwater.	Nutrients, bacteria, heavy metals
Hydrocarbon Compounds	May be identified by a hydrocarbon odour which may vary in strength from weak (just detectable) to very strong (easily detectable at a distance from the source). The odour may or may not be accompanied by specific areas of dark staining (black-grey) or larger scale discolouration of strata from a previously identified 'natural colour'. (e.g. brown mottled Clay fill, or orange-pale brown-grey Clay residual soil) May also be visible as a distinct coloured sheen on water within an excavation.	TPH, BTEX, PAH, lead, VOC

10. Site Management for Remediation Works

10.1. Access Control

Coffey understands that access to the site will be restricted to authorised contractors who have been inducted and appropriately trained for the works being undertaken. A fence or hoarding will be installed and maintained around the perimeter of the site.

Signage will be erected near the access gate to the site that provides details of the Principal Contractor and their appointed sub-contractor undertaking the remediation and site development works.

The need for traffic controls will be assessed based on the number of truck movements, proximity of excavation to public roads and in consultation with the relevant authorities.

10.2. Fill/Soil Management

Remediation excavation works will take place after the demolition/removal of existing structures and landscaping required as part of the proposed redevelopment works. Staging of the demolition and landscape removal works may be required to minimise the potential for cross contaminating areas that have been previously been validated.

Measures will be in place to reduce opportunities for soil to leave remediation areas as a result of vehicle, plant and equipment movements. To limit the potential for tracking of soil beyond the extent of the remediation area:

- vehicles, plant and equipment on the site will be kept to a practical minimum;
- vehicles, plant and equipment entry to and exit from the remediation areas will be kept to a practical minimum; and
- vehicles, plant and equipment will be washed down before it leaves the remediation area.

Stockpiles generated as part of the remediation works shall be handled to ensure that fill materials excavated from the site are properly tracked and classified appropriately and minimise the potential for different classes of waste to be mixed.

Soils that are stockpiled for assessment will be placed on a reasonably robust barrier to minimise cross-contaminating soils below the stockpile. Stockpiles will not be placed near the site boundary, footpaths, roadways, gutters or storm water pits.

Stockpiles will be positioned and formed to minimise potential for stockpile erosion where possible. The height of stockpiles shall not significantly exceed the height of site boundary hoarding to minimise dust generation from the site.

10.3. Noise Controls

Noise producing machinery and equipment will only be operated during working hours as approved by local Council and/or NSW OEH. Australian Standard *AS2436-1981 Guide to noise control on construction, maintenance and demolition sites* outlines guidelines for the minimisation of noise on construction and demolition sites and these will be followed at all times.

No ‘offensive noise’ as defined under the *Protection of the Environment Operations Act 1997* should

be created during remediation works/activities.

Mechanical plant, equipment and the like used during remediation works/activities will use practical and reasonable noise attenuating devices and measures to minimise noise being transmitted from the site. All equipment and machinery must be properly maintained and operated in an efficient manner to minimise the emission of noise.

10.4. Dust Control

In general, site activities will be managed to minimise the generation of dust and the movement of dust off the site. The following strategies will be implemented to minimise dust generation and dust movement:

- wetting down of dry soils during raking, tilling, excavation and loading;
- covering loads during transportation;
- application of shade cloth or similar to perimeter fencing;
- limiting excavation and loading activities during high winds;
- wetting down stockpiles and/or covering with plastic sheeting/geofabric; and
- maintaining stockpile heights below the heights of perimeter fencing.

10.5. Water Management

Water management is not anticipated to form a significant part of the proposed remediation or construction earthworks. Notwithstanding this, the contractor should implement controls to divert surface water away from stockpiles, cleared areas and open excavations formed as part of the remediation and subsequent site redevelopment works.

10.6. Hours of Operation

The actual hours of operations will be determined by development consent conditions. Typically, works will be allowed during the following hours:

- Monday – Friday 0700hrs – 1800hrs
- Saturday 0800hrs – 1300hrs
- Sunday & Public Holidays No work undertaken

10.7. Communication & Complaints

The communication procedures developed as part proposed redevelopment of the site shall include appropriate provision inform stakeholders on the type and extent of contamination identified within the site. Guidance provided within Schedule B8 of the ASC NEPM (NEPC, 2013) may be used to refine existing procedures to appropriately engage with members of the community, including users of the club and residents adjoining the site.

Communication and complaints received for the site will be reported to the Principal Contractor. All communications and complaints will be assessed and an appropriate response, corrective and/or

preventative action implemented (as necessary).

A communication and complaints register will be operated on site to ensure that concerns of local residences and businesses are recorded and addressed.

10.8. Emergency Preparedness and Response

The Principal Contractor, or their subcontractor appointed to undertake the remediation works shall prepare plans to respond to incidents and emergencies (e.g. fires, spills or other uncontrolled releases) in advance of commencing the works. This should include procedures to inform workers within the site and site visitors users during site inductions.

11. Regulatory, Notification, Licence and Approval Requirements

11.1. Regulatory

The remediation works will be undertaken in accordance with, but not limited to, all relevant sections of:

- Work Health and Safety Act 2011;
- Work Health and Safety Regulations 2011;
- Protection of the Environment Operations Act 1997 and associated Regulations;
- Contaminated Land Management Act 1997;
- State Environmental Planning Policy No 55 Remediation of Land and associated planning guidelines entitled Managing Land Contamination (DUAP/EPA, 1998).

Relevant guidelines made or approved by the NSW EPA under Section 105 of the Contaminated Land Management Act 1997 including:

- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999, and the associated Schedule B guidelines.
- NSW EPA (2014); Waste Classification Guidelines
- NSW DEC (2006); Guidelines for the NSW Site Auditor Scheme (2nd edition)
- NSW OEH (2011); Guidelines for Consultants Reporting on Contaminated Sites
- NSW EPA (2015); Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997

This RAP has been prepared having regard to the above regulations and guidance documentation.

11.2. Planning Consent

Coffey understands that site redevelopment works and the associated remediation works will be implemented in accordance with the development consent for the scheme. Details of the consent were not available for consideration as this documented was being prepared.

11.3. Licences, Approvals and Permits

All parties involved in the remedial works will ensure that they hold all relevant licences, approvals and permits for demolition activities, excavation activities and transport of wastes. This may include, but not be limited to:

- NSW Department of Fair Trading Contractor Licence
- NSW Demolition Licence and Notification of Demolition issued by Safe Work NSW (formerly WorkCover NSW)

It is also envisaged that approval and permits will be required from USYD to co-ordinate the proposed demolition, remediation and construction activities so as to minimise impacts on the residents within the adjoining properties, or members of the surrounding community.

12. Waste Classification

12.1. Waste Classification Criteria

The waste material generated as part of the remediation and site redevelopment works will be assessed in accordance with Waste Classification Guidelines (NSW EPA, 2014).

12.2. Waste Classification Procedure

The preference for soil sampling for waste classification purposes will be via sampling of a stockpile. The material will be assessed by a suitably qualified environmental consultant prior to removal and disposal offsite. This assessment will include:

- inspection of the stockpiled material, or review of a relevant photographic record; and
- collection and laboratory analysis of spatially representative samples of the soil material.

It is recommended that samples are collected at a rate of 1 sample per 25m^3 as per the guidance provided in Schedule B2 of the ASC NEPM (NEPC 2013). It is noted that this sampling frequency is for general waste classification of smaller stockpiles (i.e. <250m^3). The sampling frequency and analytical schedule may need to be adjusted on a 'case by case' basis by the environmental consultant, depending on factors such as:

- the volume of the material;
- the homogeneity of the material;
- investigation and laboratory analytical records relating to the material; and
- the visual assessment of the material.

Samples collected of waste soil will be analysed for a broad range of COPC consistent with the site history and informed by data presented within the Detailed Site Investigation report (Coffey, Apr 2015).

Samples will be collected using hand tools and/or mechanical excavation where a significant volume of soil is present within the stockpile being assessed.

Where sampling of stockpiled soil material is not practical or feasible, sampling of in-situ material would be used. The sampling plan would be designed in consideration of the recommendations made within the Sampling Design Guidelines (NSW EPA, 1995) so to gather sufficient evidence and collect samples for chemical characterisation that is representative of the waste materials being classified. Where in-situ classification is used, excavation of the material will be observed to confirm that the materials are reasonably consistent with those assessed for the in-situ waste classification.

12.3. Waste Classification Reporting

The environmental consultant will prepare a letter, advising the classification of the waste. These reports will be provided within the Validation Report.

12.4. Waste Tracking

The source location, volume, classification and destination of waste material removed from site will be tracked by the appointed contractor. The contractor shall maintain a materials tracking register along with consignment dockets confirming receipt of the material at the disposal facility. These records shall be presented within the Validation report.

13. Validation Reporting

13.1. Validation Report

The validation report aims to provide an independent verification that remedial goals associated with site works have been met and the site is suitable for its ongoing or future uses. The validation report should be prepared by a suitably qualified and experienced environmental consultant.

At the completion of remediation and validation works, a validation report will be prepared in general accordance with the relevant sections of NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (NSW OEH, 2011) and other relevant guidance documentation.

The validation report will include:

- Executive Summary
- Scope of Work
- Site Identification
- Summary of Site History
- Summary of Site Condition and Surrounding Environment
- Summary of Geology and Hydrogeology
- Remediation Activities Undertaken (including extent and observations of excavation/s, waste documentation and imported fill documentation)
- Validation Sampling and Analysis Plan (including Methodology)
- Field QA / QC
- Laboratory QA / QC, where applicable
- QA / QC Data Evaluation
- Basis for Validation Criteria
- Validation Sampling Results (including sample descriptions)
- Site Characterisation
- Ongoing Site Management Requirements, if any
- Conclusions and Recommendations

14. Summary and Conclusions

The site is located within the suburb of Darlington within USYD's main campus in Sydney. The site comprises a row of terraced dwellings along Darlington Road, and a small area of public open space along the eastern extent of the site. It is understood that these dwellings currently provide accommodation for students attending USYD.

USYD intend to lodge a Development Application to integrate affordable student accommodation and other educational establishments. It is understood this will include refurbishment of existing terraced houses, construction of four, three storey buildings within the rear gardens of the existing terraces, and minor road modifications and landscaping. Section 1.2 and drawings provided in Appendix A provide further detail of the proposed development.

The site has been subject to a previous phase of investigation to assess the historical uses of the site and surrounding land, and the contamination status of the site. These investigations identified shallow fill material which had been impacted with lead and PAH, that has likely arisen from lead-based paint residues and deposition of ash historically. Similarly, shallow fill materials were assessed to be unsuitable as a planting medium for landscaping that will be introduced as part of the proposed development. The Detailed Site Investigation (Coffey, Apr 2015) concluded that the lead and PAH identified in shallow fill on site requires remediation to make the site suitable for the proposed development in accordance with SEPP55.

Coffey considers that insufficient investigation has been carried out within the eastern extent of the site (Area 4). The RAP presents a scope of supplementary investigation to collect sufficient data to assess whether this part of the site is suitable for the continued use as residential land and public open space.

This RAP outlines a strategy to mitigate health and ecological risks associated with impacted fill materials and thereby mitigate potentially unacceptable risks. This RAP also presents a strategy to manage unexpected finds of contamination that may be encountered during construction. If the remediation is carried out in accordance with this RAP using the preferred remedial option, then Coffey concludes the site should be made suitable for the proposed development.

The reader should refer to the 'Important Information about Your Coffey Environmental Report'.

References

- Australian Standard AS 4482 (2005): *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soils* (Parts 1 and 2).
- Australian Standard AS 4964 (2004); *Method for the qualitative identification of asbestos in bulk samples*
- Australian Standard *AS2436-1981 Guide to noise control on construction, maintenance and demolition sites*
- Coffey (Mar 2015); *Geotechnical Investigation, Student Accommodation Development, 000-02 Darlington Road Terraces, The University of Sydney, Darlington* (GEOTLCOV25176AA-AF; final)
- Coffey (Apr 2015); *Stage 2 Detailed Site Contamination Investigation, Student Accommodation Development, 000-02 Darlington Road Terraces, The University of Sydney, Darlington* (GEOTLCOV25176AA-AD; final)
- Dept. Land & Water Conservation (1997); Acid Sulfate Soil Risk Map - Botany Bay (Scale: 1:25,000 Ref: 9130S3, Ed. 2)
- Friebel and Nadebaum (2011); CRC CARE Technical Report No. 10 – Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater
- Geological Survey of New South Wales (1983); *Geological Series Sheet 9130 - Sydney* (1st Edition; Scale 1:100 000)
- NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Amendment Measure* (No. 1) 1999, as registered 2013, and associated Schedule B guidelines.
- NSW DEC (2006); *Guidelines for the NSW Site Auditor Scheme* (2nd edition)
- NSW EPA (1995); *Sample Design Guidelines*
- NSW EPA (2014) *Waste Classification Guidelines*
- NSW EPA (2015); *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*
- NSW OEH (2012); *Excavated Natural Material Exemption*
- NSW OEH (2011); *Guidelines for Consultants Reporting on Contaminated Sites*
- SKM (Sept 2010); *Phase 1 Environmental Assessment for the 3.6Ha Abercrombie Precinct* (Ref: EN02867, Final).
- *State Environmental Planning Policy No 55 - Remediation of Land* and its associated planning guidelines *Managing Land Contamination* (DUAP/EPA, 1998)

Important information about your **Coffey** Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but

steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Figures

drawn	ML / AW	coffey A TETRA TECH COMPANY	client:	UNIVERSITY OF SYDNEY	
approved	ML		project:	DARLINGTON TERRACE STUDENT ACCOMMODATION DEVELOPMENT DARLINGTON ROAD, DARLINGTON, NSW	
date	31 / 05 / 16		title:	SITE LOCATION PLAN	
scale	AS SHOWN		project no: GEOTLCOV25176AB-AB	figure no: FIGURE 1	rev: B
original size	A4				

PLOT DATE: 31/05/2016 3:29:49 PM DWG FILE: F:\GEOTECHNICS\1.PROJECTS\GEOTLCOV2511\GEOTLCOV25176AB RAP DARLINGTON TERRACES\14. CAD\GEOTLCOV25176AB-AB.DWG

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE	ML	ML	23/02/15
B	MINOR MODIFICATIONS	ML	ML	26/05/16

10 0 10 30 50

Scale (metres) 1:1000

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2
AERIAL IMAGE ©: 2016 AEROMETREX

drawn	ML / AW
approved	ML
date	31 / 05 / 16
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: UNIVERSITY OF SYDNEY

project: DARLINGTON TERRACE
STUDENT ACCOMMODATION DEVELOPMENT
DARLINGTON ROAD, DARLINGTON, NSW

title: INVESTIGATION LOCATION PLAN

project no: GEOTLCOV25176AB-AB | figure no: FIGURE 2 | rev: B

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revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE	ML	ML	23/02/15
B	MINOR MODIFICATIONS	ML	ML	26/05/16

10 0 10 30 50

Scale (metres) 1:1000

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2
AERIAL IMAGE ©: 2016 AEROMETREX

drawn	ML / AW
approved	ML
date	31 / 05 / 16
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: UNIVERSITY OF SYDNEY

project: DARLINGTON TERRACE
STUDENT ACCOMMODATION DEVELOPMENT
DARLINGTON ROAD, DARLINGTON, NSW

title: EXTENT OF SOIL REMEDIATION

project no: GEOTLCOV25176AB-AB | figure no: FIGURE 3 | rev: B

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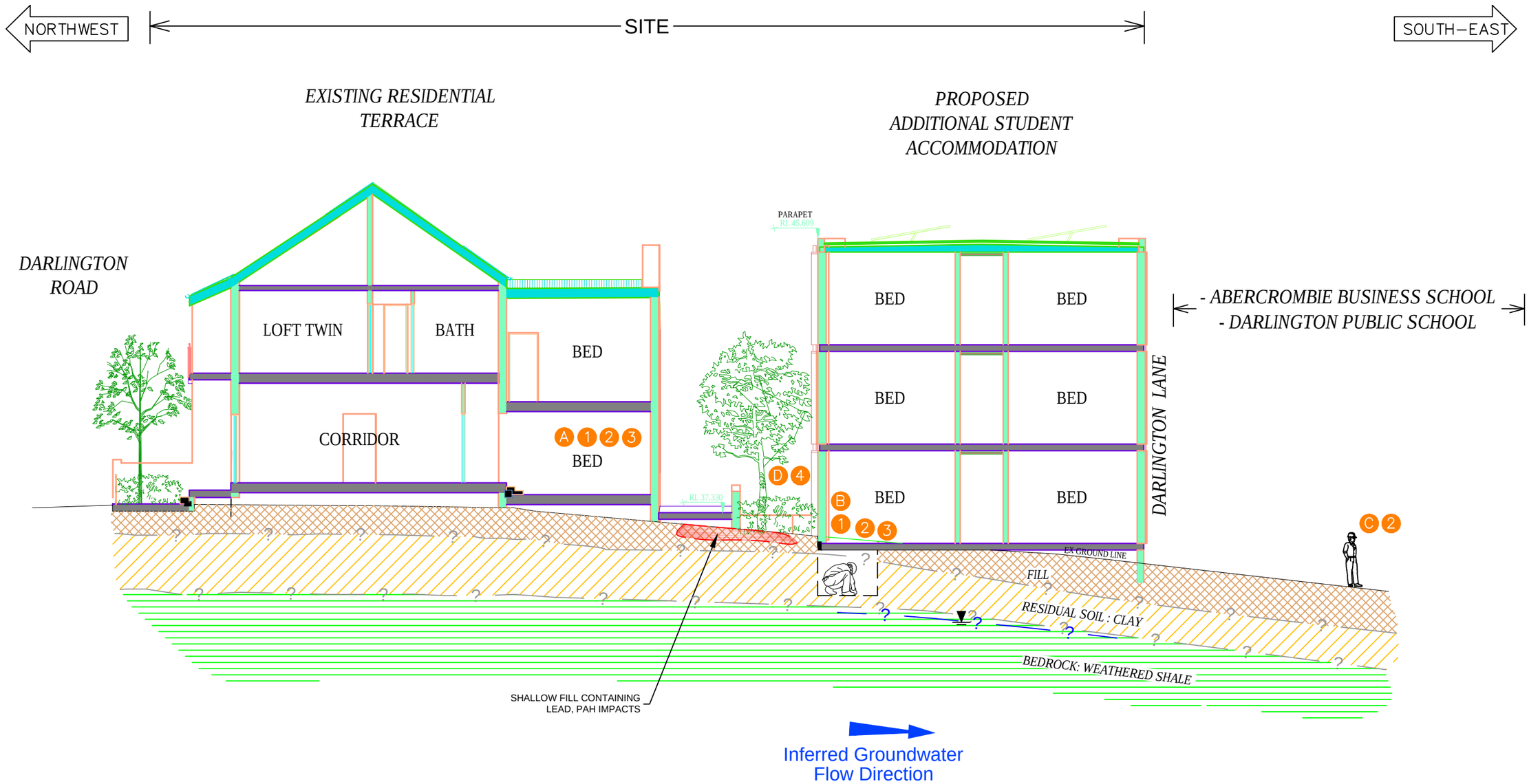

LEGEND

- EXISTING GROUND PROFILE ALONG SECTION LINE (APPROX.)
- INTERPRETED GEOTECHNICAL UNIT BOUNDARY
- INTERPRETED GROUNDWATER TABLE

RECEPTORS

- A STUDENTS - ADULT (CURRENT/FUTURE)
- B GROUNDWORKERS
- C NEIGHBOURING SITE USER
- D LANDSCAPING

EXPOSURE PATHWAYS

- 1 DERMAL EXPOSURE
- 2 INHALATION OF DUST / SOIL PARTICLES
- 3 INGESTION OF DUST / SOIL PARTICLES
- 4 PLANT UPTAKE

DRAFT

revision

no.	description	drawn	approved	date
A	ORIGINAL ISSUE	ML	ML	23/02/15
B	MINOR MODIFICATIONS	ML	ML	26/05/16
C	MINOR MODIFICATIONS	AW	ML	16/06/16
D	MINOR MODIFICATIONS	AW	ML	20/06/16

drawn	ML / AW
approved	ML
date	20 / 06 / 16
scale	NTS
original size	A3

coffey
A TETRA TECH COMPANY

client: UNIVERSITY OF SYDNEY

project: DARLINGTON TERRACE
STUDENT ACCOMMODATION DEVELOPMENT
DARLINGTON ROAD, DARLINGTON, NSW

title: CONCEPTUAL SITE MODEL

project no: GEOTLCOV25176AB-AB | figure no: FIGURE 4 | rev: D

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Appendix A - Proposed Development Information

DRAWING LIST

DA0001	COVER SHEET
DA1000	SITE ANALYSIS PLAN / SITE PLAN
DA1103	DEMOLITION PLAN - TERRACE NO.131-118 - L1
DA1104	DEMOLITION PLAN - TERRACE NO.131-118 - L2
DA1105	DEMOLITION PLAN - TERRACE NO.119-102 - L1
DA1106	DEMOLITION PLAN - TERRACE NO.119-102 - L2
DA1107	DEMOLITION PLAN - TERRACE NO.104-86 - L1
DA1108	DEMOLITION PLAN - TERRACE NO.104-86 - L2
DA2102	PLAN - BUILDING A - L1
DA2103	PLAN - BUILDING A - L2 & TERRACE NO.131-120 - L1 & BICYCLE RACKS BLD. NO. 132
DA2104	PLAN - BUILDING A - L3 & TERRACE NO.131-120 - L2
DA2105	PLAN - BUILDING A - L4 PLAN & TERRACE NO.131-120 ROOF
DA2106	PLAN - BUILDING A - ROOF PLAN
DA2111	PLAN - BUILDING B - L1 PLAN
DA2112	PLAN - BUILDING B - L2 & TERRACE NO.119-102 - L1
DA2113	PLAN - BUILDING B - L3 & TERRACE NO.119-102 - L2
DA2114	PLAN - BUILDING B - L4 PLAN & TERRACE NO. 119-102 ROOF
DA2115	PLAN - BUILDING B - ROOF PLAN
DA2121	PLAN - BUILDING C & D - L1 & TERRACE NO.101-86 - L1
DA2122	PLAN - BUILDING C & D - L2 & TERRACE NO.101-86 - L2
DA2123	PLAN - BUILDING C & D - L3 PLAN & TERRACE NO. 101-86 ROOF
DA2124	PLAN - BUILDING C & D - ROOF PLAN
DA3100	ELEVATIONS
DA3200	SECTION A,B,C & D
DA3201	SECTION E & F
DA3901	SHADOW DIAGRAMS - 21 JUNE 9AM - PROPOSED
DA3902	SHADOW DIAGRAMS - 21 JUNE 12PM - PROPOSED
DA3903	SHADOW DIAGRAMS - 21 JUNE 3PM - PROPOSED
DA4100	PHOTOMONTAGE 1
DA4101	PHOTOMONTAGE 2
DA4102	PHOTOMONTAGE 3
DA4103	PHOTOMONTAGE 4
DA5100	MATERIAL BOARD

MATERIALS KEY

- EXISTING FABRIC TO BE RETAINED
- EXISTING FABRIC TO BE DEMOLISHED
- PROPOSED - CONCRETE
- PROPOSED - GLAZING
- PROPOSED - LIGHTWEIGHT WALL
- PROPOSED - MASONRY
- PROPOSED - STEEL / METAL CLADDING
- PROPOSED PLANTING ZONE

A/C	AIR CONDITIONING
AL	ALUMINIUM
AO	ACCESS OPENING
AP	ACCESS PANEL
AT	ACOUSTIC TILE
B	BOLLARD
BAL	BALUSTRADE
BDY	BOUNDARY
BH	BOREHOLE
BHD	BULKHEAD
BK	BRICK
BLDG	BUILDING
BLK	BLOCKWORK
BN	BULLNOSE
BOE	BRICK-ON-EDGE
BSN	BASIN
BTH	BATH
BWK	BRICKWORK
BWU	BOILING WATER UNIT
C	COMMUNICATIONS (ICT) CUPBOARD
CB	CONCRETE BLOCK
CCTV	CLOSED CIRCUIT TELEVISION
CD	CLOTHES DRYER
CFC	COMPRESSED FIBROUS CEMENT
CHS	CIRCULAR HOLLOW SECTION
CI	CAST IRON
CIP	CAST IRON PIPE
CJ	CONTROL JOINT
CK	COOK TOP
CL	CLEANERS CUPBOARD
CLNR	CLEANER
COL	COLUMN
COMMS	COMMUNICATIONS CUPBOARD
CONC	CONCRETE
CP	CONCRETE PAVING
CPD	CUPBOARD
CPT	CARPET
CR	CEMENT RENDER
CSK	COUNTERSINK
CT	CERAMIC TILES
CTR	CENTRE
CU	CONDENSER UNITS
CW	COLD WATER
D	DOOR
DF	DRINKING FOUNTAIN
DG	DRIP GROOVE
DIA	DIAMETER
DIM	DIMENSION
DP	DOWNPIPE
DPC	DAMP-PROOF COURSE
DPM	DAMP-PROOF MEMBRANE
DRG	DRAWING
DS	DUCTED SKIRTING
DW	DISHWASHER
EA	EACH
EDB	ELECTRICAL DISTRIBUTION BOARD
EJ	EXPANSION JOINT
EQ	EQUAL
ESB	ELECTRICAL SWITCHBOARD
EWIS	EMERGENCY WARNING AND INTERCOMUNICATION SYSTEM
EX	EXISTING (PRIOR TO)
EXT	EXTERNAL
F	FIXED GLAZING
FB	FACE BRICK
FBL	FACE BLOCK
FC	FIBROUS CEMENT
FCL	FINISHED CEILING LEVEL
FCU	FAN COIL UNIT
FEN	FENCE
FFL	FINISHED FLOOR LEVEL
FGL	FINISHED GROUND LEVEL
FHR	FIRE HOSE REEL
FIP	FIRE INDICATOR PANEL
FLR	FLOOR
FP	FIBROUS PLASTER
FR	FIRE RISER
FRL	FIRE RESISTANCE LEVEL
FSL	FINISHED STRUCTURAL LEVEL
FW	FLOOR WASTE TO SEWER
GALV	GALVANISED
GD	GRATED DRAIN
GL	GLAZING
GND	GROUND
GPO	GENERAL PURPOSE (POWER) OUTLET
GR	GRAB RAIL
GRANO	GRANOLITHIC
GRC	GLASS REINFORCED CONCRETE/CEMENT
GT	GATE
GTP	GREASE TRAP
HYD	HYDRANT
HC	HOSE COCK
HMR	HIGH MOISTURE RESISTANT
HR	HANDRAIL
HTR	HEATER
HW	HOT WATER
HWD	HARDWOOD
HWP	HOT WATER PLANT
HWU	HOT WATER UNIT
ID	INSIDE DIAMETER
IL	INVERT LEVEL
INCL	INCLUDE
INT	INTERNAL
IO	INSPECTION OPENING
J	JOINERY
JT	JOINT
KB	KERB
KG	KERB AND GUTTER
KIT	KITCHEN
L	LOUVRE
LDY	LAUNDRY
LINO	LINOLEUM / VINYL FLOORING
LS	LOUVRE SCREEN
M	MIRROR
MC	METAL CLADDING
MCP	MANUAL CALL POINT
MDF	MEDIUM DENSITY FIBREBOARD
ME	MECHANICAL EXHAUST
MER	MECHANICAL RISER
MH	MANHOLE
MISC	MISCELLANEOUS
MJ	MOVEMENT JOINT
MLM	MELAMINE
MO	MICROWAVE OVEN
MR	METAL ROOF
MRS	METAL ROOF SHEETING
MS	MILD STEEL
MSB	MAIN SWITCHBOARD
MV	MECHANICAL VENT
MW	METALWORK
NGL	NATURAL GROUND LEVEL
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
ODT	ON-SITE DETENTION TANK
OF	OVERFLOW-RAINWATER
OFC	OFF-FORM CONCRETE
OFG	OBSCURE FIXED GLASS
OHD	OVERHEAD DOOR
OP	OPAQUE
OV	OVEN
P	PAINT (FINISH)
PAV	PAVING
PB	PLASTERBOARD
PC	PRECAST CONCRETE
PEB	PEBBLE BALLAST
PFC	PARALLEL FLANGE CHANNEL
PLY	PLYWOOD
PTD	PAPER TOWEL DISPENSER
RA ROOM	RESIDENTIAL ASSISTANT'S ROOM
REF	REFRIGERATOR
RA	RETURN AIR
RAD	RADIUS
RC	REINFORCED CONCRETE
RGH	RANGE HOOD
RH	ROBE HOOK
RHS	RECTANGULAR HOLLOW SECTION
RJ	RENDER JOINT (V-JOINT)
RL	RELATIVE LEVEL
ROW	RIGHT OF WAY
RS	ROLLER SHUTTER
RW	RETAINING WALL
RWH	RAINWATER HEAD
RWO	RAINWATER OUTLET TO STORMWATER
RWP	RAINWATER PIPE
RWT	RAINWATER TANK
S	SECURITY CUPBOARD
SA	SUPPLY AIR
SC	STEEL COLUMN
SCR	SUNSCREEN
SCT	SUSPENDED CEILING TILE
SD	SEWER DRAIN
SFL	STRUCTURAL FLOOR LEVEL
SHB	SHOWER BATH
SHR	SHOWER
SHS	SQUARE HOLLOW SECTION
SK	SKIRTING
SKL	SKYLIGHT
SNK	SINK
SP	SOLAR PANEL
SPEC	SPECIFICATION
SPL	SPLASHBACK
SR	SHOWER ROSE
SRZ	STRUCTURAL ROOT ZONE
SS	STAINLESS STEEL
ST	STONE
SVP	SEWER VENT PIPE
SW	STORM WATER
SWD	SOFTWOOD
SWP	STORMWATER PIT
T	TILE
T&G	TONGUE AND GROOVE
TEL	TELEPHONE
TGSI	TACTILE INDICATORS
TIMB	TIMBER
TOK	TOP OF KERB
TOW	TOP OF WALL
TP	TAP
TPH	TOILET PAPER HOLDER
TPZ	TREE PROTECTION ZONE
TR	TOWEL RAIL
TRZO	TERRAZZO
TUB	LAUNDRY TUB
TV	TELEVISION
TYP	TYPICAL
U/G	UNDERGROUND
U/S	UNDERSIDE
UB	UNIVERSAL BEAM
UC	UNIVERSAL COLUMN
UR	URINAL
V	VINYL
VB	VANITY BASIN
VOS	VERIFY ON SITE
VP	VENT PIPE
W	WINDOW
WB	WEATHERBOARD
WC	WATER CLOSET
WIP	WARDEN INTERCOM POINT
WIR	WALK-IN-ROBE
WM	WASHING MACHINE
WO	WALL OVEN
WP	WASTE PIPE
WPM	WATERPROOF MEMBRANE
WR	WARDROBE
WS	WALL STIFFENER

FOR DEVELOPMENT APPLICATION

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON NSW 2008

Key

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

THE UNIVERSITY OF SYDNEY

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ABN 53 003 782 250

Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS
Darlington Road DARLINGTON
NSW 2008
Proj. No. 14051

Drawing Title

COVER SHEET

Drawing Status

NOT FOR CONSTRUCTION

Scale

Drawing No. DA0001

Issue B

PLOT DATE & TIME: 10/06/2016 6:03:26 PM
PLOTTED & CHECKED BY: Author
REF: C:\Users\Aungz\Documents\14051_Master_aungz.rvt

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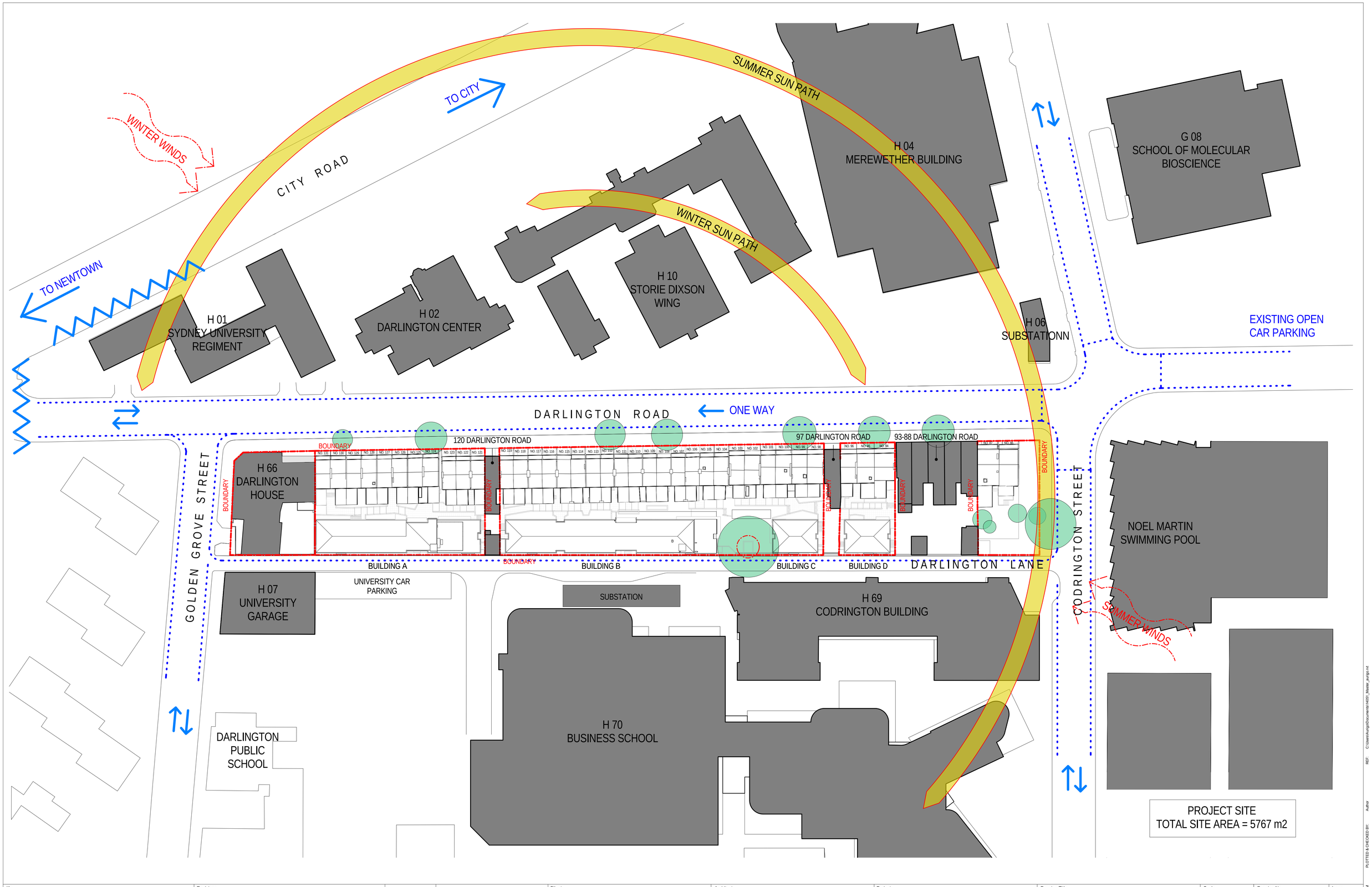

Key

PEDESTRIAN NETWORK

TRAFFIC NOISE

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

SITE ANALYSIS PLAN / SITE PLAN

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 500 @A1

Drawing No.: DA1000

Issue: B

PLOTTED & CHECKED BY: Author

REF: C:\Users\Author\Documents\14051_Master_author.rvt

PLOT DATE & TIME: 15/06/2016 6:03:34 PM

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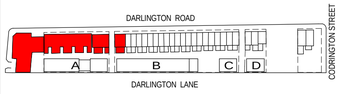
ALLOW TO MAKE GOOD AND WATERPROOF EXISTING WALL NOW EXPOSED.

Key



Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

DEMOLITION PLAN - TERRACE NO.131-118 - L1

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA1103

Issue: B

REF: C:\Users\Aurgo\Documents\14051_Master_Aurgo.rvt

PLOTTED & CHECKED BY: Author

PLOT DATE & TIME: 15/06/2016 6:03:37 PM

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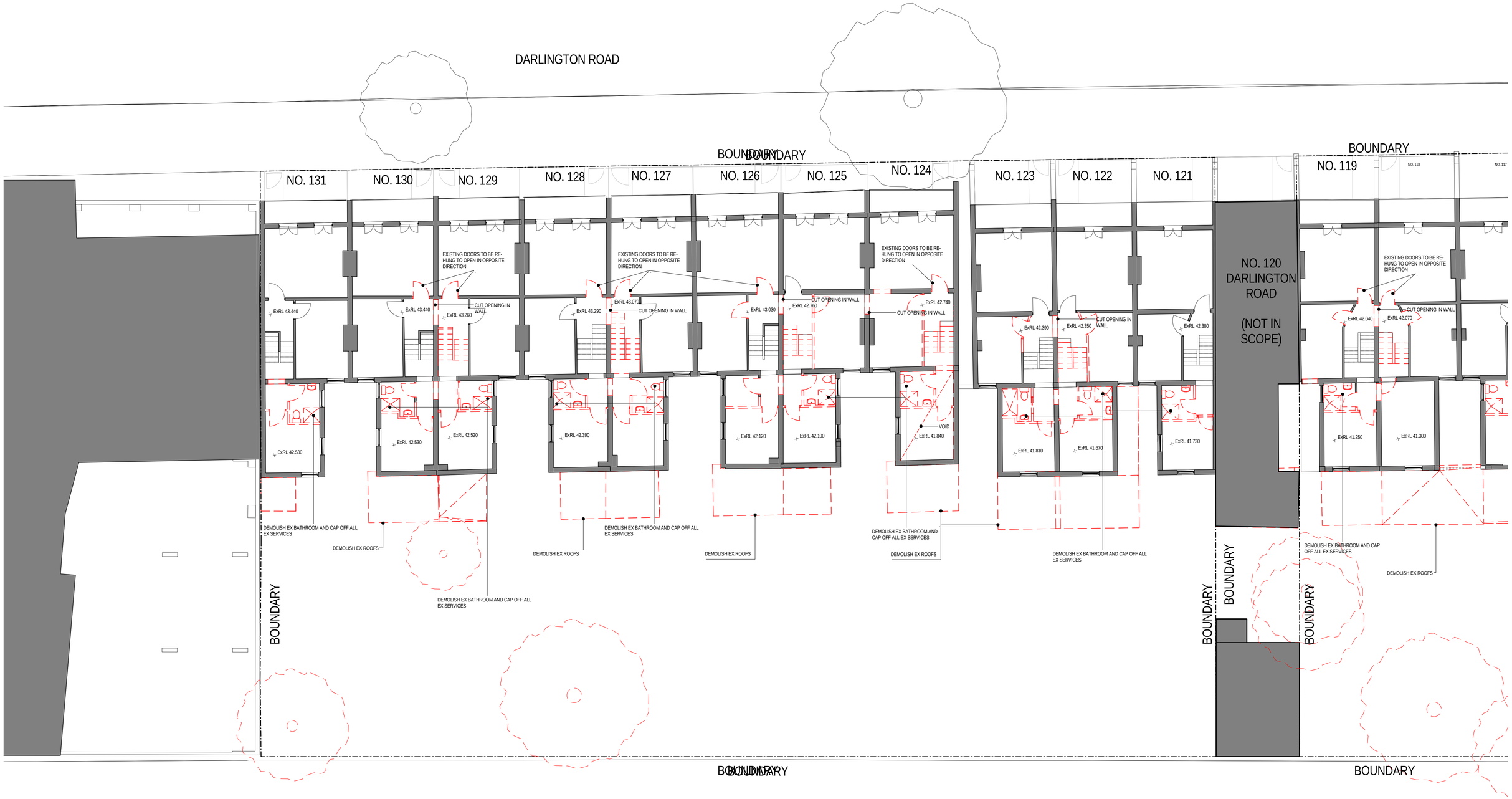

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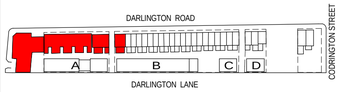

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client: THE UNIVERSITY OF SYDNEY

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Project: DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS
Darlington Road DARLINGTON NSW 2008
Proj. No. 14051

Drawing Title: DEMOLITION PLAN - TERRACE NO.131-118 - L2

Drawing Status: NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA1104

Issue: B

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PLOT DATE & TIME: 15/06/2016 6:03:40 PM
PLOTTED & CHECKED BY: Author
REF: C:\Users\Aungo\Documents\14051_Master_aungo.rvt

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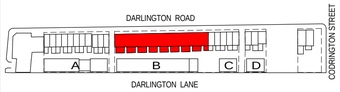
ALLOW TO MAKE GOOD AND WATERPROOF EXISTING WALL NOW EXPOSED.

Key



Revisions

No.	Date	Description	Ver	App'd
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B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

DEMOLITION PLAN - TERRACE
NO.119-102 - L1

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA1105

Issue: B

REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

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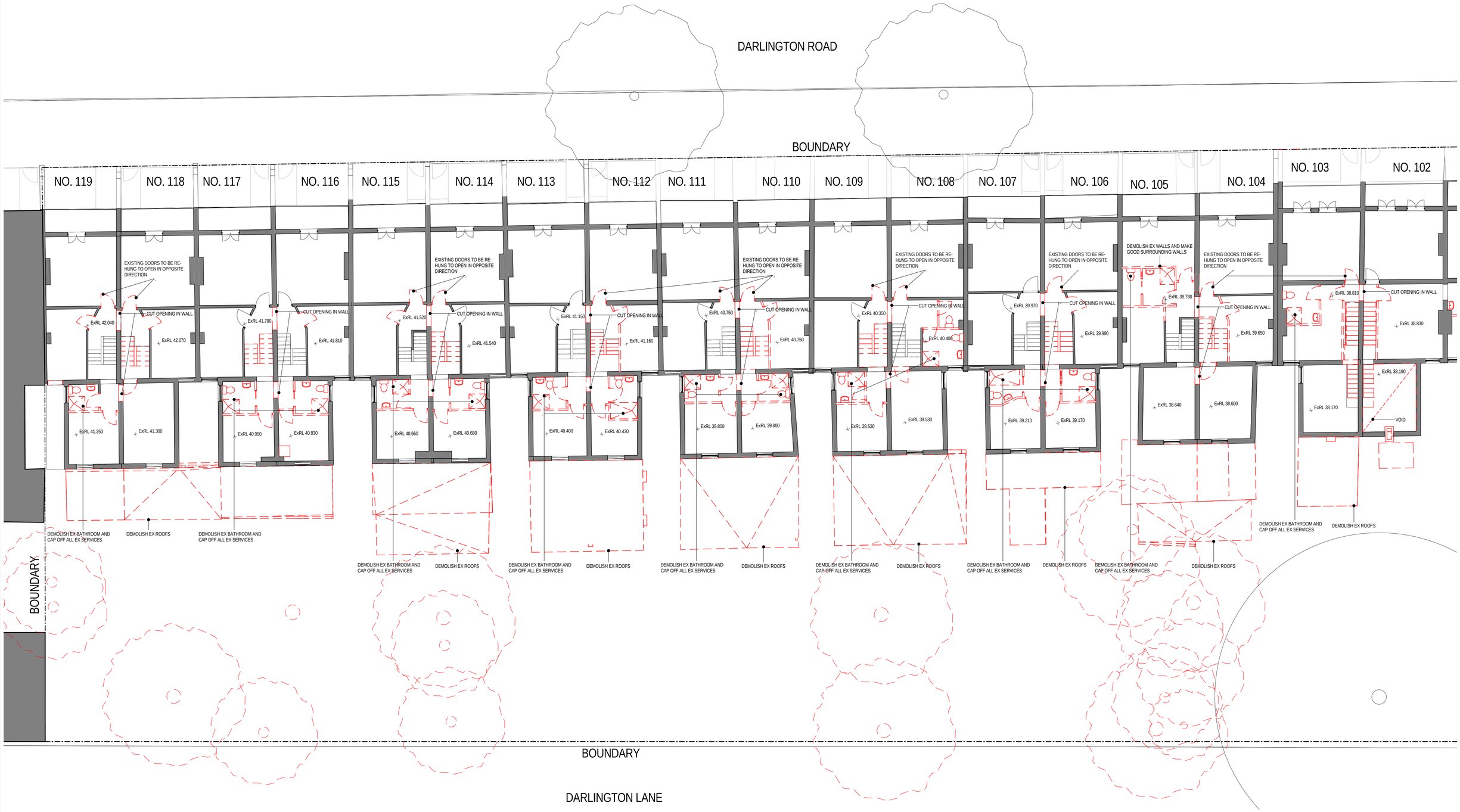

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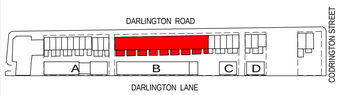

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

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DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

DEMOLITION PLAN - TERRACE NO.119-102 - L2

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA1106

Issue: B

REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

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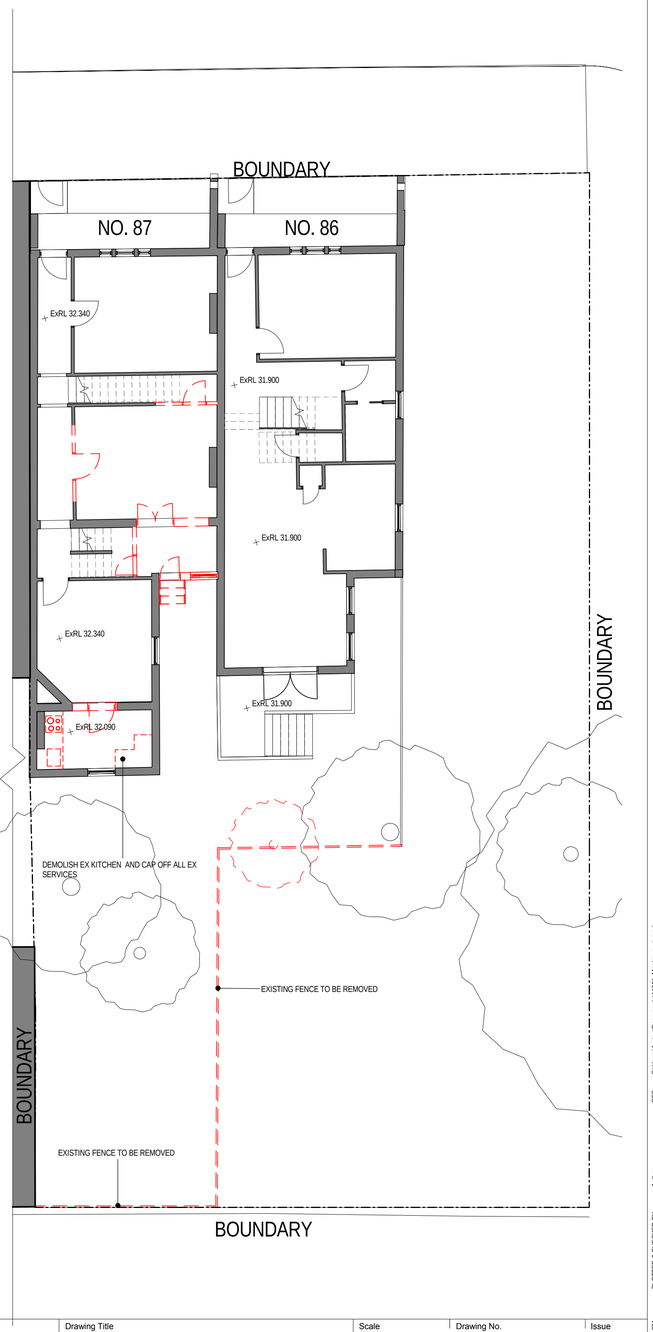

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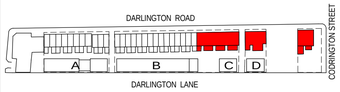

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

DEMOLITION PLAN - TERRACE NO.104-86 - L1

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA1107

Issue: B

PLOT DATE & TIME: 15/06/2016 6:03:49 PM
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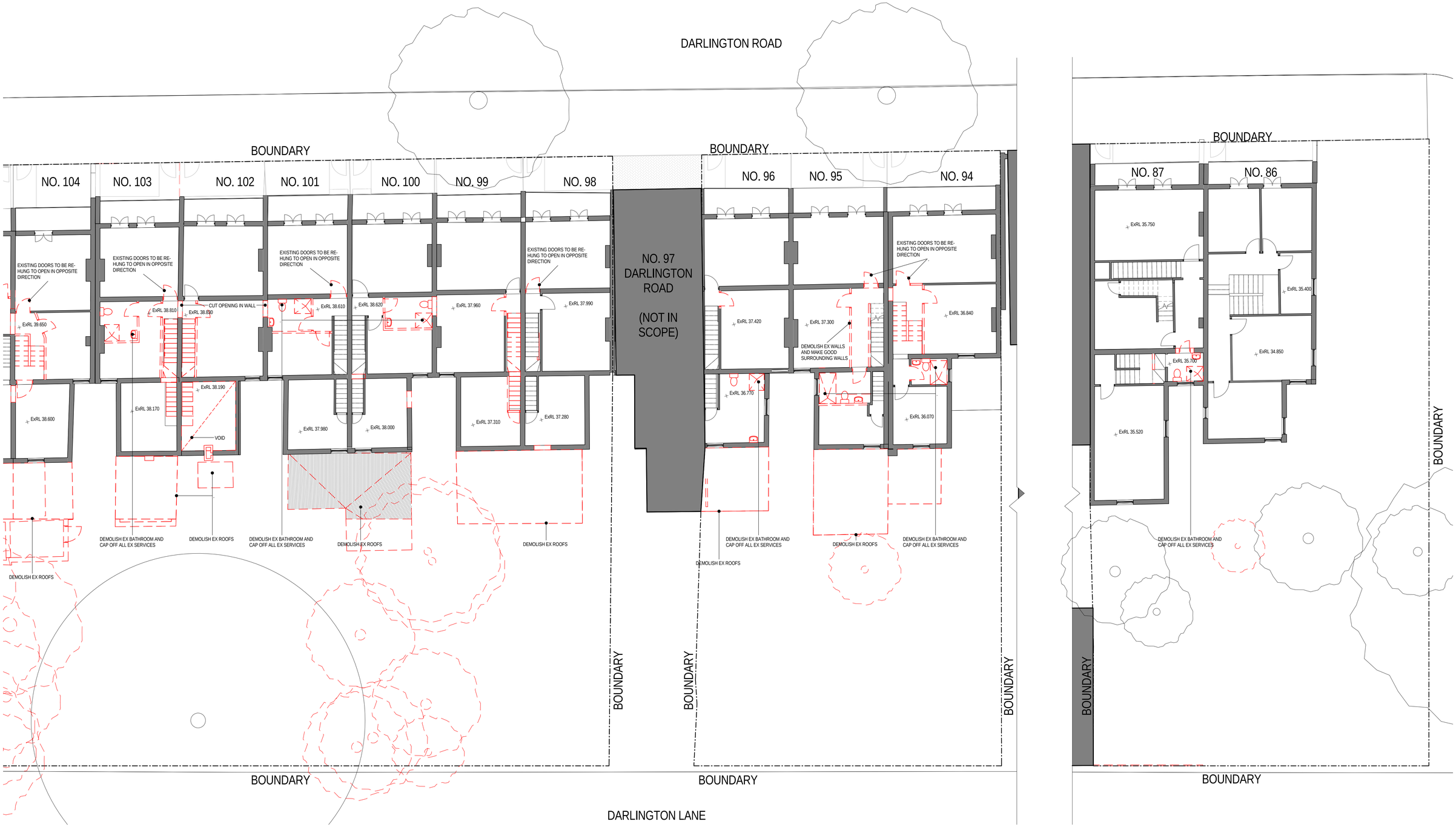

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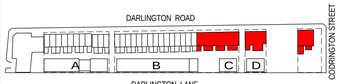

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

DEMOLITION PLAN - TERRACE NO.104-86 - L2

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA1108

Issue: B

PLOT DATE & TIME: 15/06/2016 03:52 PM PLOTTED & CHECKED BY: Author REF: C:\Users\Aurigo\Documents\14051_Master_Aurigo.rvt

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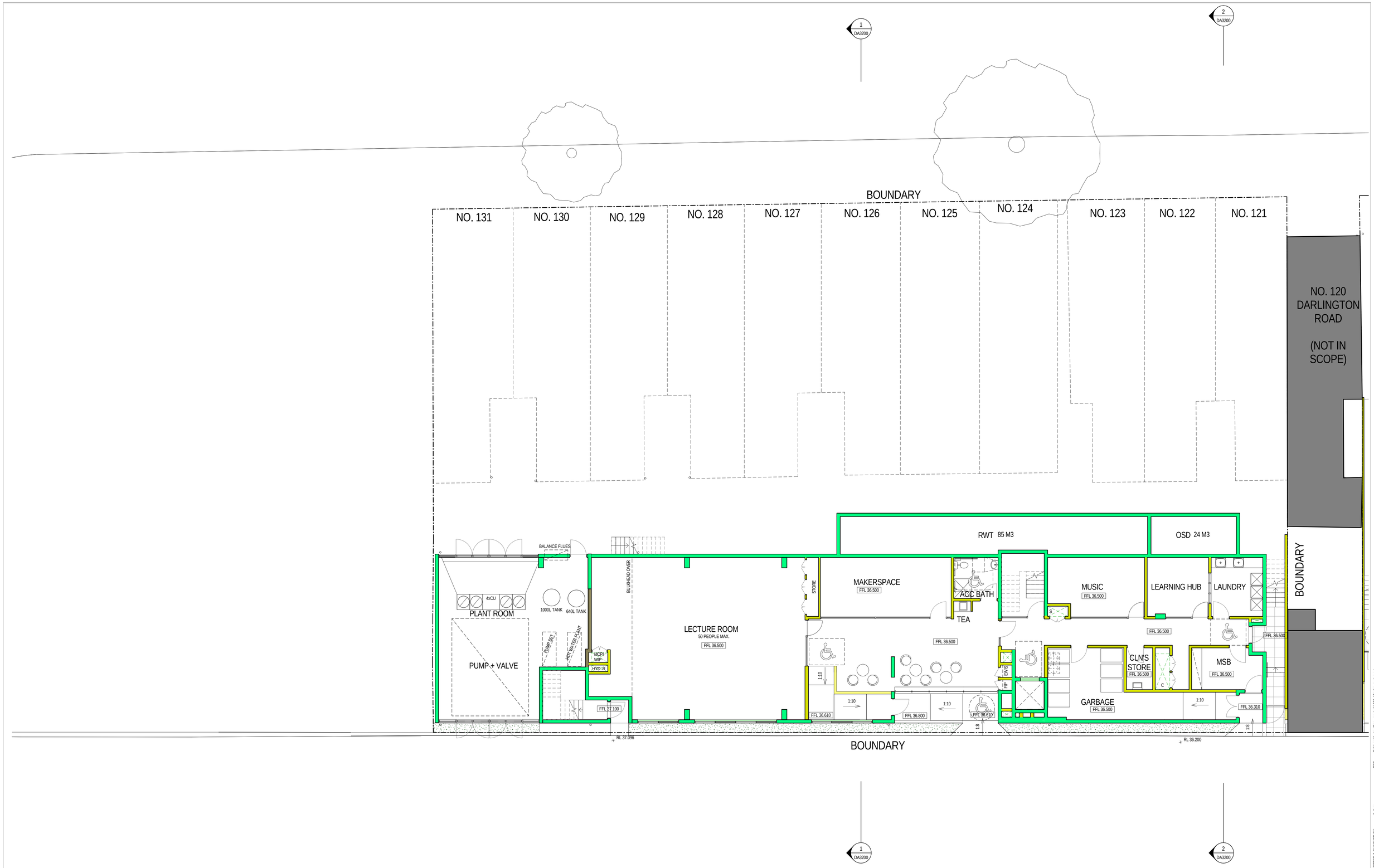

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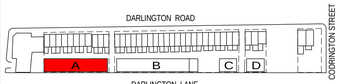

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING A - L1

Drawing Status

NOT FOR CONSTRUCTION

Scale

1 : 100 @A1

Drawing No.

DA2102

Issue

B

PLOTTED & CHECKED BY: Author

PLOT DATE & TIME: 15/06/2016 6:03:54 PM

REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

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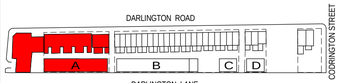
Key



Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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ABN 53 003 782 250

Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING A - L2 & TERRACE NO.131-120 - L1 & BICYCLE RACKS BLD. NO. 132

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2103

Issue: B

PLOT DATE & TIME: 15/06/2016 6:04:01 PM PLOTTED & CHECKED BY: Author REF: C:\Users\AuraguDocuments\14051_Master_Jarrge.rvt

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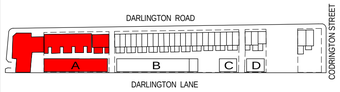
Key



Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING A - L3 & TERRACE NO.131-120 - L2

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2104

Issue: B

REF: C:\Users\kungo\Documents\14051_Master_kungo.rvt

PLOTTED & CHECKED BY: Author

PLOT DATE & TIME: 15/06/2016 6:04:06 PM

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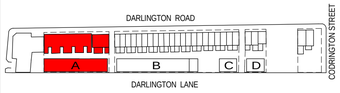
Key



Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING A - L4 PLAN & TERRACE NO.131-120 ROOF

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2105

Issue: B

PLOT DATE & TIME: 15/06/2016 6:04:09 PM
PLOTTED & CHECKED BY: Author
REF: C:\Users\Aungo\Documents\14051_Master_aungo.rvt

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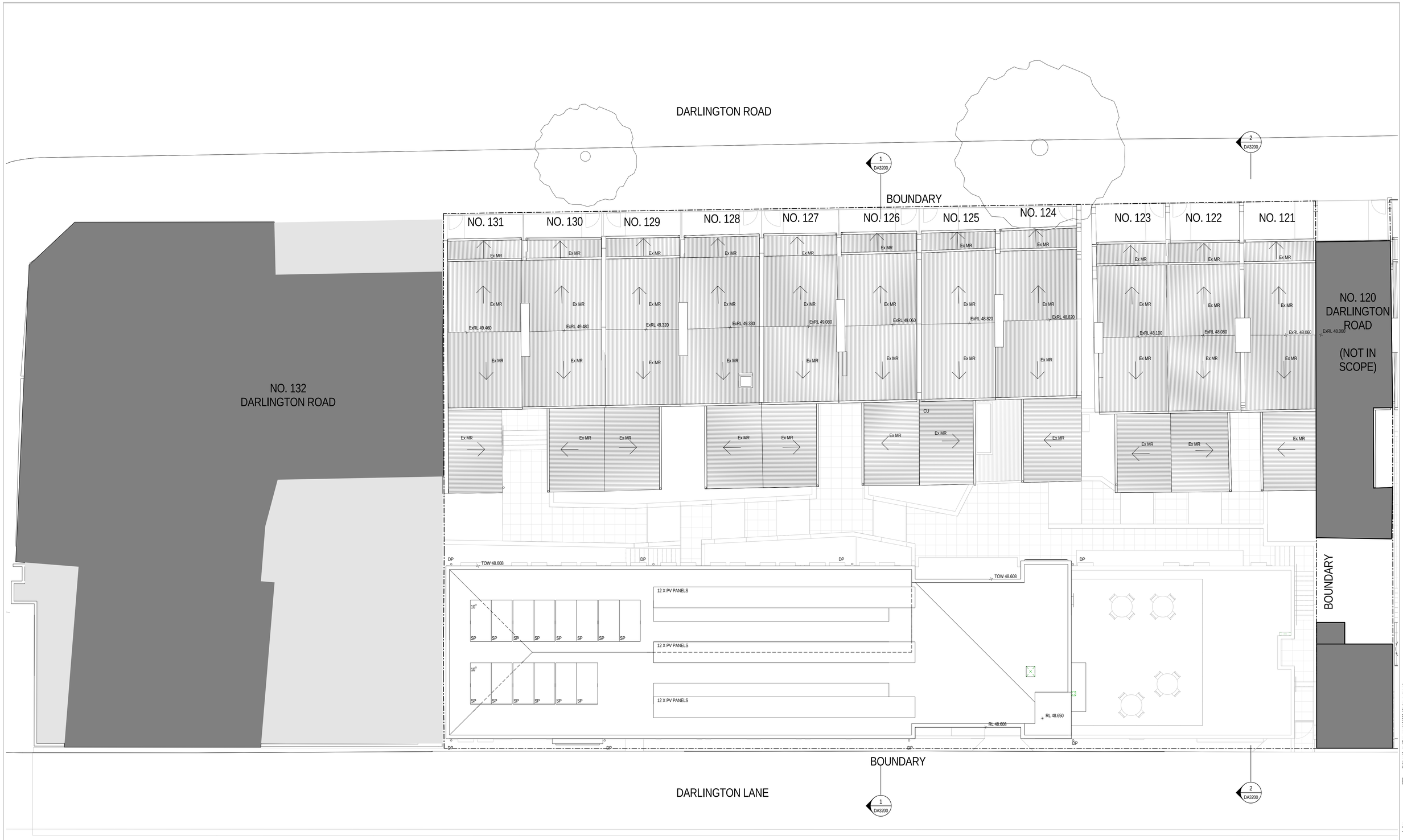

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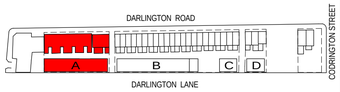

Revisions

No.	Date	Description	Ver	App'd
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B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

N

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING A - ROOF PLAN

Drawing Status

NOT FOR CONSTRUCTION

Scale

1 : 100 @A1

Drawing No.

DA2106

Issue

B

REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

Author

PLOTTED & CHECKED BY:

PLOT DATE & TIME: 15/06/2016 6:04:12 PM

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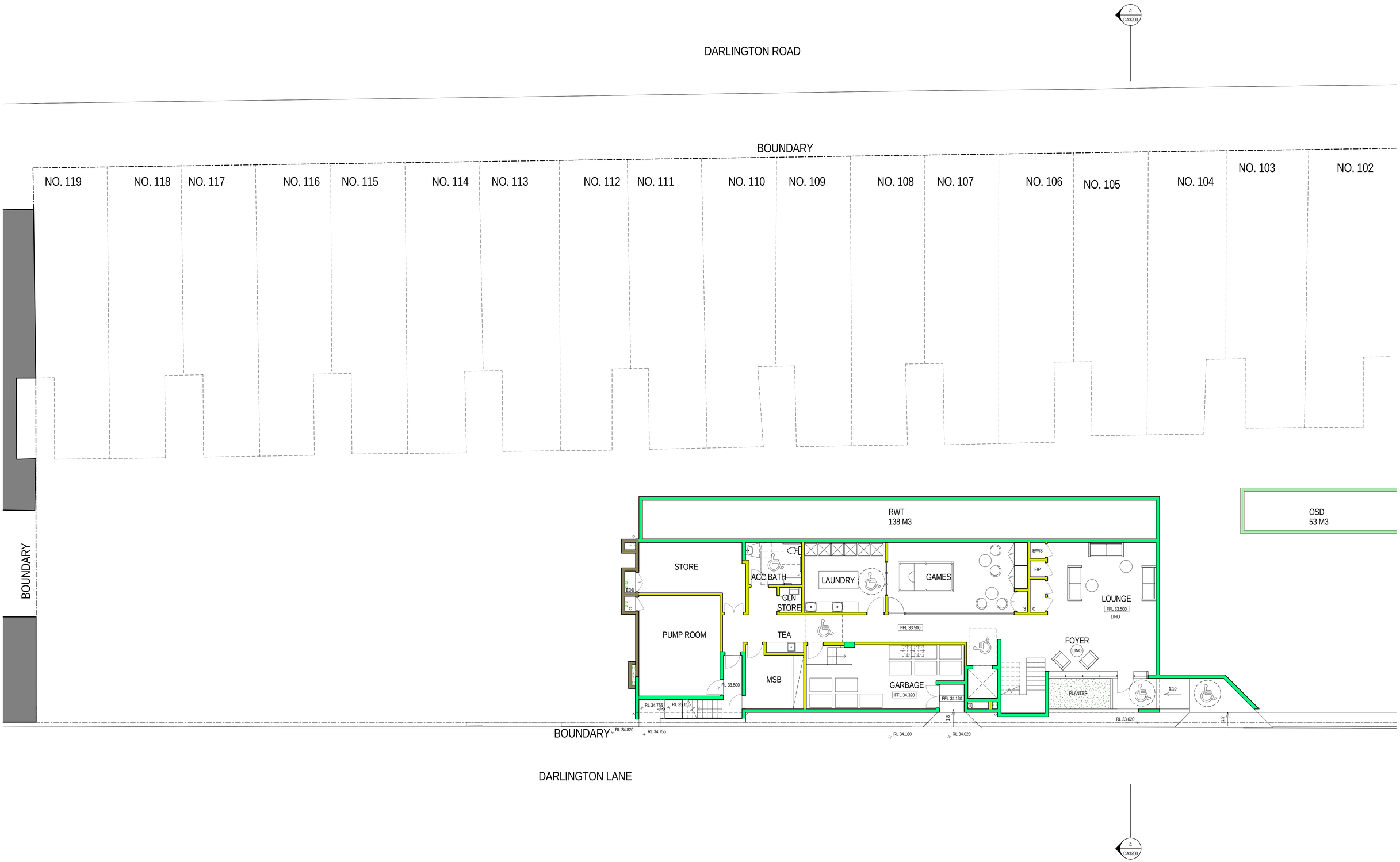

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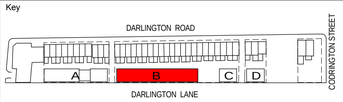

Revisions

No.	Date	Description	Ver	App'd
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B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING B - L1 PLAN

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2111

Issue: B

PLOTTED & CHECKED BY: Author

REF: C:\Users\Aarlington\Documents\14051_Master_darlgtn.rvt

PLOT DATE & TIME: 15/06/2016 6:04:13 PM

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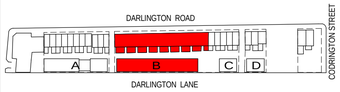

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING B - L2 & TERRACE NO.119-102 - L1

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2112

Issue: B

REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

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PLOT DATE & TIME: 15/06/2016 6:04:16 PM

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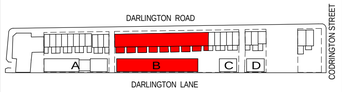

Revisions

No.	Date	Description	Ver	App'd
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B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING B - L3 & TERRACE NO.119-102 - L2

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2113

Issue: B

PLOT DATE & TIME: 15/06/2016 5:04:18 PM
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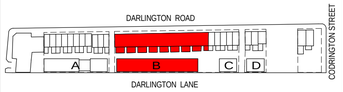

Revisions

No.	Date	Description	Ver	App'd
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B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING B - L4 PLAN & TERRACE NO. 119-102 ROOF

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2114

Issue: B

PLOTTED & CHECKED BY: Author

REF: C:\Users\Aurigo\Documents\14051_Master_Aurigo.rvt

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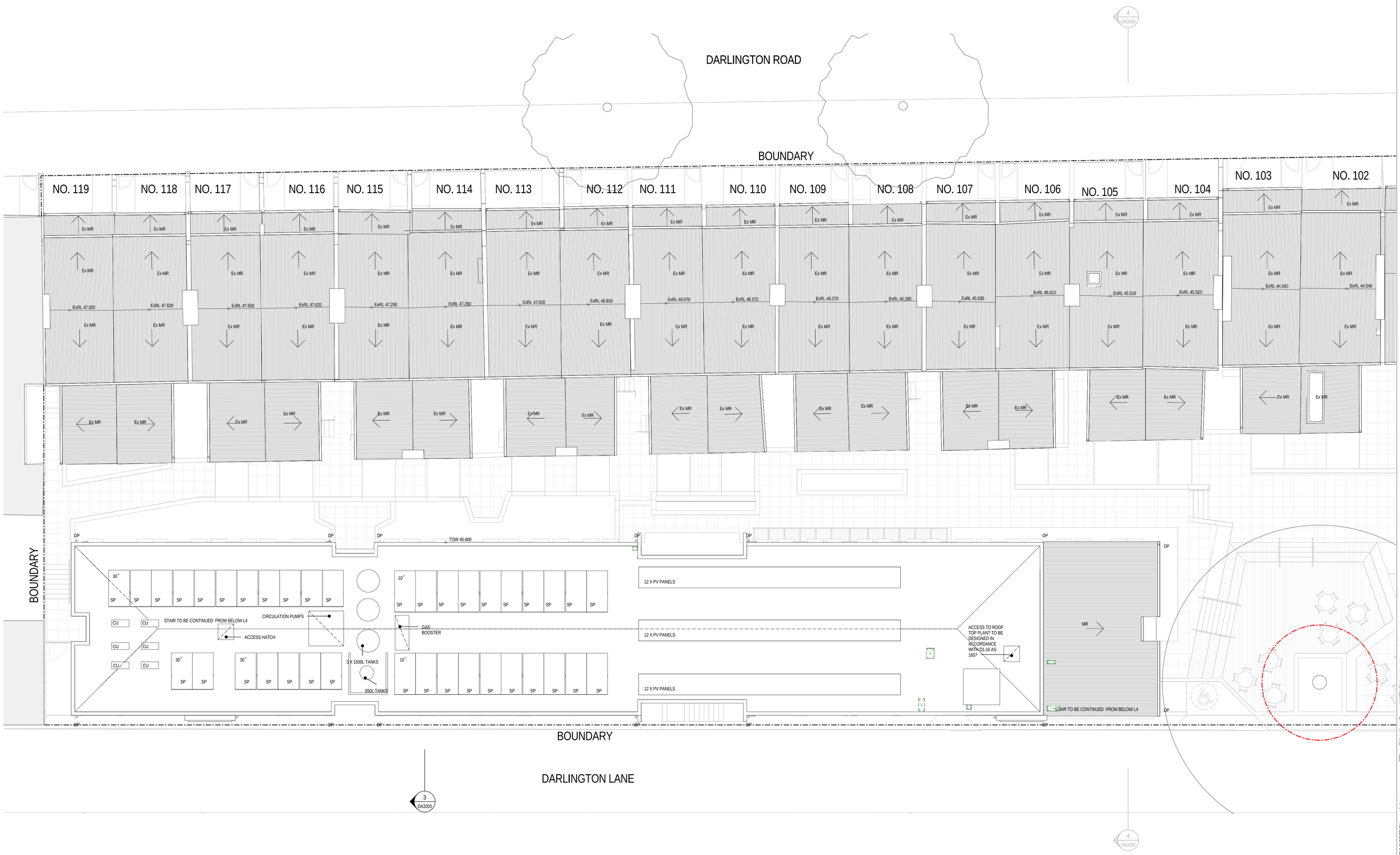

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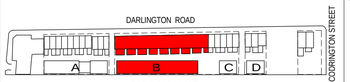

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING B - ROOF PLAN

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2115

Issue: B

PLOT DATE & TIME: 10/06/2016 6:04:22 PM

PLOTTED & CHECKED BY: Author

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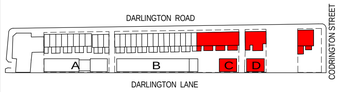

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING C & D - L1 & TERRACE NO.101-86 - L1

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2121

Issue: B

PLOT DATE & TIME: 15/06/2016 6:04:28 PM

PLOTTED & CHECKED BY: Author

REF: C:\Users\Aurgo\Documents\14051_Master_aurgo.rvt

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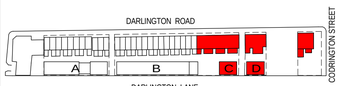

Revisions

No.	Date	Description	Ver	App'd
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B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING C & D - L2 & TERRACE NO.101-86 - L2

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2122

Issue: B

PLOT DATE & TIME: 15/06/2016 6:04:30 PM PLOTTED & CHECKED BY: Author REF: C:\Users\AngryDocuments\14051_Master_Jul\gc.rvt

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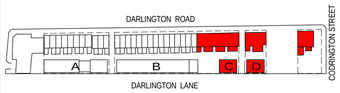

Revisions

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B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING C & D - L3 PLAN & TERRACE NO. 101-86 ROOF

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2123

Issue: B

REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

PLOTTED & CHECKED BY: Author

PLOT DATE & TIME: 15/06/2016 6:04:32 PM

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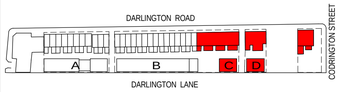

Revisions

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A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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ABN 53 003 782 250

Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PLAN - BUILDING C & D - ROOF PLAN

Drawing Status

NOT FOR CONSTRUCTION

Scale: 1 : 100 @A1

Drawing No.: DA2124

Issue: B

PLOT DATE & TIME: 15/06/2016 6:04:34 PM
PLOTTED & CHECKED BY: Author
REF: C:\Users\Angel\Documents\14051_Master_aungo.rvt

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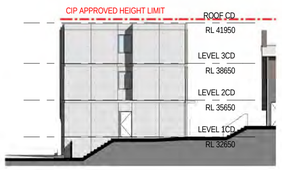
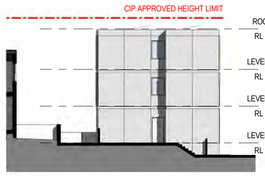
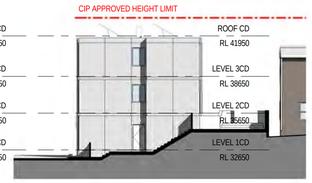


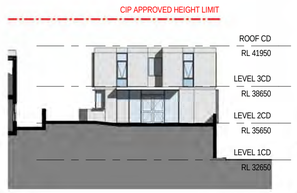
10 ELEVATION - BUILDING D EAST
1 : 250



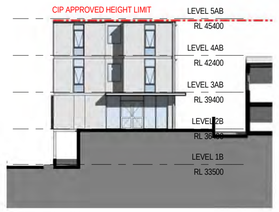
9 ELEVATION - BUILDING D WEST
1 : 250



7 ELEVATION - BUILDING C EAST
1 : 250

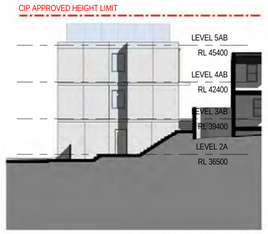


8 ELEVATION - BUILDING C WEST
1 : 250

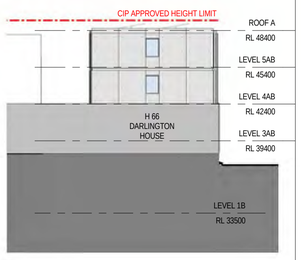


5 ELEVATION - BUILDING B EAST
1 : 250

6 ELEVATION - BUILDING B WEST
1 : 250



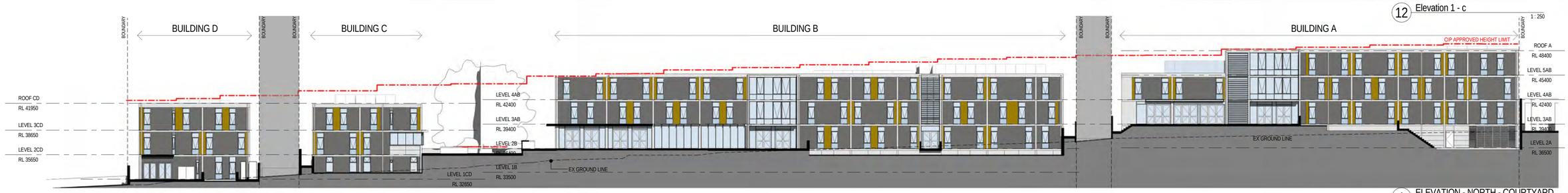
4 ELEVATION - BUILDING A EAST
1 : 250



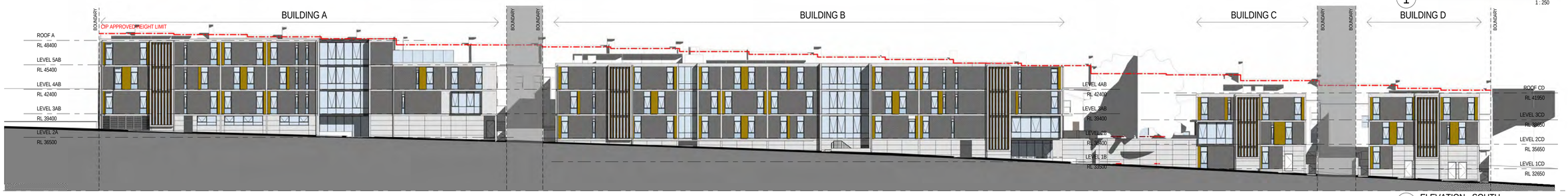
3 ELEVATION - BUILDING A WEST
1 : 250

11 ELEVATION - NORTH - DARLINGTON ROAD
1 : 250

12 Elevation 1 - c
1 : 250



1 ELEVATION - NORTH - COURTYARD
1 : 250



2 ELEVATION - SOUTH
1 : 250

Key	Revisions No.	Date	Description	Ver	App'd
	A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
	B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client
THE UNIVERSITY OF SYDNEY

Architect
AJ+C ALLEN JACK+COTTIER
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ABN 53 003 782 250

Project
DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS
Darlington Road DARLINGTON
NSW 2008
Proj. No. 14051

Drawing Title
ELEVATIONS

Drawing Status
NOT FOR CONSTRUCTION

Scale 1 : 250 @A1
Drawing No. DA3100
Issue B

PLOT DATE & TIME: 15/06/2016 6:04:59 PM
REF: C:\Users\AvingoDocuments\14051_Master_avigo.rvt
Author
CHECKED BY:
LEVEL 1E
RL 29950

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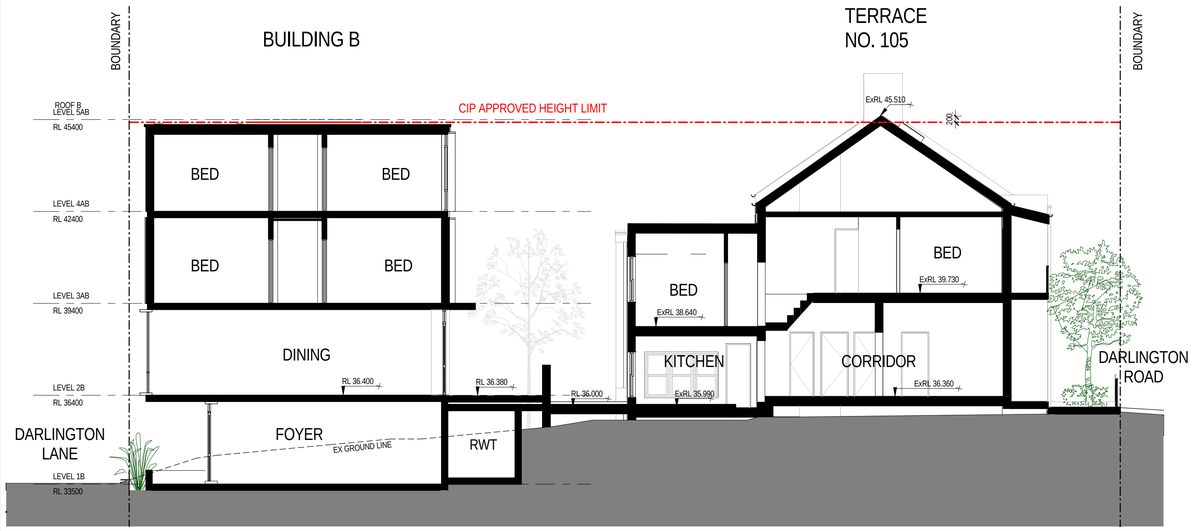

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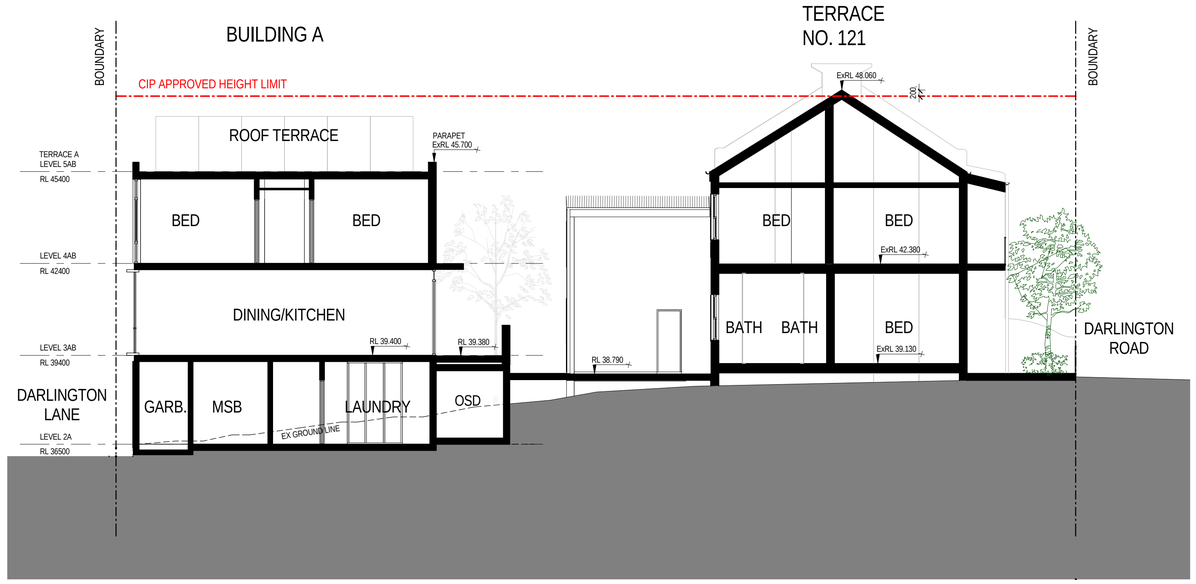

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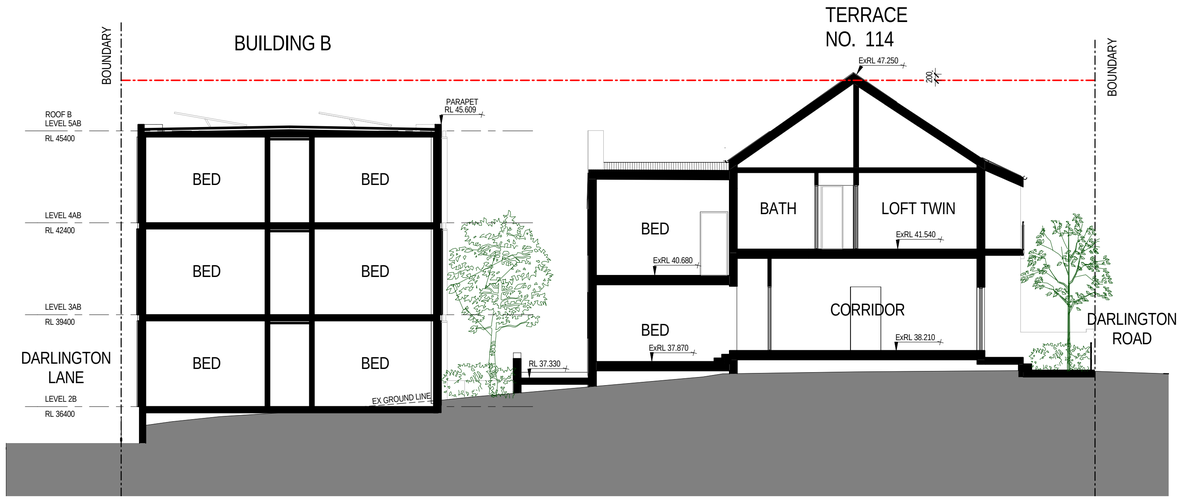

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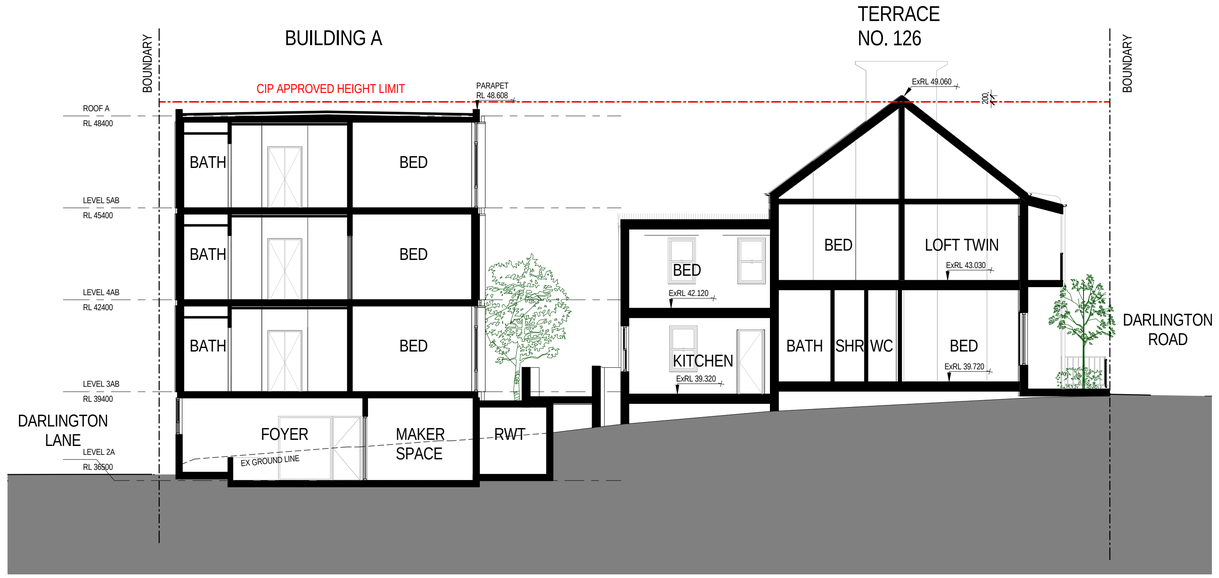

1 SECTION A
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Key

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client
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Project
DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS
Darlington Road DARLINGTON
NSW 2008
Proj. No. 14051

Drawing Title
SECTION A,B,C & D

Drawing Status
NOT FOR CONSTRUCTION

Scale
1 : 100 @A1

Drawing No.
DA3200

Issue
B

PLOT DATE & TIME: 15/06/2016 6:05:00 PM
PLOTTED & CHECKED BY: Author
REF: C:\Users\Aurge\Documents\14051_Master_aurgo.rvt

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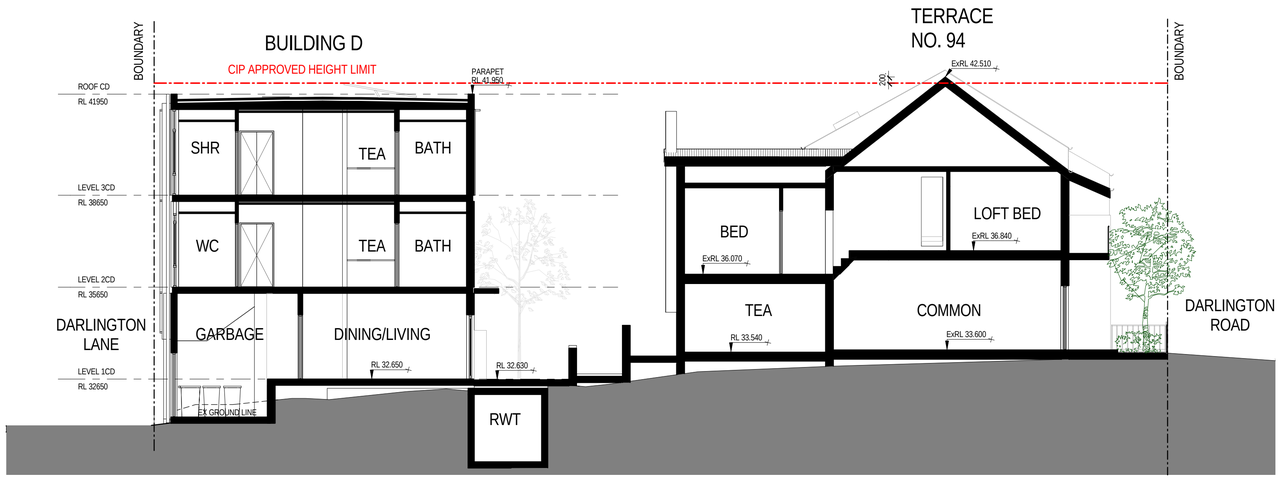
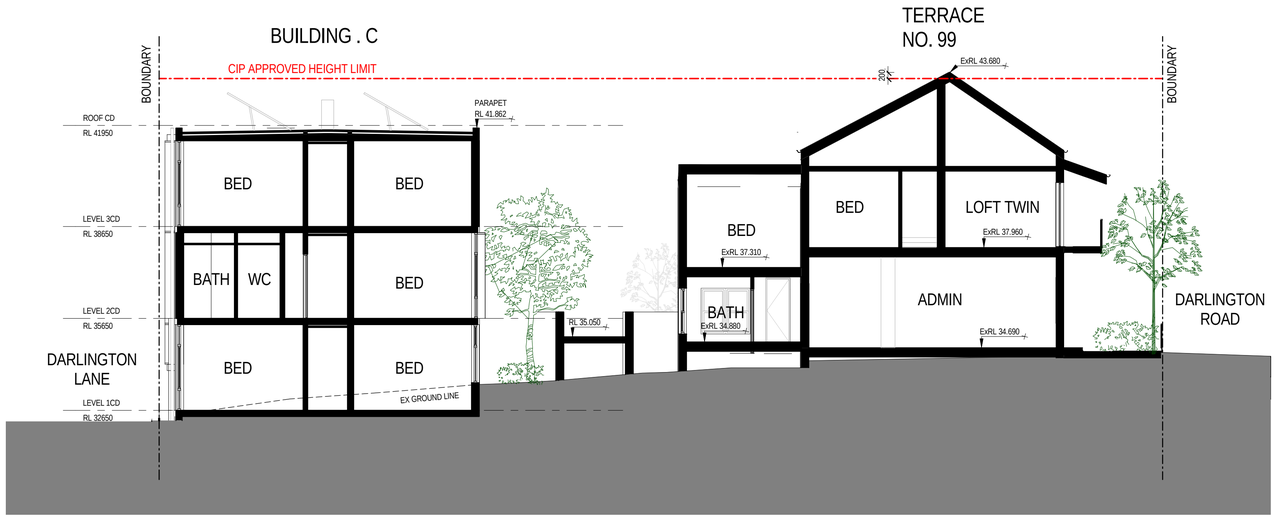


1 SECTION E
1 : 100



2 SECTION F
1 : 100

Key	Revisions					Client	Architect	Project	Drawing Title	Scale	Drawing No.	Issue
	No.	Date	Description	Ver	App'd	THE UNIVERSITY OF SYDNEY	AJ+C Allen Jack+Cottier 79 Myrtle Street Chippendale NSW 2008 AUSTRALIA ph +61 2 9311 8222 fx +61 2 9311 8200 ABN 53 003 782 250	DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS Darlington Road DARLINGTON NSW 2008 Proj. No. 14051	SECTION E & F Drawing Status NOT FOR CONSTRUCTION	1 : 100 @A1	DA3201	B
	A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB							
	B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB							

PLOT DATE & TIME: 10/06/2016 6:06:01 PM PLOTTED & CHECKED BY: Author REF: C:\Users\Author\Documents\14051_Master_Jun\gc.rvt

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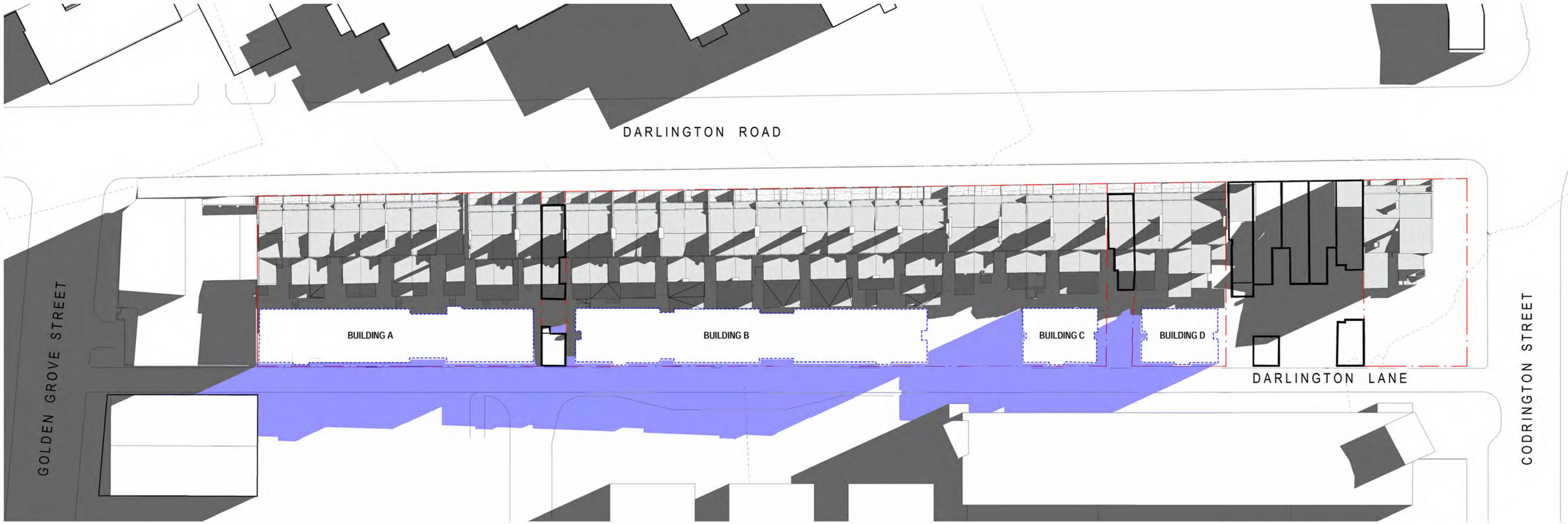

ADDITIONAL OVERSHADOWING

PROPOSED NEW BUILDINGS

Key

Revisions No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

N

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON NSW 2008

Proj. No. 14051

Drawing Title

SHADOW DIAGRAMS - 21 JUNE 9AM - PROPOSED

Drawing Status

NOT FOR CONSTRUCTION

Scale: @A1

Drawing No.: DA3901

Issue: B

PLOT DATE & TIME: 15/06/2016 6:05:11 PM PLOTTED & CHECKED BY: Author REF: C:\Users\Aurego\Documents\14051_Master_Aurgo.rvt

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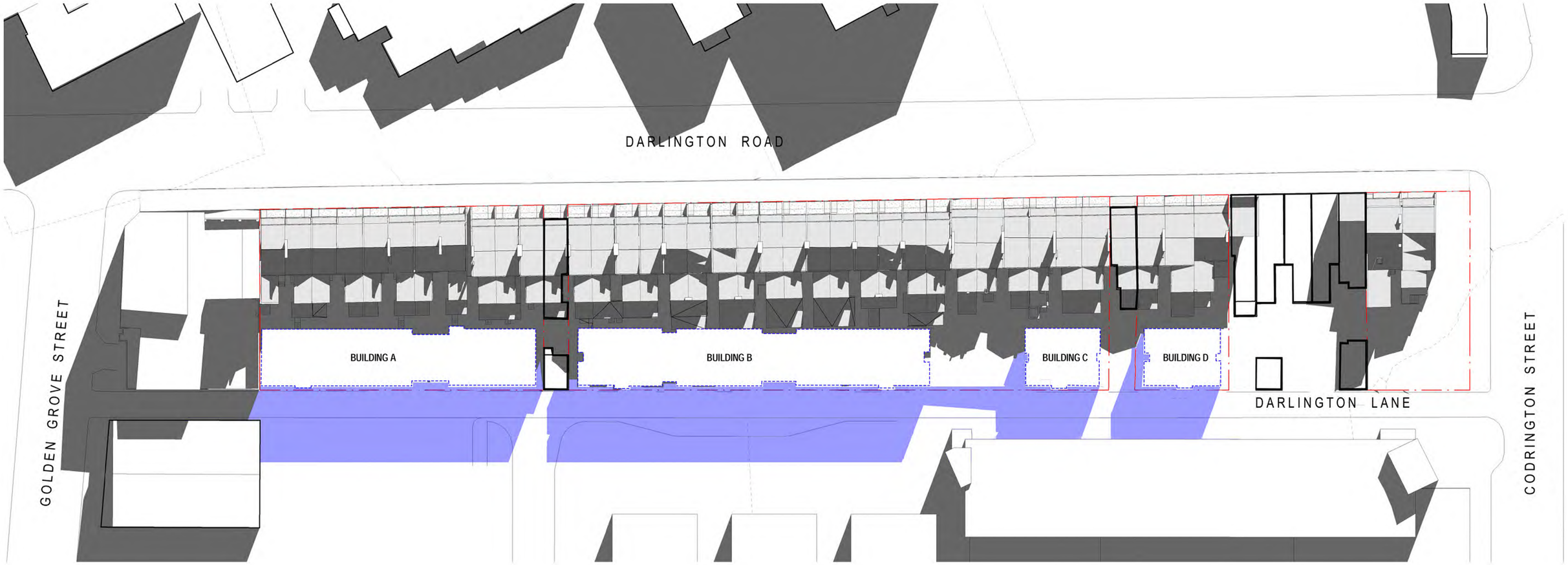

ADDITIONAL OVERSHADOWING

PROPOSED NEW BUILDINGS

Key

Revisions No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

N

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

SHADOW DIAGRAMS - 21 JUNE 12PM - PROPOSED

Drawing Status

NOT FOR CONSTRUCTION

Scale: @A1

Drawing No.: DA3902

Issue: B

PLOT DATE & TIME: 15/06/2016 6:05:20 PM PLOTTED & CHECKED BY: Author REF: C:\Users\Author\Documents\14051_Master_Jun\jpc.rvt

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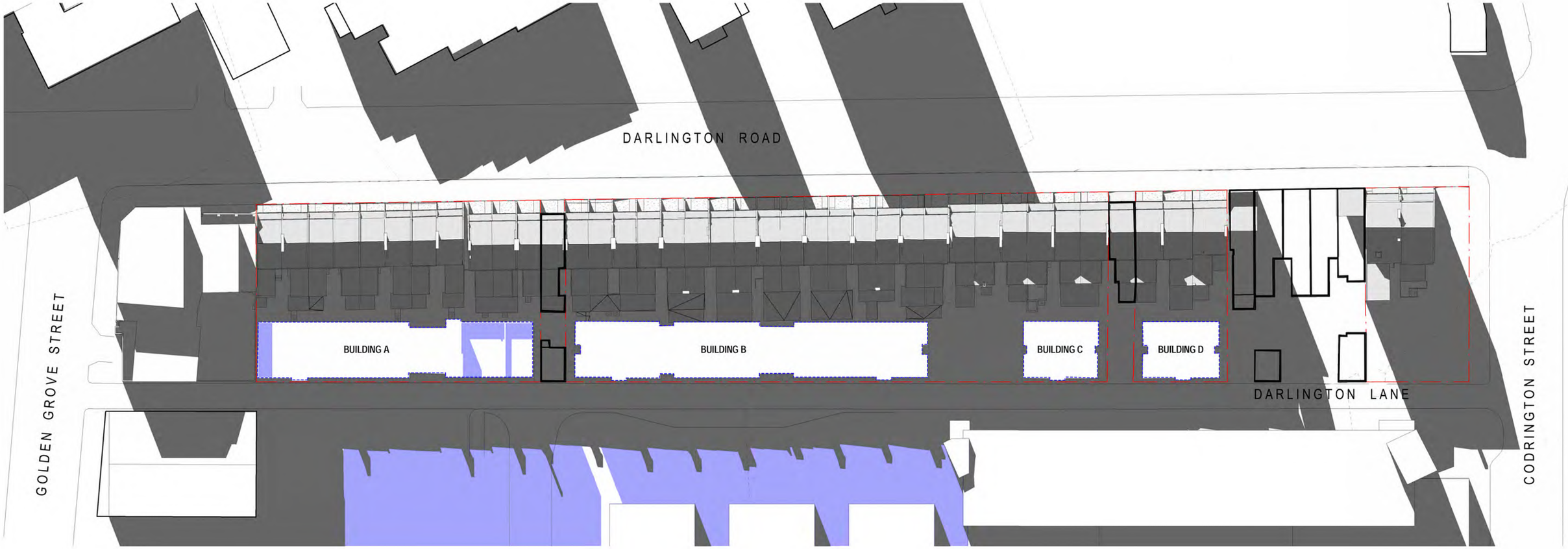

ADDITIONAL OVERSHADOWING

PROPOSED NEW BUILDINGS

Key

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

N

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

SHADOW DIAGRAMS - 21 JUNE
3PM - PROPOSED

Drawing Status

NOT FOR CONSTRUCTION

Scale @A1

Drawing No. DA3903

Issue B

PLOT DATE & TIME: 15/06/2016 6:00:27 PM PLOTTED & CHECKED BY: Author REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

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EXISTING VIEW FROM CODRINGTON ST.

PROPOSED VIEW FROM CODRINGTON ST.

Key

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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ABN 53 003 782 250

Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PHOTOMONTAGE 1

Drawing Status

NOT FOR CONSTRUCTION

Scale

Drawing No.

DA4100

Issue

B

PLOT DATE & TIME: 15/06/2016 6:05:32 PM PLOTTED & CHECKED BY: Author REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

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EXISTING VIEW FROM DARLINGTON LN.

PROPOSED VIEW FROM DARLINGTON LN.

Key

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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ABN 53 003 782 250

Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PHOTOMONTAGE 2

Drawing Status

NOT FOR CONSTRUCTION

Scale

Drawing No.

DA4101

Issue

B

PLOT DATE & TIME: 15/06/2016 6:05:37 PM PLOTTED & CHECKED BY: Author REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

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EXISTING VIEW FROM GOLDEN GROVE ST.

PROPOSED VIEW FROM GOLDEN GROVE ST.

Key

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

THE UNIVERSITY OF SYDNEY

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ABN 53 003 782 250

Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PHOTOMONTAGE 3

Drawing Status

NOT FOR CONSTRUCTION

Scale

Drawing No.

DA4102

Issue

B

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REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

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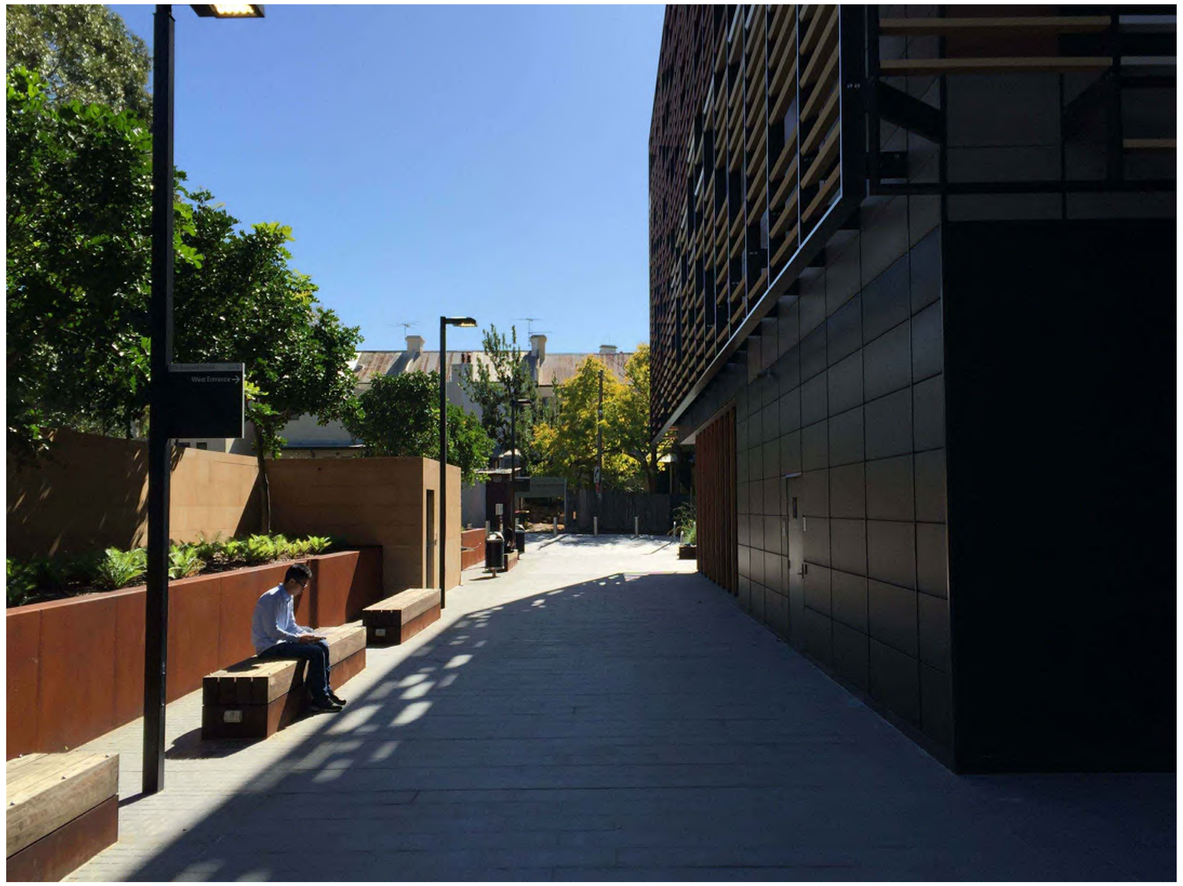

EXISTING VIEW FROM BUSINESS SCHOOL

PROPOSED VIEW FROM BUSINESS SCHOOL

Key

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

THE UNIVERSITY OF SYDNEY

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

PHOTOMONTAGE 4

Drawing Status

NOT FOR CONSTRUCTION

Scale

Drawing No.

DA4103

Issue

B

PLOTTED & CHECKED BY: Author REF: C:\Users\Aurigo\Documents\14051_Master_aurigo.rvt

PLOT DATE & TIME: 15/06/2016 6:05:43 PM

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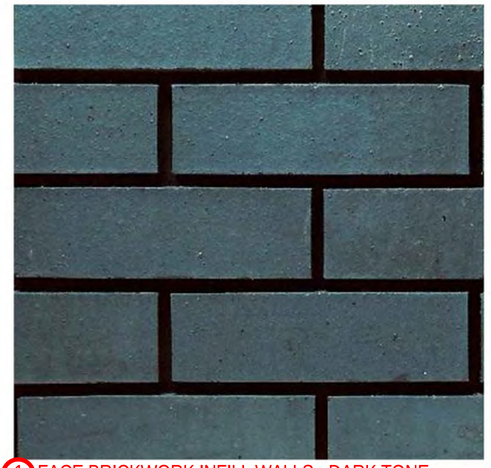

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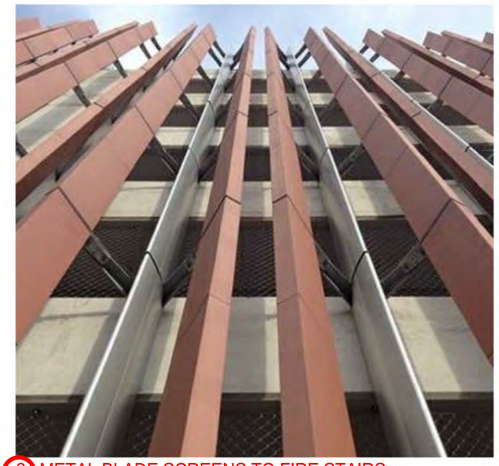
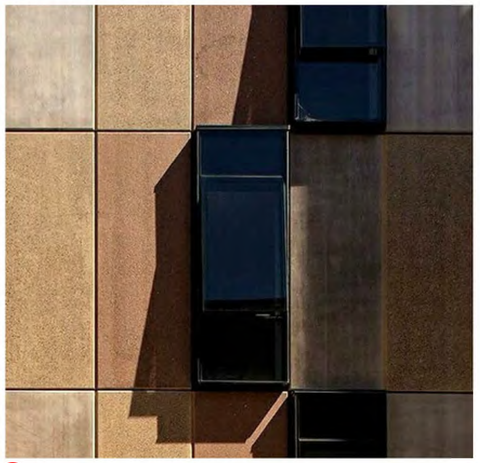


2. METAL BLADE SCREENS TO FIRE STAIRS

3. GLASS CURTAIN WALL WITH FROSTED IMAGERY



4. DARK ALUMINIUM WINDOWS WITH FROSTED PANELS TO LOWER PANEL

5. PREFINISHED ALUMINIUM PANELS

6. OFF-FORM CONCRETE BLADES AND SLAB EDGES WITH INFILL PANELS

7. GREEN WALL TO DARLINGTON LANE BELOW EXISTING TREE

Key

Revisions

No.	Date	Description	Ver	App'd
A	31/05/16	DRAFT DA SUBMISSION ISSUE 1	GA	VB
B	15/06/16	DRAFT DA SUBMISSION ISSUE 2	NZ	VB

Client

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Project

DARLINGTON ROAD TERRACES MIXED USE BUILDING ADDITIONS AND ALTERATIONS TO THE DARLINGTON ROAD TERRACES AND PUBLIC DOMAIN IMPROVEMENTS

Darlington Road DARLINGTON
NSW 2008

Proj. No. 14051

Drawing Title

MATERIAL BOARD

Drawing Status

NOT FOR CONSTRUCTION

Scale

Drawing No.

DA5100

Issue

B

PLOT DATE & TIME: 15/06/2016 6:05:50 PM
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Appendix A - Proposed Development Information

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