Robert Bird Group

Preliminary Flooding and Water Sensitive Urban Design Advice for Planning Proposal

2 Chifley Square, Sydney

Issue: 2

9 August 2021

Prepared For: Charter Hall

Project No.: 19200C

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Report Amendment Register

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2	All	Issued for Information	Charlene Huang	Chris Waite	09/08/21

REVISION/ISSUE AUTHOR:

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Charlene Huang
Signing for and on behalf of
Robert Bird Group Pty Ltd
Date: 09 August 2021

REVIEWER:

.. ..
Chris Waite
Signing for and on behalf of
Robert Bird Group Pty Ltd
Date: 09 August 2021

Executive Summary

Robert Bird Group (RBG) have been engaged by Charter Hall to undertake a civil engineering preliminary desktop study of flooding and water urban sensitive design to inform the reference scheme associated with a Planning Proposal of the site at 2 Chifley Square, Sydney.

The purpose of this report is to identify and discuss existing conditions, design requirements and opportunities for flooding and water sensitive urban design as well as the implications in the context of the development proposal and concept reference design.

Flood Study:
The proposed development does not propose to alter the kerb heights or driveway entry points, leaving external levels in their current form. From review of the information provided, only small areas around the site categorised as low hazard areas are affected by 1% AEP and PMF floods. RBG identified the minimum flood planning requirements near the existing flood zones from City of Sydney's flood study and would not propose any further flood mitigations to be implemented on the project.

Water Sensitive Urban Design:
RBG also recommended the WSUD design opportunities applicable to the proposed development. Detailed design will be subject to WSUD design development in accordance with Charter Hall's high sustainability aspirations for the site.

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1 Introduction

Robert Bird Group (RBG) have been engaged by Charter Hall to undertake a civil engineering desktop study of flooding and water urban sensitive design to inform the reference scheme associated with a Planning Proposal of the site at 2 Chifley Square, Sydney, Sydney (the subject site), which is legally described as Lot 10 in DP 777545, see Figure 1-1 below.

Figure 1-1 Site Locality - 2 Chifley Square, Sydney

This Planning Proposal is submitted to the Council of the City of Sydney to request amendments to the Sydney Local Environmental Plan 2012 for land at 2 Chifley Square, Sydney. The purpose of this Planning Proposal is to introduce a maximum floor space (FSR) control for the site and amend the height limit on the site to align with the updated Sun Access Plane for the Domain, as set out in the Central Sydney Planning Strategy (CSPS).

The Planning Proposal will facilitate the development of a new commercial tower on the southern portion of the existing Chifley site, up to a height of RL 214.2 (being a height above ground level of approximately 188.1m). When combined with the existing north tower and podium, the new, refurbished and existing floor space combined will total over 130, 000m^2 GFA. The project is forecast to generate approximately 1,500 jobs during construction and provide for an increase of approximately 4,000 jobs in operation.

The Planning Proposal is prepared in accordance with Section 3.33 of the Environmental Planning & Assessment Act 1979, and describes the site, the proposed amendments to the Sydney LEP 2012 and provides an environmental assessment of the proposed height and FSR controls, building envelope and indicative tower reference design, consistent with the strategic intent of the CSPS. A draft site-specific development control plan accompanies the Planning Proposal.

1.1 Subject Site

The site widely known as “Chifley Square” is currently bound by Bent Street to north, Hunter Street to south, Philip Street to west and Macquarie Street to east, through which Elizabeth Street would connect with the northern section of Phillip Street and form a thoroughfare to Circular Quay.

It comprises a six-storey curved façade podium with retail arcades on lower levels and commercial offices on upper levels, and a 43-storey commercial tower above the northern podium.

The existing site is falling from east to west at approximate 5.8% on Bent Street and 5.6% on Hunter Street. Figure 1-2 below has shown the existing site elevations.

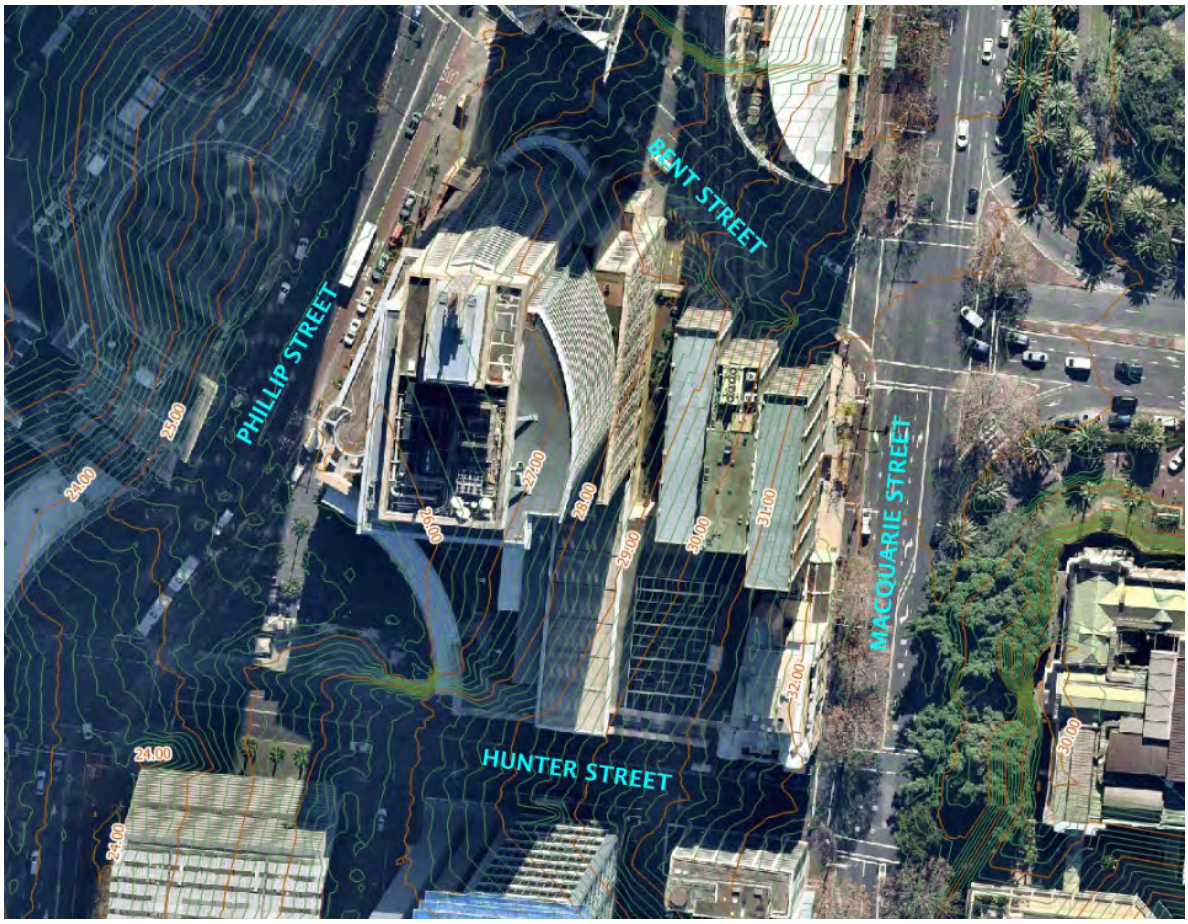

Figure 1-2 Existing Site Elevation Plan (source: NSW Spatial Services)

The site is currently zoned as Zone B8 Metropolitan Centre, see Figure 1-3 below.

Figure 1-3 Site Location from City of Sydney Land Zoning Map
(Source: Sydney Local Environmental Plan 2012)

1.2 Concept Reference Design

A Concept Reference Design has been developed as part of the planning proposal to demonstrate that the proposed building envelope is capable of accommodating a viable scheme.

The Concept Reference Design is indicative only and the final detailed design will be the subject of a competitive design process and detailed development application (DA) which will ultimately result in further refinement. The latest Architectus reference design and envelope plans is shown in Figure 1-4 below.

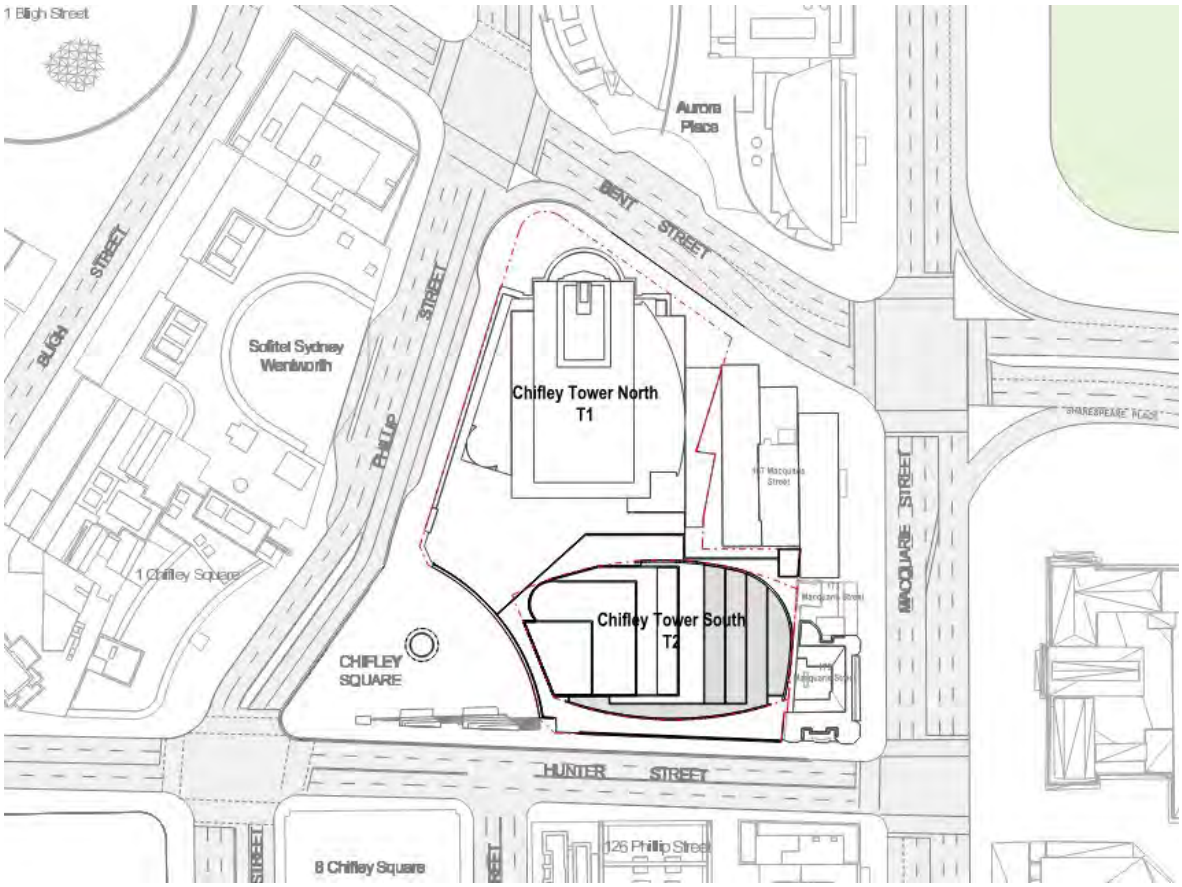

Figure 1-4 Proposed Chifley Square Revelopment Site Plan
(Source: Architectus dated 07/07/2021)

The Concept Reference Design primarily includes a new 36-storey tower, Chifley Tower South T2 next to the existing Chifley Tower North T1 in Figure 1-4 above. The new tower is proposed to be constructed on the southern side of the existing podium which is proposed to be refurbished to facilitate the new tower.

1.3 Purpose of Report

The purpose of this report is to provide a review of existing conditions, design requirements and opportunities for flooding and water sensitive urban design in the context of the proposed planning amendments and the Concept Reference Design, to evaluate their likely suitability, and requirements for future assessment and detailed design.

The following development controls as required by City of Sydney for a site-specific Flood Study and WSUD have been reviewed in the context of the Concept Reference Design:

- City of Sydney Interim Floodplain Management Policy
- Sydney City Area Catchment Study
- NSW Floodplain Development Manual 2005

- Clause 7.15 of Sydney Local Environmental Plan 2012
- Clause 3.7 of the of the Sydney Development Control Plan 2012

As the planning submission does not seek consent for the specific development, a detailed quantitative assessment of the Concept Reference Design is not considered to be warranted at this stage.

2 Preliminary Flood Assessment

A high-level review of flooding risk has been undertaken to identify the flooding constraints and likely flood planning implications for the proposed development, which includes

- Review the existing drainage infrastructure around the site;
- Review the relevant flood studies and the model results around the proposed development;
- Review the relevant Council flood risk management policies that may apply to the site; and
- Provide flood advice for the proposed redevelopment, including identifying specific flood design requirements for specific areas of the development.

2.1 Existing Drainage Infrastructure

The site is surrounded by existing in-ground drainage infrastructure owned by Sydney Water as shown in Figure 2-1 below, which collect and drain surface water in different directions, generally following the falls in the natural topography. The infrastructure surrounds the site as follows:

Figure 2-1 Sydney Water DBYD Map

- A DN900 concrete circular to the west along Phillip Street and the south-western corner of Phillip Street and Hunter Street;
- A DN300 vitrified clay circular pipe to the south along Hunter Street;
- A 711 x 1066 heritage brick convert to the east along Macquarie Street;
- A DN225 vitrified clay circular pipe to the north along the lower side of Bent Street.

2.2 Review of Existing Flood Study and Flood Planning Requirements

2.2.1 City of Sydney City Area Catchment Flood Studies

The site is located within the City of Sydney (CoS) City Area Catchment, from which Flood Study was completed by BMT WBM in October 2014 on behalf of the City of Sydney. A dynamic 1d/2d TUFLOW model was utilised using 'the direct rainfall' approach (also referred to as 'rainfall-on-grid' approach) in this study. This study defined the flood behaviour within the City Area catchment under the existing conditions in terms of the flood depths, flood levels, velocities and provisional hazard for a range of design events.

The City Area Catchment Floodplain Risk Management Plan was undertaken by WMAwater for the City of Sydney (WMAwater, September 2016). The existing model adopted in this study was based on the WBM's model but incorporated minor refinements. It is referred to this report for flood information. The purpose of this study was to investigate the performance of a range of flood mitigation measures.

2.2.2 Review of City of Sydney Flood Maps

Extracted CoS flood maps in Figure 2-2 and Figure 2-4 have shown that the site is positioned at the upstream extents of the Sydney City Area catchment and not majorly affected by flooding. The catchment boundary to the adjacent Woolloomooloo Catchment is only 150m to the east of the site.

1% AEP Flood:

Figure 2-2 Extracted CoS 1% AEP Flood Map
(Source: City of Sydney)

Figure 2-3 Extracted CoS 1% AEP Hydraulic Categorisation Map
(Source: City of Sydney)

- A small area at the corner of the square near Hunter Street is affected by localising flooding with no more than 0.25m flood depth during the 1% AEP storm events.
- This flood affected area above is categorised as Low Hazard during 1% AEP storm events.

PMF Flood:

Figure 2-4 Extracted CoS PMF Flood Map
(Source: City of Sydney)

Figure 2-5 Extracted CoS PMF Hydraulic Categorisation Map
(Source: City of Sydney)

- Additional minor flood affected areas with no more than 0.25m flood depths are presented at the square around Hunter Street and Phillip Street as well as the basement entrance on Bent Street during the PMF storm events.

- The flood affected areas above are categorised as Low Hazard during the PMF storm events.

2.2.3 Review of City of Sydney Flood Planning Requirements

Flood planning levels (FPLs) for the site are dictated by the City of Sydney Interim Floodplain Management Policy 2014. Minimum building floor levels and/or building entrance threshold for the refurbished floors of the podium are driven by the FPLs, so as to ensure the proposed development is not at undue risk of flood and that proposals do not increase flood risk for existing properties.

Table 2-1 Flood Planning Requirements for Commercial Development (source: City of Sydney)

Development	Type of flooding	Flood Planning Level
Business	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood level.
Retail Floor Levels	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood. The proposal must demonstrate a reasonable balance between flood protection and urban design outcomes for street level activation.
Below-ground car park*	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m or the PMF (whichever is the higher).

*Note: The below ground garage/car park level applies to all possible ingress points to the car park such as vehicle entrances and exits, ventilation ducts, windows, light wells, lift shaft openings, risers and stairwells.

2.2.4 Development Flood Compliance

On the basis of that the proposed development does not propose to alter the kerb heights or driveway entry points, leaving external levels in their current form, RBG have reviewed and summarised the minimum flood planning floor level requirements at the reference location below in conjunction with the proposed development from the Concept Reference Design. It is noted that the permission to use this WMAwater model for the current study has been granted by the City of Sydney.

Location A – Corner of the Square near Hunter St:

Door threshold levels at the proposed retail development near location A in Figure 2-6 below are recommended to be maintained at the existing door threshold levels near where the localised flooding is present.

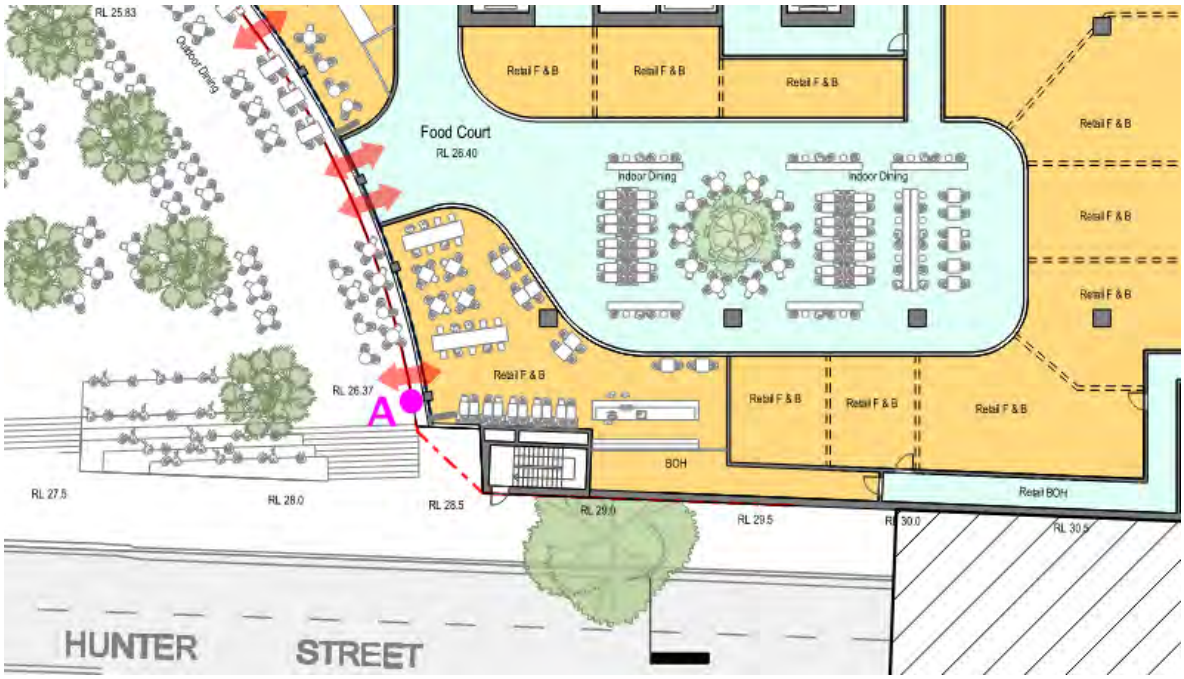

Figure 2-6 Extracted Concept Reference Design Layout Plan – Reference Location A
(Source: Achitectus Lower Groud Level Drawing RD-01-05 07/07/2021)

3 Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design (WSUD) aims to minimise the impacts of developments on the quantity and quality of stormwater runoff, to decrease flooding risk and reduce the effects of water bourn pollution on receiving waterways. This an important consideration during an urban development's planning and design process to satisfy the ecological and sustainable outcomes as required by the City of Sydney.

The water quality targets associated with major redevelopments as recommended by the City of Sydney are presented in Table 3-1. The proposed development is likely to be required to satisfy these targets to support the proposed development.

Table 3-1 City of Sydney Water Quality Targets
(Source: City of Sydney Decentralised Water Master Plan WSUD & Stormwater Infrastructure Report)

Water Quality Parameters	Pollutant Reduction Targets
Total Suspended Solids (TSS)	85%
Total Phosphorus (TP)	65%
Total Nitrogen (TN)	45%
Gross Pollutants	90% (>5mm)

The proposed redevelopment enables new opportunities to incorporate WSUD, which may include the followings:

- Bio-retention and raingardens in the landscaping areas. These are proposed to treat ground run-off before it discharges off-site.
- Rainwater tank. Harvest roof runoff for non-portable water reuse, such as toilet flushing and irrigation, so as to reduce the overall portable water demand.
- Proprietary filtration device. A proprietary water quality treatment device could be utilised to treat all roof catchments. A system such as the Oceanprotect Storm filter cartridges system is to be installed in the overflow discharge line form the rainwater tanks which is effective at removing TSS, TP, and TN to reach the reduction targets.
- Proprietary enviropods. These use a fine mesh to separate debris from stormwater as it enters the pit grate. They are easy to install, maintain, repair and replace as required.

Detailed design will be subject to WSUD design development in accordance with Charter Hall's high sustainability aspirations for the site.

APPENDICES

Appendix A Architectural Reference Design

Appendix B Sydney Water Asset Map

Appendix C City of Sydney City Area Floodplain Risk Management Plan Flood Maps

Appendix A Architectural Reference Design

2 Chifley Square, Sydney

Reference Design

Sheet Number	Sheet Name
RD-00-01	Site Plan
RD-01-01	Basement Level 04
RD-01-02	Basement Level 03
RD-01-03	Basement Level 02
RD-01-04	Basement Level 01
RD-01-05	Lower Ground Level
RD-01-06	Upper Ground Level
RD-01-07	Podium - Level 01
RD-01-08	Podium - Level 02 - 03
RD-01-09	Podium - Level 04 - 05
RD-01-10	Podium Roof - Level 06
RD-01-11	Low Plant - Level 07
RD-01-12	Low Rise Typical - Level 08 - 19
RD-01-13	Transfer Level - Level 20
RD-01-14	Mid Plant - Level 21
RD-01-15	High Rise - Level 22
RD-01-16	High Rise Typical - Level 22 - 31
RD-01-17	High Rise Terrace - Level 32
RD-01-18	High Rise Terrace - Level 33
RD-01-19	High Rise Terrace - Level 34
RD-01-20	High Rise Terrace - Level 35
RD-01-21	Roof Plant - Level 36
RD-01-22	Roof Plant - Roof
RD-02-01	Section East West
RD-02-02	Section North South
RD-03-01	Building Articulation
RD-04-01	Visualisation - View from Chifley Square
RD-04-02	Visualisation - View from The Domain

2 Chifley Square

Drawing: **Cover Sheet**
Drawing no: **RD-00-00**
Issue:
Scale @ A3:
Date: **23/07/21**

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Level 18 MLC Centre
19 Martin Place
Sydney NSW 2000
sydney@architectus.com.au

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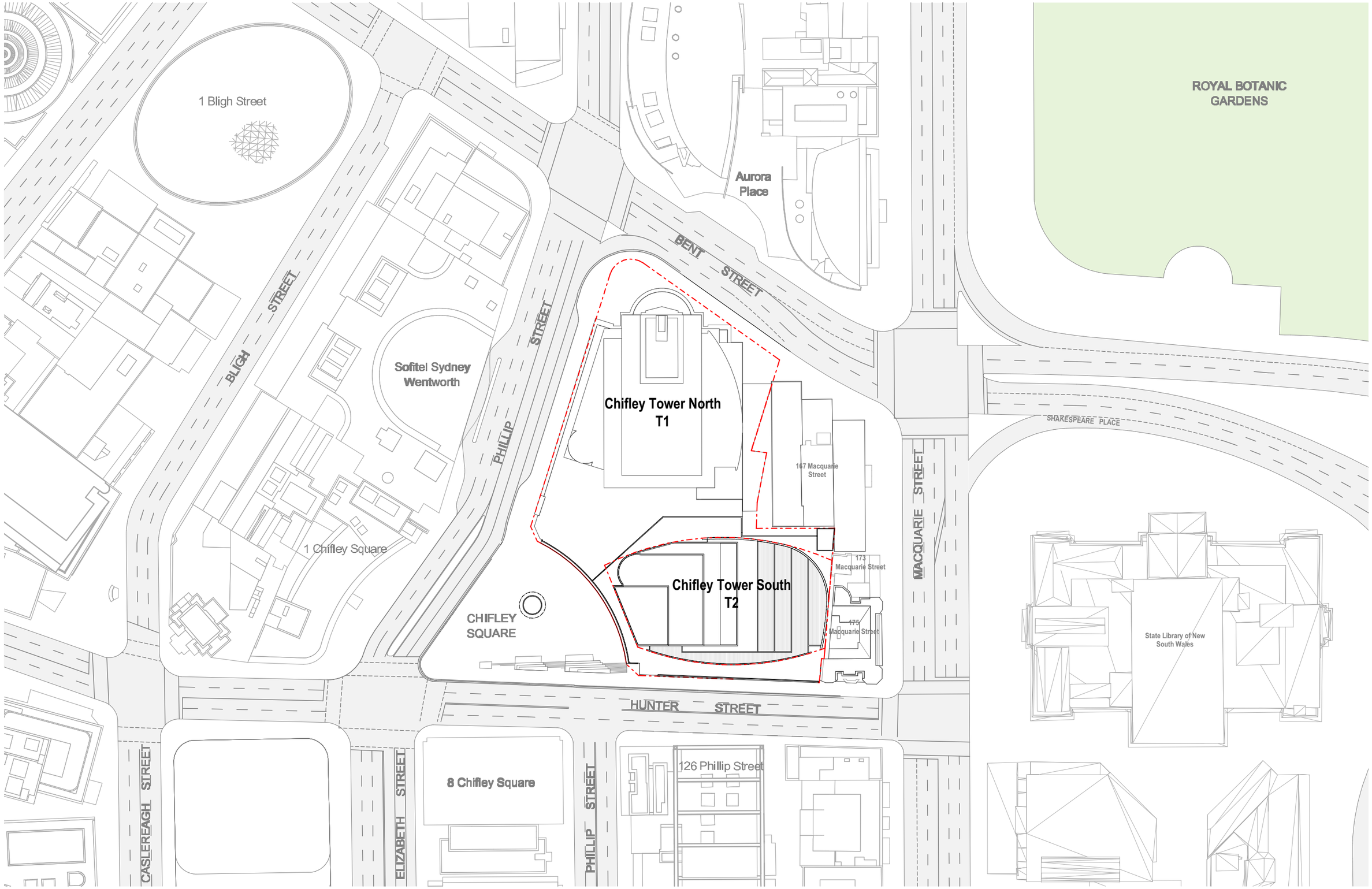

2 Chifley Square

Drawing:	**Site Plan**
Drawing no:	**RD-00-01**
Issue:	
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Date:	**23/07/21**

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m

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2 Chifley Square

Drawing:	**Basement Level 04**
Drawing no:	**RD-01-01**
Issue:	
Scale @ A3:	**1 : 500**
Date:	**23/07/21**

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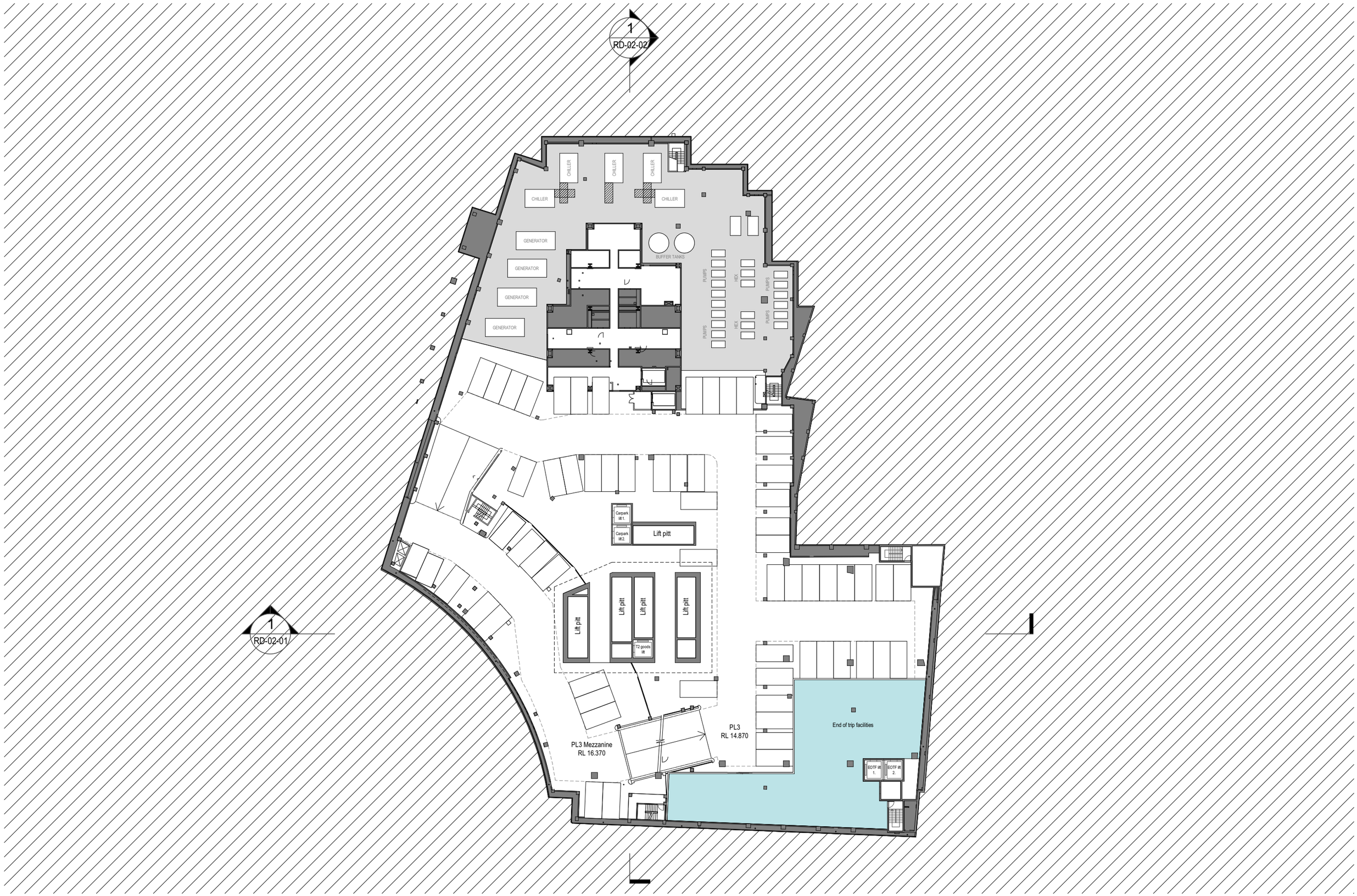

2 Chifley Square

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Date:	**23/07/21**

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2 Chifley Square

Drawing: **Basement Level 02**
Drawing no: **RD-01-03**
Issue:
Scale @ A3: **1 : 500**
Date: **23/07/21**

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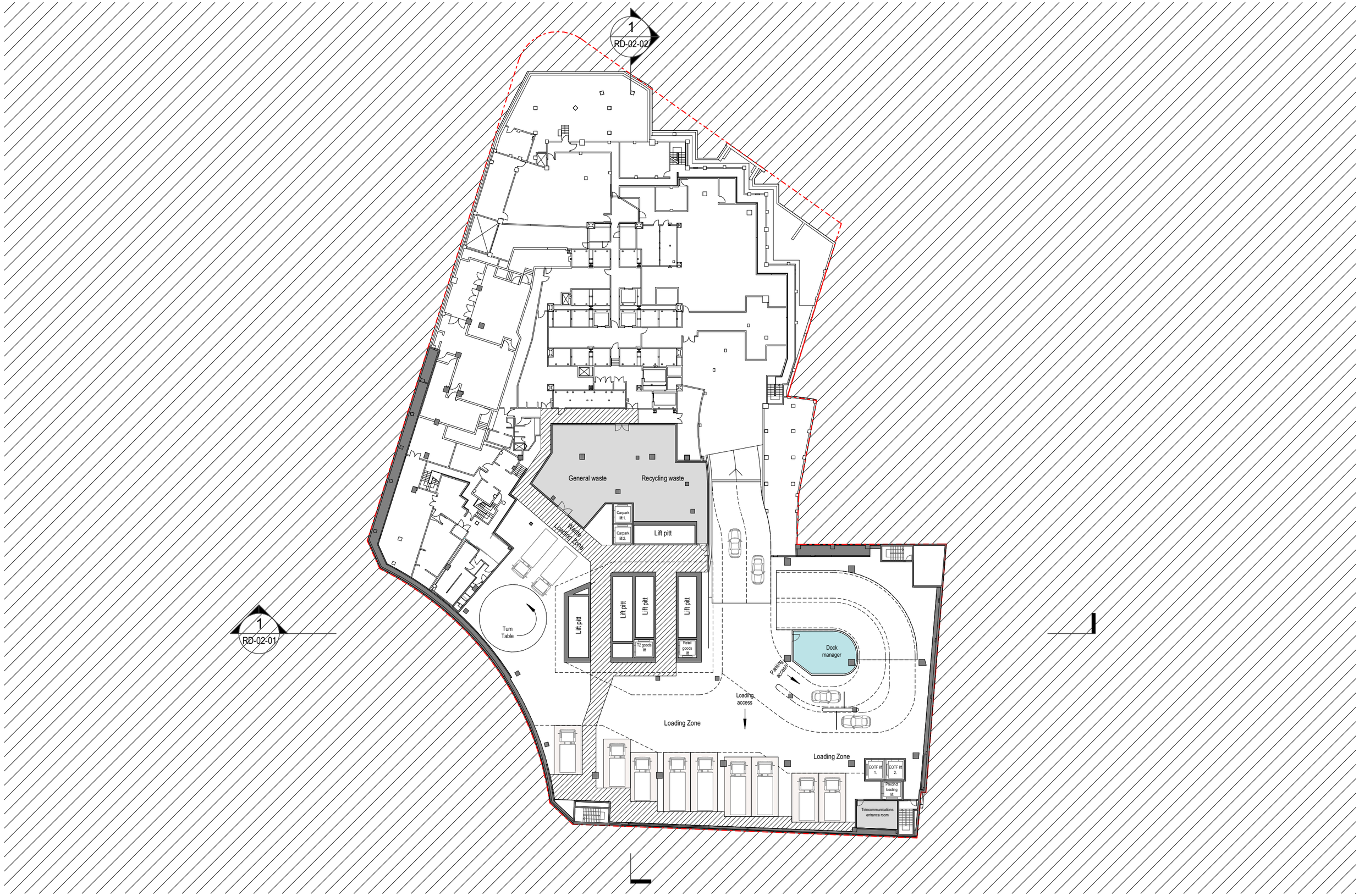

2 Chifley Square

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Drawing: **Lower Ground Level**
Drawing no: RD-01-05
Issue:
Scale @ A3: 1 : 500
Date: 23/07/21

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2 Chifley Square

Drawing:	**Upper Ground Level**
Drawing no:	**RD-01-06**
Issue:	
Scale @ A3:	**1 : 500**
Date:	**23/07/21**

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2 Chifley Square

Drawing: **Podium - Level 01**
Drawing no: RD-01-07
Issue:
Scale @ A3: 1 : 500
Date: 23/07/21

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Drawing: **Podium - Level 02 - 03**
Drawing no: RD-01-08
Issue:
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Date: 23/07/21

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Drawing: **Podium - Level 04 - 05**
Drawing no: RD-01-09
Issue:
Scale @ A3: 1 : 500
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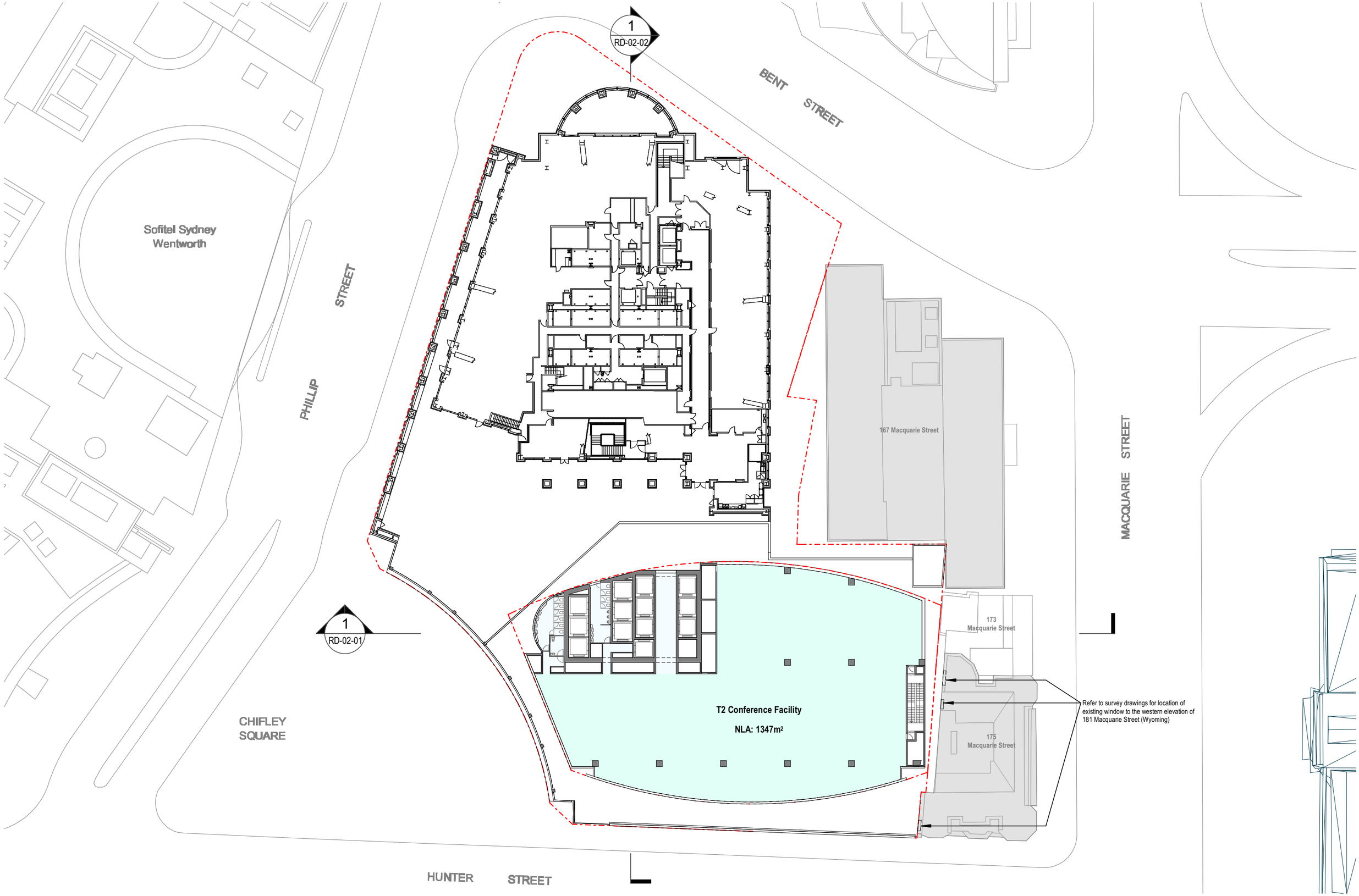

2 Chifley Square

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Date:	**23/07/21**

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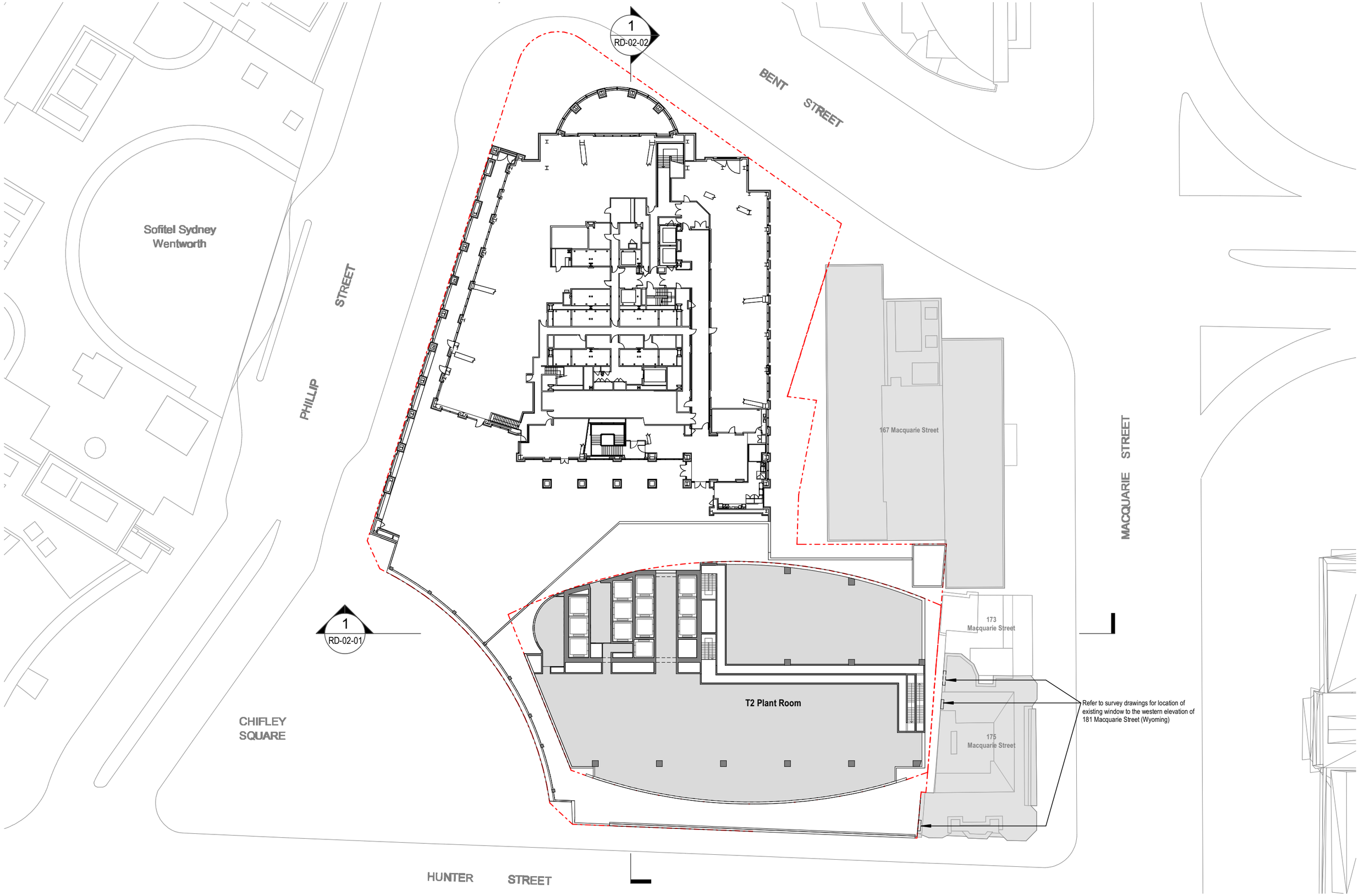

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Date:	**23/07/21**

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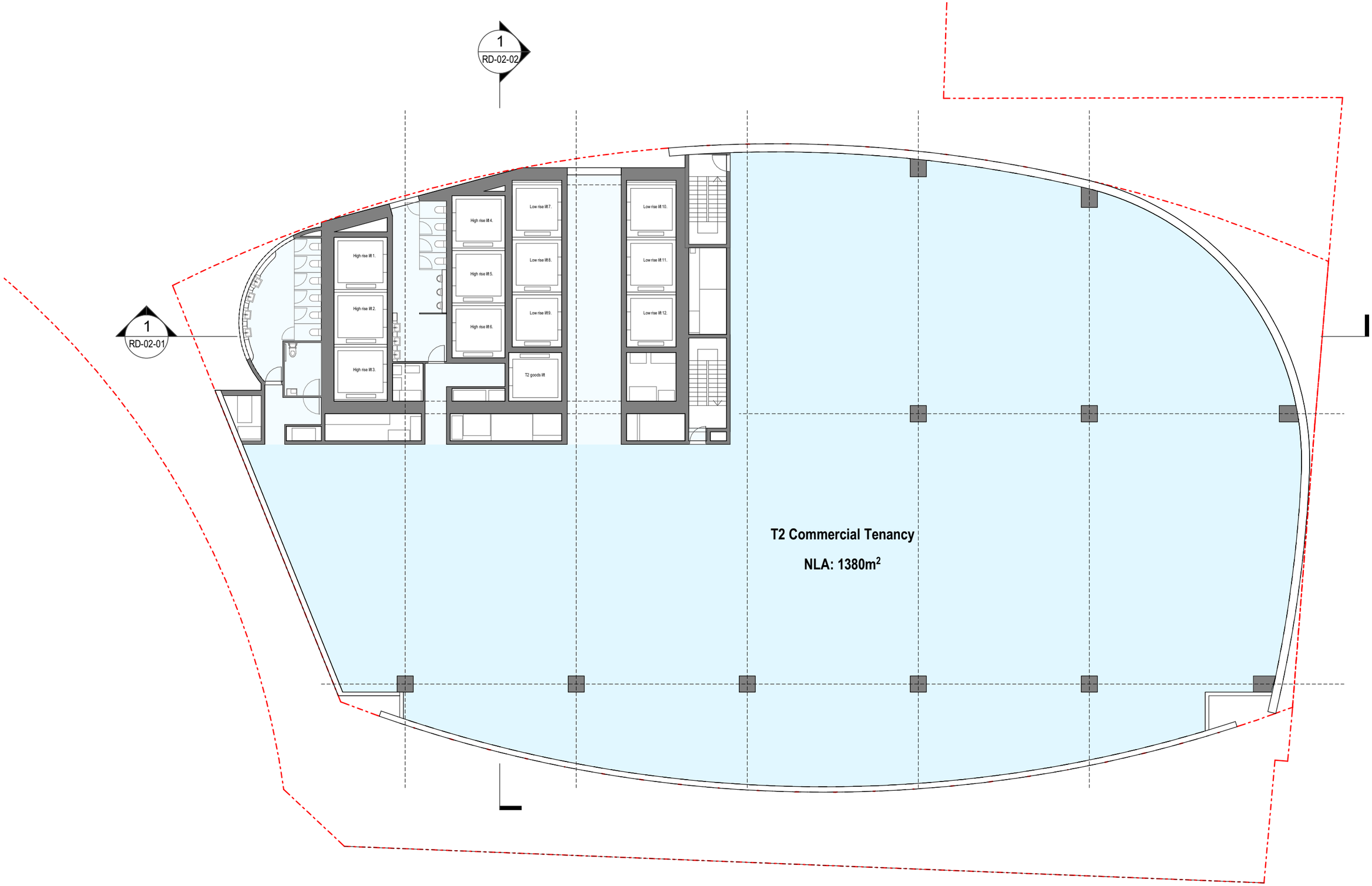

2 Chifley Square

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Date:	23/07/21

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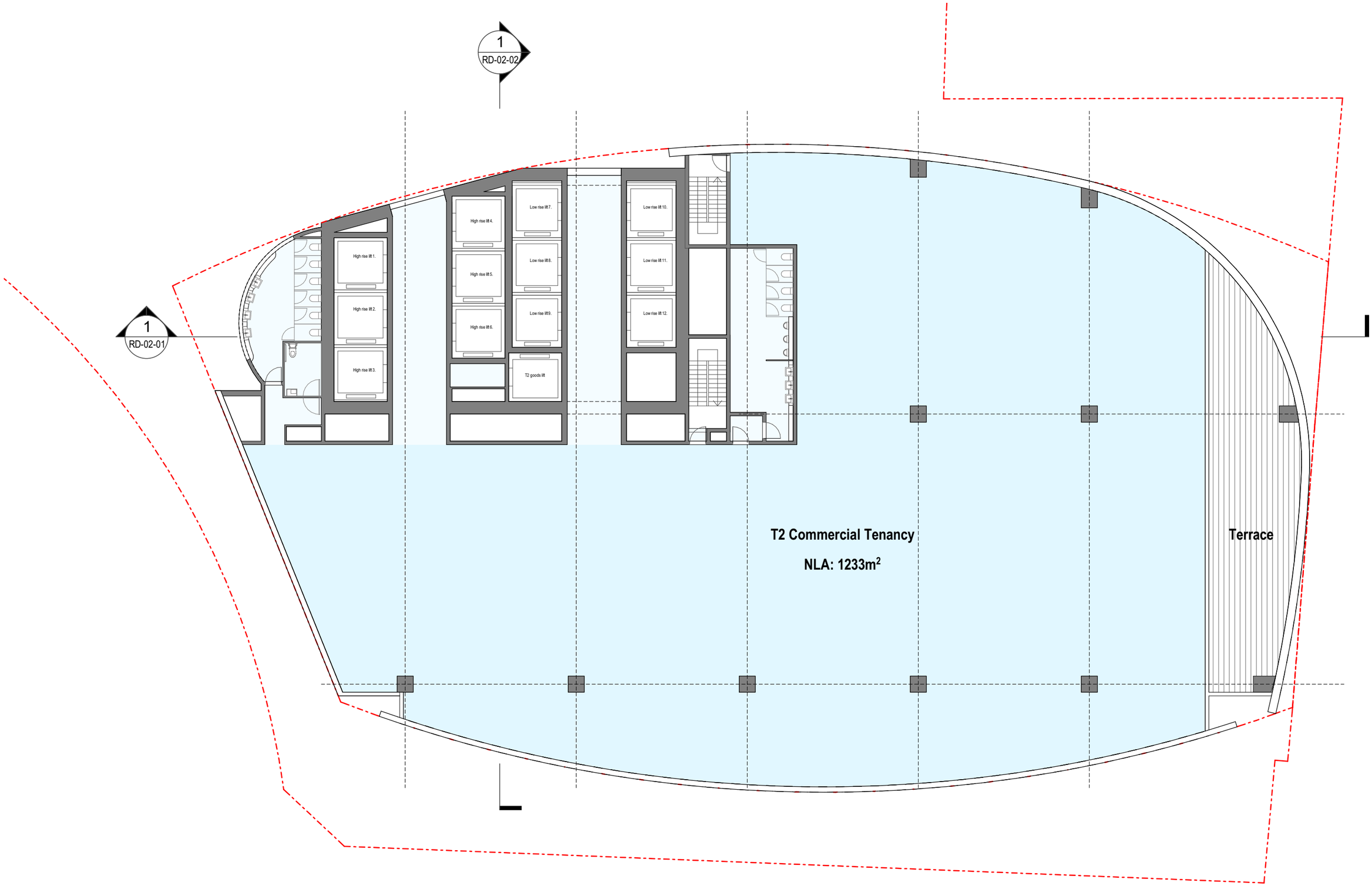

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Issue:	
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Date:	**23/07/21**

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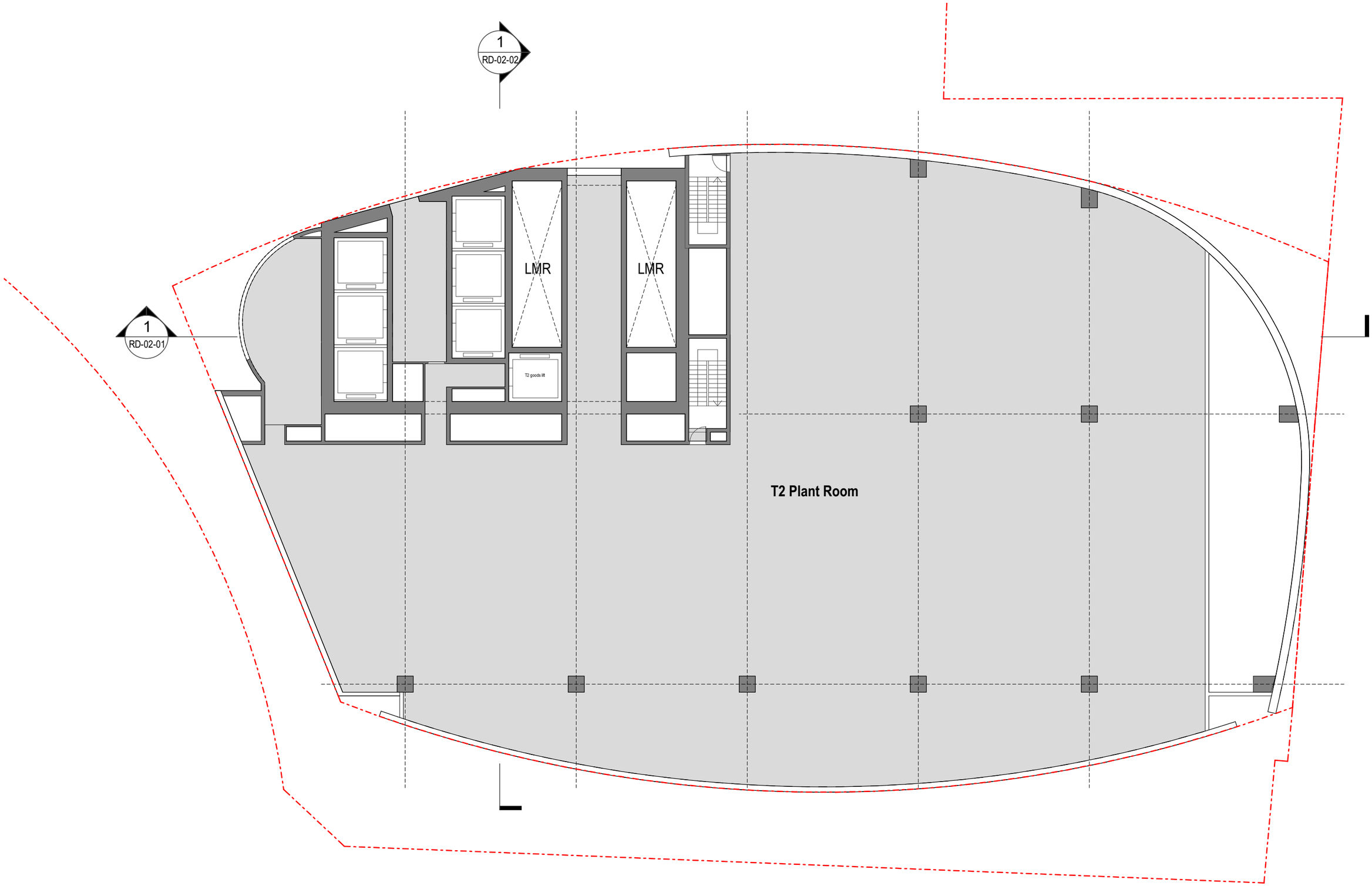

2 Chifley Square

Drawing:	**Mid Plant - Level 21**
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Issue:	
Scale @ A3:	**1 : 200**
Date:	**23/07/21**

0 1 2 3 4 5 10
m

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2 Chifley Square

Drawing: **High Rise - Level 22**
Drawing no: **RD-01-15**
Issue:
Scale @ A3: **1 : 200**
Date: **23/07/21**

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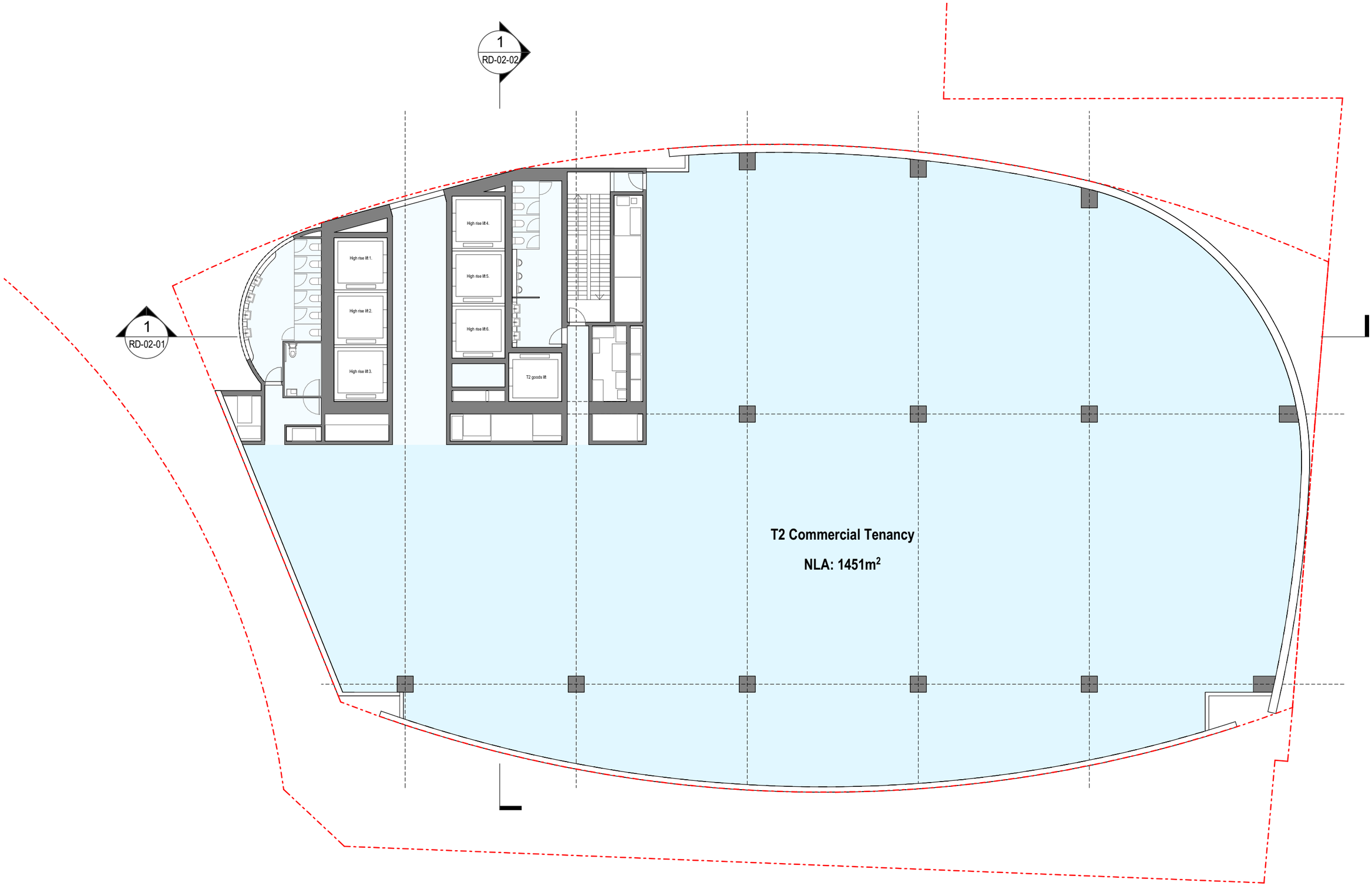

2 Chifley Square

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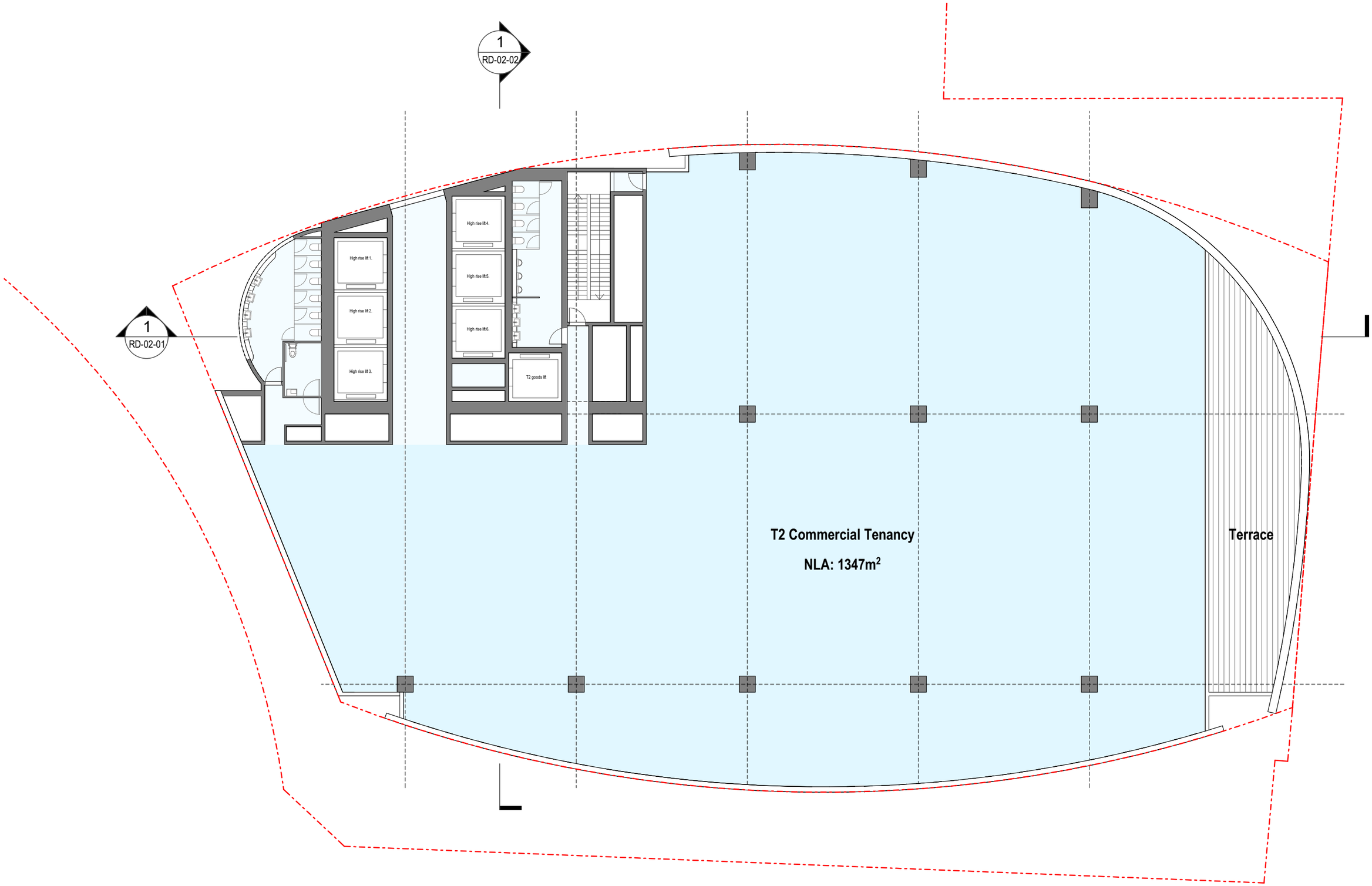

2 Chifley Square

Drawing: **High Rise Terrace - Level 32**
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Issue:
Scale @ A3: 1 : 200
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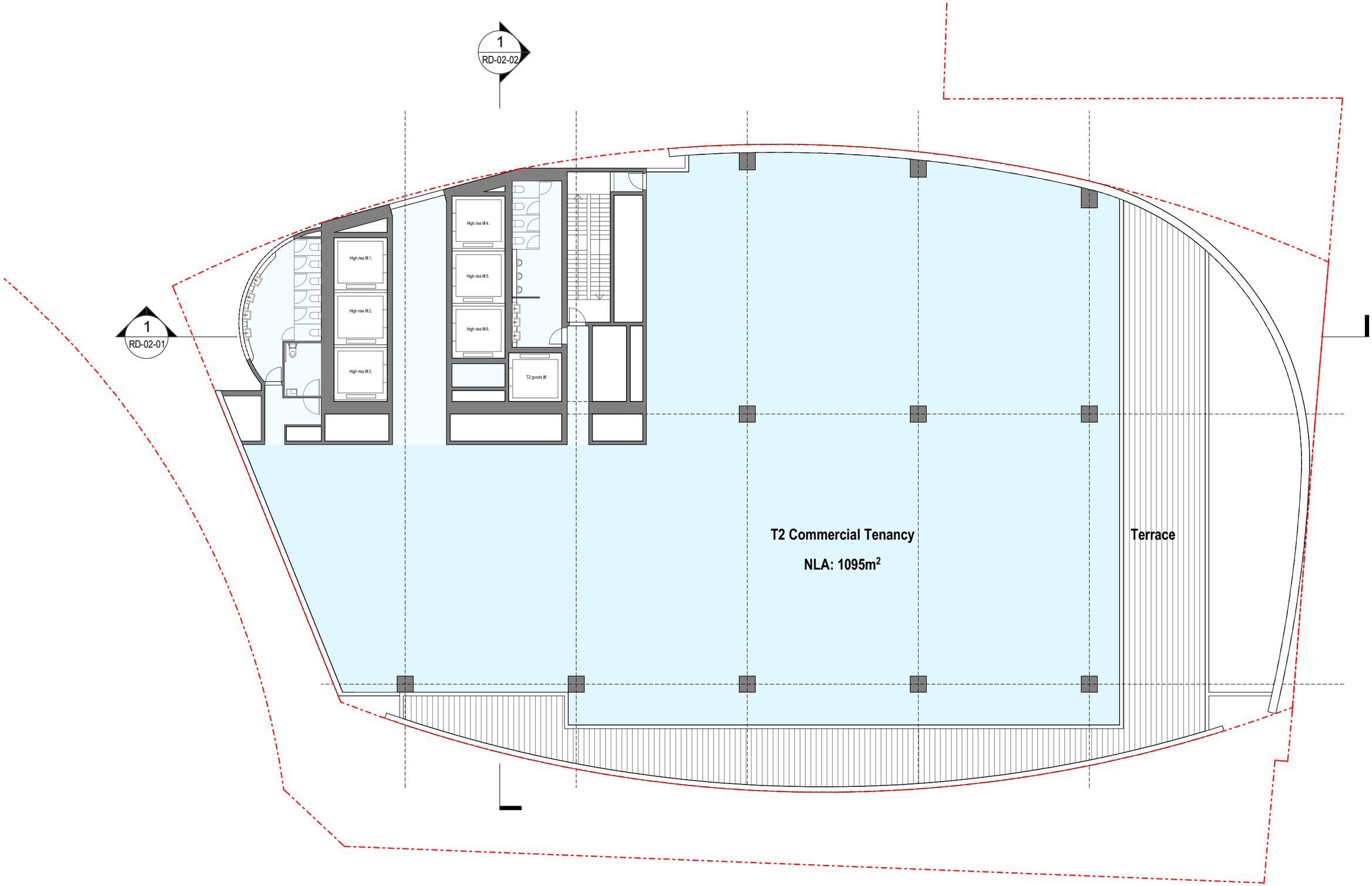

2 Chifley Square

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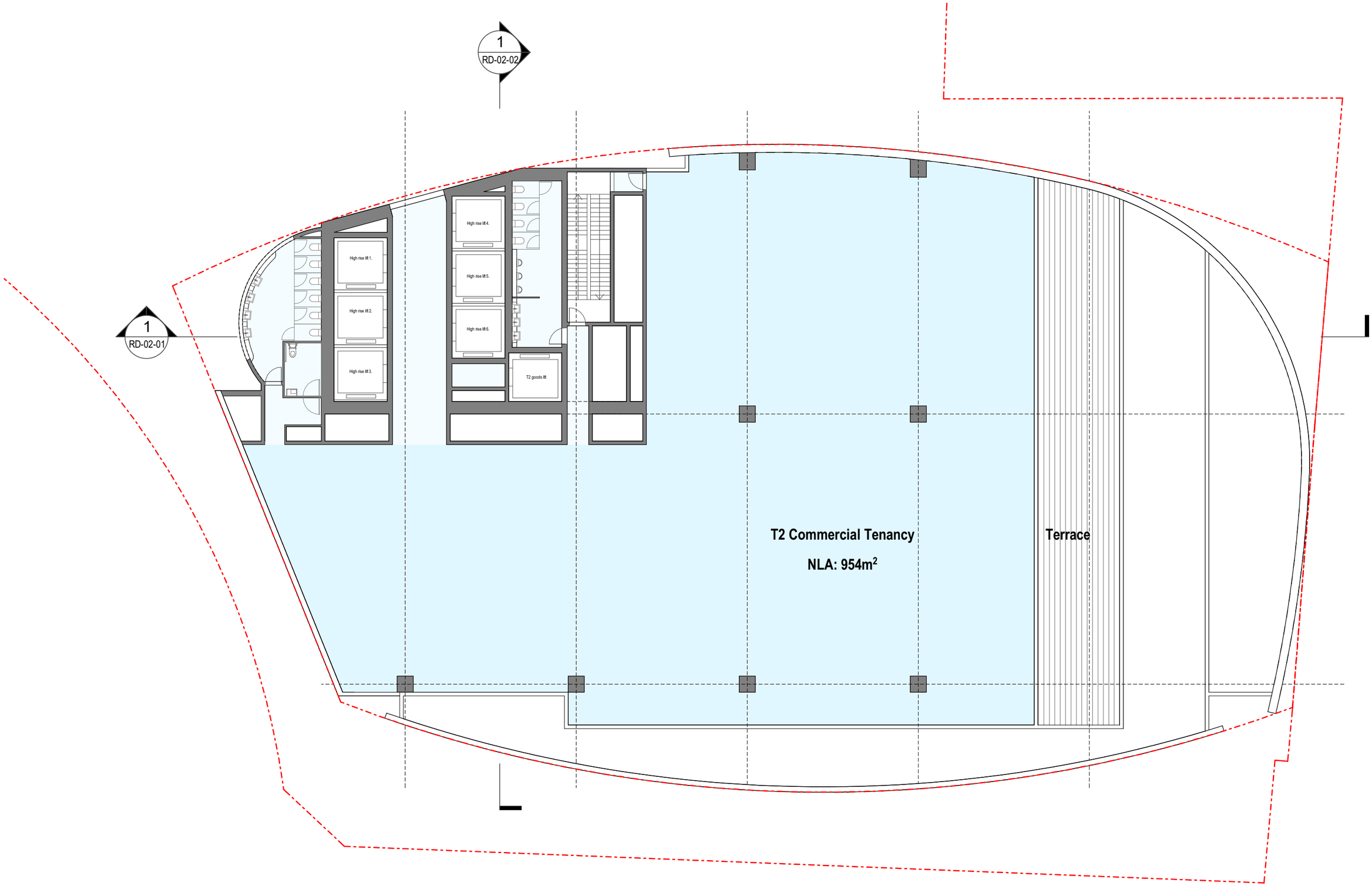

2 Chifley Square

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Date: 23/07/21

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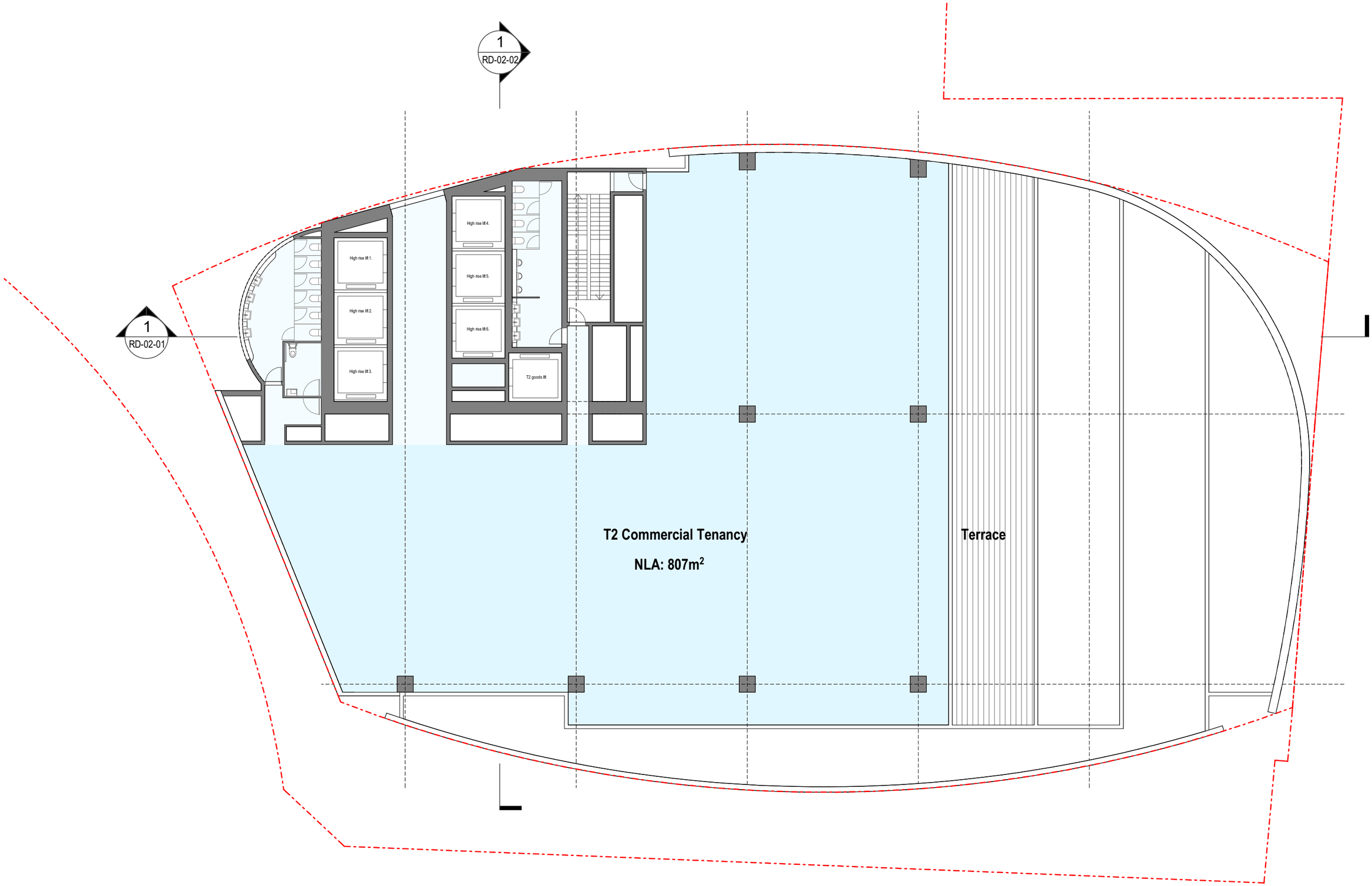

2 Chifley Square

Drawing: **High Rise Terrace - Level 35**
Drawing no: RD-01-20
Issue:
Scale @ A3: 1 : 200
Date: 23/07/21

0 1 2 3 4 5 10
m

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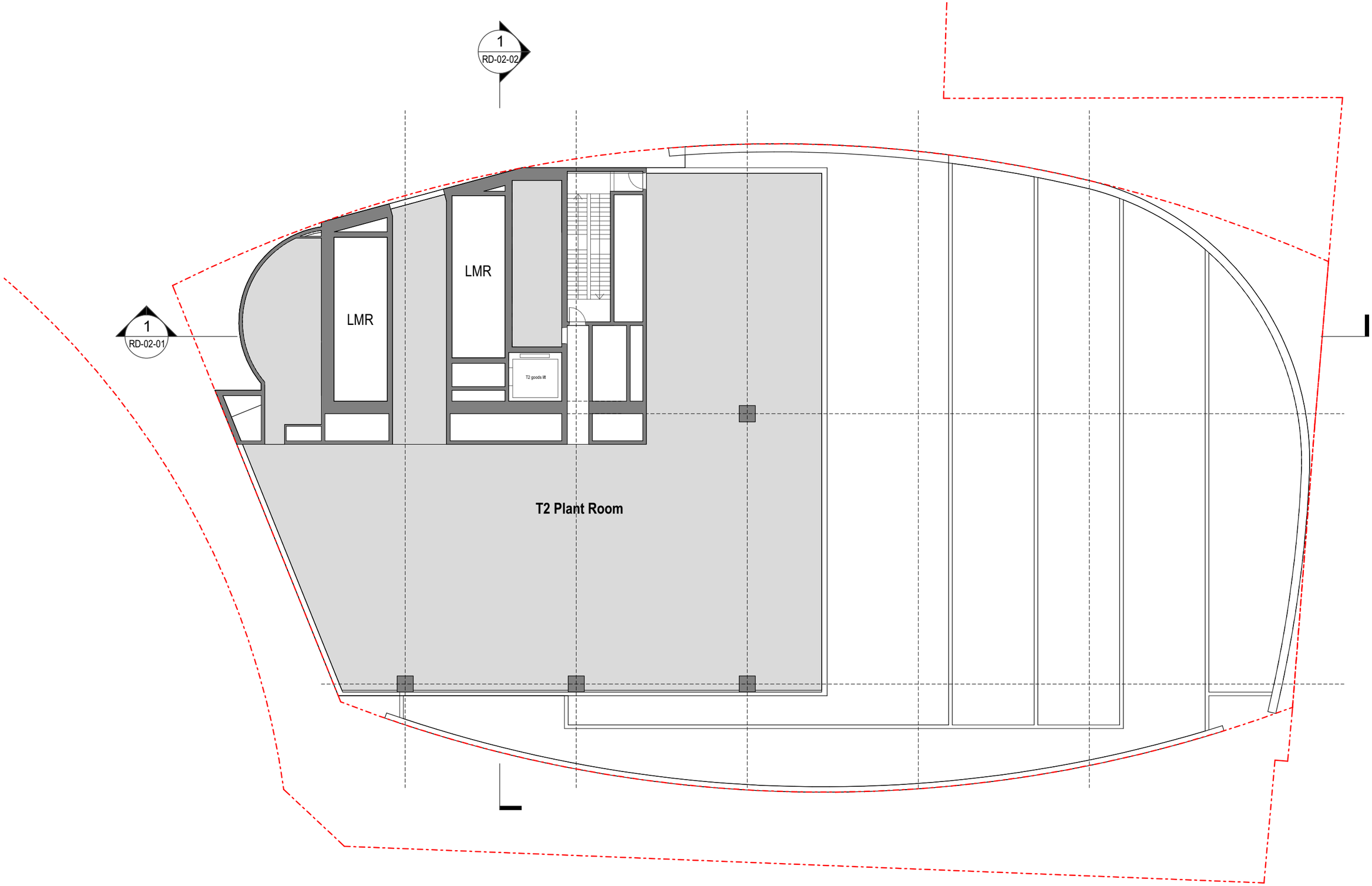

2 Chifley Square

Drawing: **Roof Plant - Level 36**
Drawing no: **RD-01-21**
Issue:
Scale @ A3: **1 : 200**
Date: **23/07/21**

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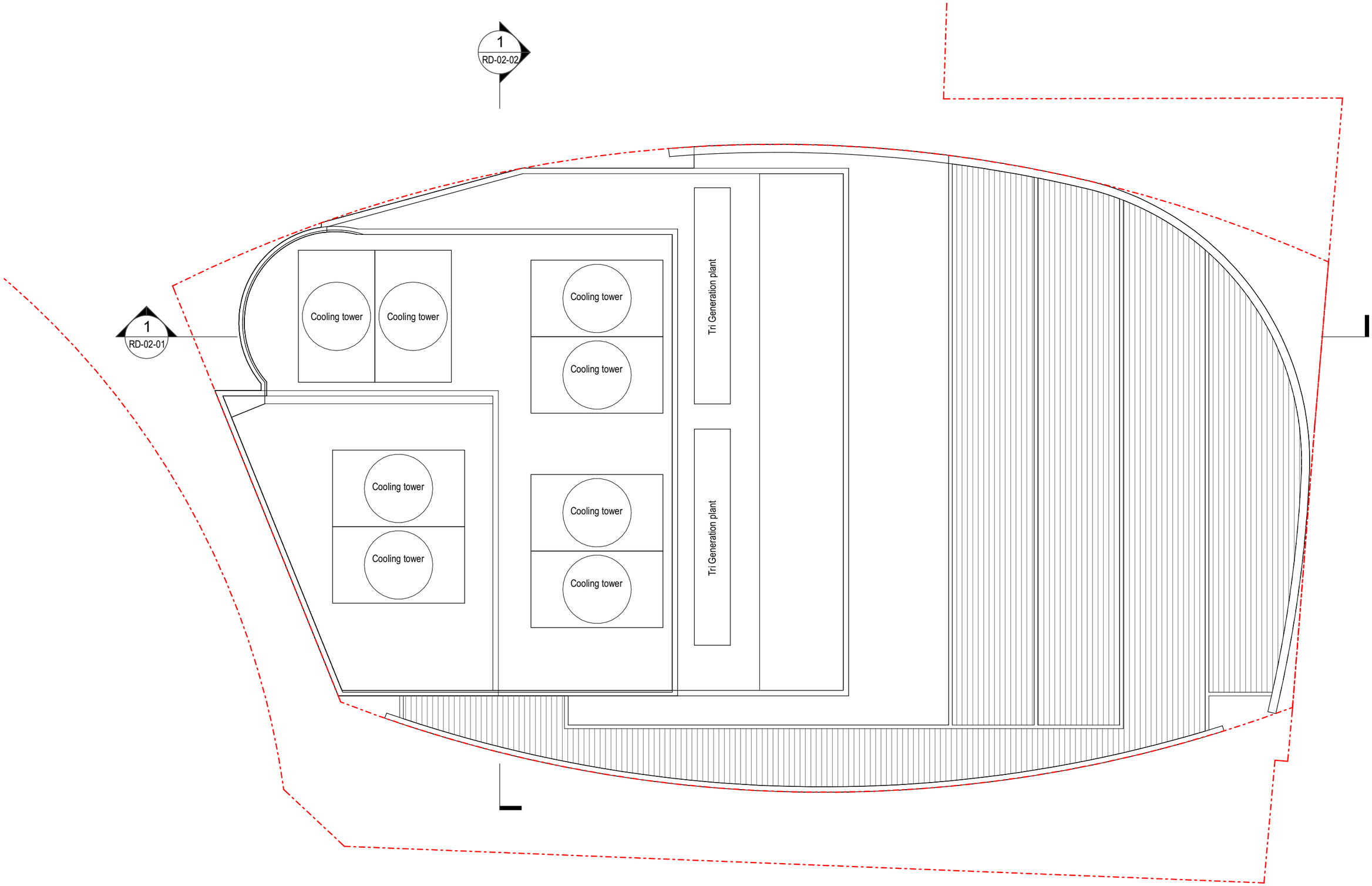

2 Chifley Square

Drawing: **Roof Plant - Roof**
Drawing no: **RD-01-22**
Issue:
Scale @ A3: **1 : 200**
Date: **23/07/21**

0 1 2 3 4 5 10
m

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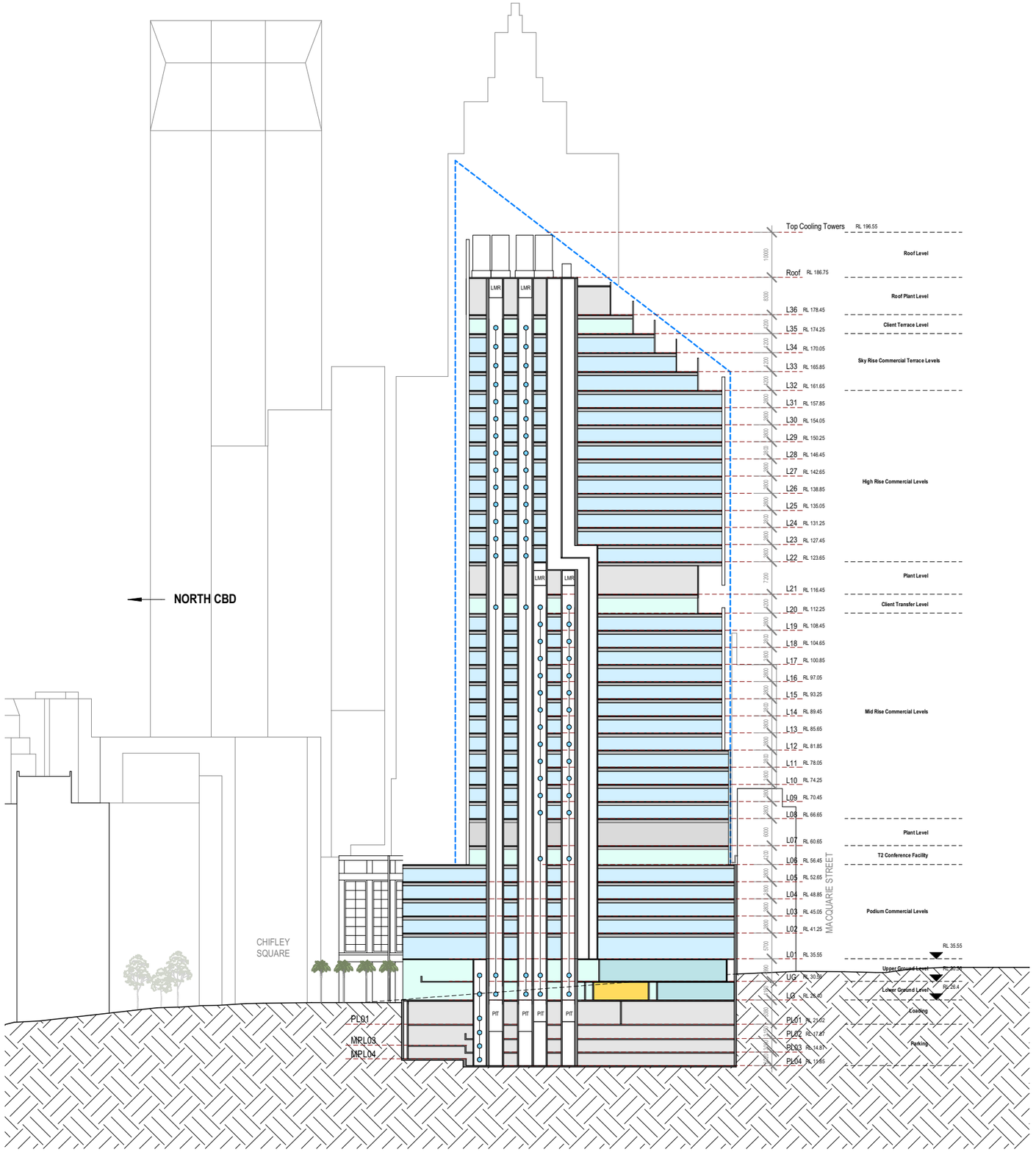

2 Chifley Square

Drawing: **Section East West**
Drawing no: **RD-02-01**
Issue:
Scale @ A3: **1 : 1000**
Date: **23/07/21**

0 5 10 15 20 25 50
m

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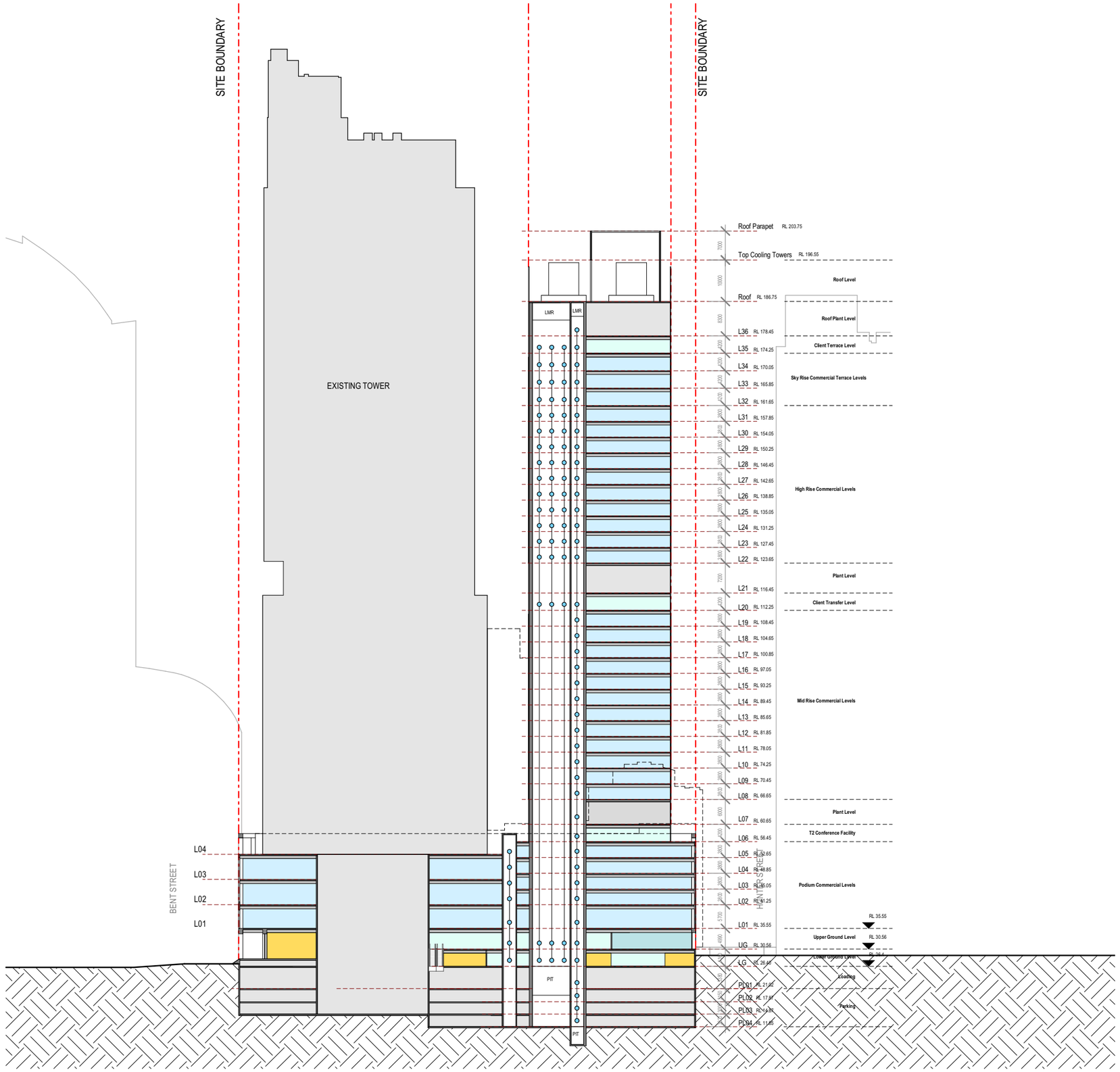

2 Chifley Square

Drawing: **Section North South**
Drawing no: RD-02-02
Issue:
Scale @ A3: 1 : 1000
Date: 23/07/21

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2 Chifley Square

Drawing: **Visualisation - View from Chifley Square**
Drawing no: **RD-04-01**
Issue:
Scale @ A3:
Date: **23/07/21**

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Appendix B Sydney Water Asset Map

A3

BENNELONG SWC No. 29

DBYD Address: 61-101 Phillip Street Sydney NSW 2000	DBYD Job No: 16075625 DBYD Sequence No: 82087129	Copyright Reserved Sydney Water 2019 No warranty is given that the information shown is complete or accurate. SYDNEY WATER CORPORATION	Scale: 1:1500 Date of Production: 08/04/2019	Plan 1 of 1 N 0m 7m 14m 21m 28m

Appendix C City of Sydney City Area Floodplain Risk Management Plan Flood Maps

FIGURE 2
PEAK FLOOD DEPTH
1% AEP DESIGN FLOOD EVENT

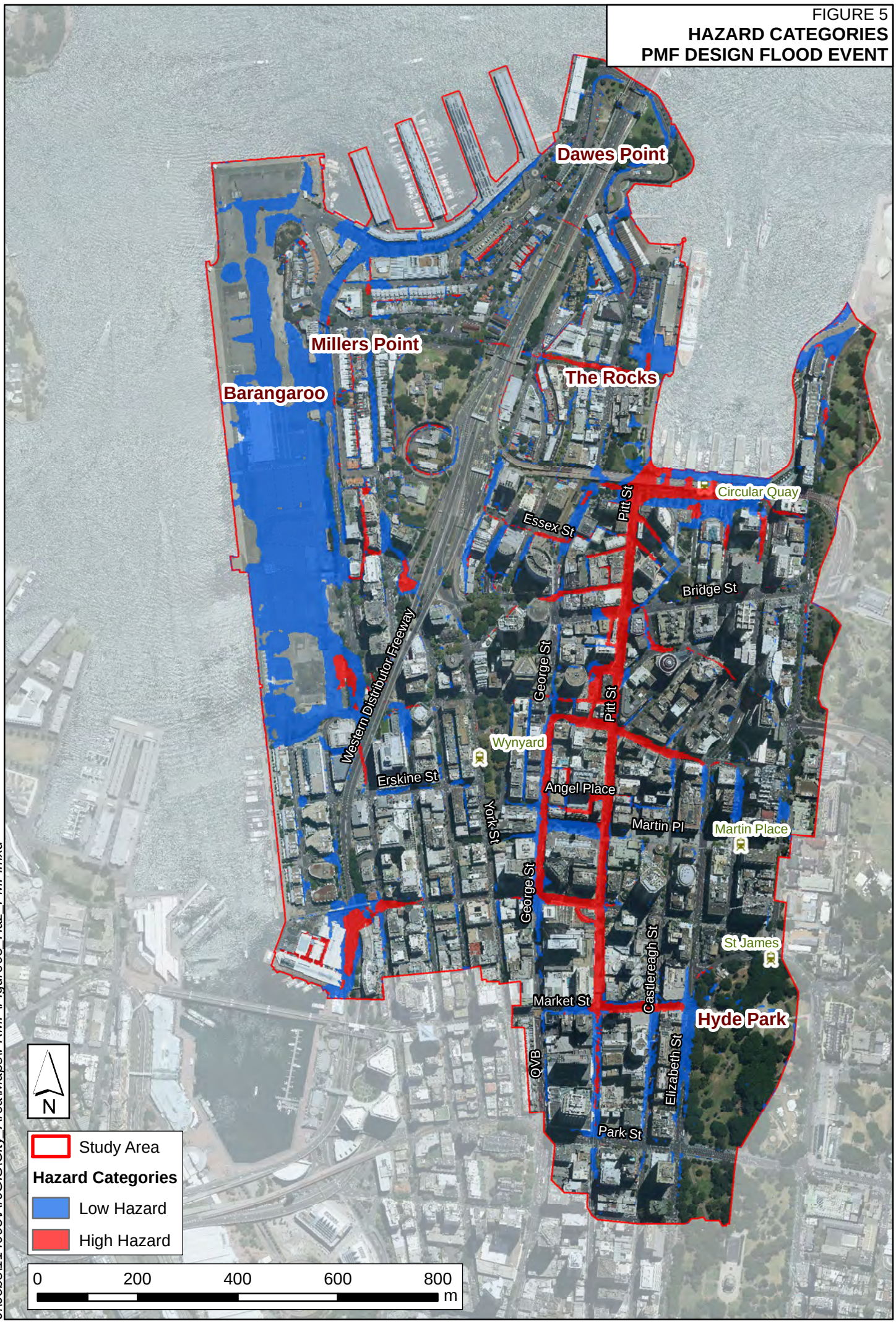
J:\Jobs\114095\ArcGIS\City_AreaMaps\FRMP\Figure02_Peak_Flood_Depth_1%.mxd


FIGURE 3
PEAK FLOOD DEPTH
PMF DESIGN FLOOD EVENT
Dawes Point
Millers Point
Barangaroo
The Rocks
Circular Quay
Essex St
Pitt St
Bridge St
Western Distributor Freeway
George St
Pitt St
Wynyard
Erskine St
Angel Place
York St
Martin Pl
Martin Place
George St
St James
Market St
Castlereagh St
Hyde Park
QVB
Elizabeth St
Park St
N
Study Area
Depth (m)
0.10 - 0.25
0.25 - 0.50
0.50 - 0.75
0.75 - 1.0
> 1.0
0
200
400
600
800
m
J:\Jobs\114095\ArcGIS\City_AreaMaps\FRMP\Figure03_Peak_Flood_Depth_PMF.mxd

FIGURE 4
HAZARD CATEGORIES
1% AEP DESIGN FLOOD EVENT

J:\Jobs\114095\ArcGIS\City_AreaMaps\FRMP\Figure04_Haz_100y.mxd

FIGURE 5
HAZARD CATEGORIES
PMF DESIGN FLOOD EVENT



J:\Jobs\114095\ArcGIS\City_AreaMaps\FRMP\Figure05_Haz_PMF.mxd

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