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Supplementary Water Management Report

Response to Contentions

For a Proposed Residential Development

Prepared for: Warriewood Developers Pty Ltd

Project address: Lots 1 & 2 in DP 349085 (No. 45-49) and Lot 2 in DP 972209 (No.43)
Warriewood Road, Warriewood

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VERSION HISTORY

Version	Date	Purpose	Prepared By	Approved By
A	15/12/2023	Supplementary Water Management Report	Nathan Broadbent	

Review Panel	
Division/Office	Name

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Annexure A ACOR Consultants (CC) Pty Ltd Civil Engineering Plans, reference CC230177, sheets C1.00 to C3.16 (22 sheets), Revision A dated 15 December 2023

1 Introduction

This report has been prepared as a supplementary report to the Engineering Report prepared by C & M Consulting Engineers, Report No. R2192, Revision C, dated 4 June 2021 and seeks to address the relevant contentions outlined in the Statement of Facts and Contentions (SOFCAS) reference No. 2023/00096634. This report also incorporates engineering concepts discussed with Northern Beaches Council and their representatives during the preparation of this report.

During the preparation of this report, information was sourced from various documents. These included, but are not limited to the following:

- Addendum Flood Impact Assessment prepared by BMT, reference L.N20951.007_Warriewood_Rd_FloodingRFI.docx, dated 8 July 2022.
- Civil Engineering Works prepared by C & M for the subject site, drawing No.'s 02192-100 to 02192 (14 sheets), revision 4, dated 26 July 2023.
- Detailed Site Investigation report prepared by Sydney Environmental Group, Report No. 2148-DSI-01-280723.v1f, dated 28 July 2023.
- Engineering Report prepared by C & M, reference R02192, Revision C, dated 4 June 2021.
- Northern Beaches Council Pittwater Development Control Plan (DCP) 21
- Northern Beaches Council Warriewood Valley Water Management Specification 2001
- Statement of Facts and Contentions (SOFCAS) reference No. 2023/00096634 filed 18 May 2023.

2 Site overview

The subject site is known as Lots 1 & 2 in DP 349085 (No. 45-49) and Lot 2 in DP 972209 (No.43) Warriewood Road, Warriewood.

A detailed description of the site can be found in the Detailed Site Investigation report prepared by Sydney Environmental Group, Report No. 2148-DSI-01-280723.v1f, dated 28 July 2023.

2.1 Proposed development

The proposed development consists of two Residential Flat Buildings and a Torrens Title Subdivision creating 11 new residential allotments.

The primary details of the proposed development are depicted on Site Plan prepared by Archidrome, Drawing No.A03, Revision 10, dated 11 December 2023.

3 Contentions

To address the contentions raised by Council, supplementary civil engineering plans have been prepared. In this regard, we refer to our document reference CC230177, sheets C1.00 to C3.16 (22 sheets), revision A, dated 15 December 2023 (copies enclosed under Annexure A). The DRAINS modelling and MUSIC modelling which forms the basis for our revised design can be forwarded to Council and their representatives for review. A description of the DRAINS modelling parameters are outlined in Addendum Flood Impact Assessment prepared by BMT, reference L.N20951.007_Warriewood_Rd_FloodingRFI.docx, dated 8 July 2022.

The relevant contentions and associated responses are included in Table 1.

Table 1.

No.	Contention	Response
3.a.i	<p>The proposal seeks to discharge stormwater into the wetlands at the rear of the site.</p> <p>The Applicant has not addressed the impacts of the outlet flow upon the wetlands, which contain a groundwater dependent EEC.</p>	<p>We refer to our document CC230177, sheets C1.00 to C3.16 (22 sheets), revision A, dated 15 December 2023 and note that an updated BDAR has been prepared based on these plans. We confirm our revised engineering plans provide an outcome that accommodates the maintenance of base flows currently servicing the EEC.</p>
3.a.ii	<p>The proposal seeks to construct a 900mm RCP stormwater line within the existing drainage reserve (43 Warriewood Road) to cater for the 1 in 100-year AEP upper catchment flow from upslope of the site. Although this approach is supported in principle, the Applicant has not demonstrated how the flow of water from upslope is to be suitably captured/directed into the proposed pipeline</p>	<p>A DRAINS model has been prepared based on our revised civil engineering plans. The model demonstrates that the revised stormwater system is able to capture all of the 100 Year ARI +CC30 flows from Warriewood Road and convey them via the proposed culvert to Narrabeen Creek. The DRAINS modelling includes a 20% blockage applied to all on-grade pits and a 50% blockage to all sag pits.</p>
3.a.iii	<p>The proposed 900mm RCP stormwater line within the existing drainage reserve (43 Warriewood Road) is required to be included in the TUFLOW model, inclusive of all existing and proposed drainage systems in the catchment in order to demonstrate that there are no adverse impacts associated with the proposal up to the PMF Event. The assessment needs to assess the worst-case scenario where there is a coincidental local catchment and Narrabeen Creek event up to the PMF event.</p>	<p>Supplementary flood modelling has been undertaken to assess the PMF behaviour within Warriewood Road as DRAINS modelling was deemed unsuitable for this assessment. The revised modelling prepared by BMT includes a direct rainfall TUFLOW model used to assess PMF overland flows occurring near the site. In this regard, we refer to the revised PMF assessment prepared by BMT.</p>
3.a.iv	<p>The Applicant has not provided sufficient detail with respect to the design of the overland flow path over the proposed stormwater line within the existing drainage reserve. Cross sections are required along the overland flow path to detail the 1& AEP Top Water Levels and to ensure that all habitable areas are a minimum of 500mm above these levels.</p>	<p>We refer to our response to contention 3.a.ii and note that a revised design and associated DRAINS model has been prepared which demonstrates the system depicted on our revised civil engineering plans can sufficiently capture and convey 100 Year ARI + CC30 flows through the site.</p>

No.	Contention	Response
3.a.v	The overland flow path dissects Lot 1 and limits the available footprint for future development.	We refer to Site Plan prepared by Archidrome, Drawing No.A03, Revision 10, dated 11 December 2023 and note the revised overland flow path does not encroach on the proposed new Lot 1
3.a.vi	The Applicant does not adequately demonstrate suitable infrastructure upgrades on Warriewood Road, with a new 375mm RCP pipe and pit/s required.	We refer to our revised civil engineering plans and note that a revised stormwater drainage system for Warriewood Road has been documented.
3.a.vii	The development application is not supported by sufficient long sections of stormwater lines, required to detail surface levels, the location of the pipe, the hydraulic grade line, velocities, and flows.	We refer to our revised civil engineering plans and note that a revised stormwater drainage long section has been document. The long section includes a hydraulic grade line analysis for the 100 Year ARI flows plus Climate Change.
3.a.viii	It is unclear whether the Overland Flow Study was undertaken in accordance with Australian Rainfall and Runoff 2019 and Book 9 A Guide to Flood Estimation in Urban Areas, or whether climate change was incorporated into the modelling. Further, the modelling needs to be undertaken by an Engineer that is registered under the NSW Design and Building Practitioners Act and Regulation.	We refer to Addendum Flood Impact Assessment prepared by BMT, reference L.N20951.007_Warriewood_Rd_FloodingRFI.docx, dated 8 July 2022. In this regard, we have reviewed the adopted methodology and confirm that climate change has been considered. Additionally, we are of the view that the view the adopted flood modelling is appropriate to allow for an assessment of flood impacts and flood risk associated with the development.
3.a.ix	The development application is not accompanied by a completed/signed Documentation Checklist – Development Application, as required by the Water Management Specification.	We refer to our revised civil engineering plans and note that some of the measures included in our assessment result from an engineering assessment. Whilst these concepts have been discussed with Council's representatives, a merit-based assessment is required which falls outside the items defined within the checklist.
3.a.x	The Applicant has not demonstrated that flood free evacuation from all lots is possible in the PMF event.	We refer to our response to contention 3.a.iii and note supplementary modelling has been undertaken. In this regard, we refer to the revised PMF assessment prepared by BMT.
3.a.xi	The Applicant has failed to consider potential impacts upon the water table, or the groundwater dependent EEC.	We refer to our document CC230177, sheets C1.00 to C3.16 (22 sheets), revision A, dated 15 December 2023 and note that an updated BDAR has been prepared based on these plans. We confirm our revised engineering plans provide an outcome that accommodates the maintenance of base flows currently servicing the EEC.
3.a.xii	The Applicant has not adequately address water quality, with over simplified and generalised statements that are not specific to the unique circumstances of the site.	A detailed MUSIC model has been prepared as part of our revised assessment. The MUSIC model can be provided to Council's representative for assessment. We can confirm that the MUSIC modelling was undertaken in accordance with Council's DCP requirements, and the pollutant reduction targets of Council's Water Management for Development Specification have been met for scenarios representing a dry, wet, and average rainfall year.

No.	Contention	Response
3.a.xiii	Insufficient information has been provided in relation to the proposed infiltration basin, with concern that large volumes of runoff will not be treated. A bioretention basin is considered to be more suitable in this instance.	We refer to our document CC230177, sheets C1.00 to C3.16 (22 sheets), revision A, dated 15 December 2023 and note that two basins have been documented to manage stormwater flows and to provide a compliant water quality outcome. The details of the basin are depicted on our revised documents.
3.a.xiv	The proposed infiltration basin has a weir to control the outflow. The Applicant has not demonstrated that this is an appropriate outlet method in light of the groundwater dependent EEC along the creek line.	We refer to our document CC230177, sheets C1.00 to C3.16 (22 sheets), revision A, dated 15 December 2023 and note that weir overflows are proposed to an energy dissipation swale. This method has been discussed with Council's representatives in concept and are documented on our revised civil engineering plans. We understand this is a satisfactory outcome resulting in minimal impact to the EEC.
3.a.xv	The proposed use of litter baskets is not a practical outcome, with a gross pollutant trap is more appropriate.	We refer to our document CC230177, sheets C1.00 to C3.16 (22 sheets), revision A, dated 15 December 2023 and note two GPTs have been proposed. We acknowledge the limited fall available to provide a large GTP due to the Lorikeet Grove Road surface levels required to tie in with existing road levels. Notwithstanding, we have been liaising with manufacturers who have advised custom solutions are available to suit.
3.a.xvi	The MUSIC Model is to be prepared in accordance with Council's guidelines and is to be supplied to Council as a model file (.sqz).	We can provide our MUSIC model for assessment.
3.a.xvii	The Engineering Report (C&M Consulting Engineers, 4 June 2021) relies upon rainwater tanks on each of the 11 residential lots that are not proposed as part of the proposal, and the assumed rainwater reuse is inconsistent with the submitted BASIX Certificate.	We confirm our revised assessment includes both the ultimate scenario described in the C & M report dated 4 June 2021, and also an assessment that does not include rainwater tanks on the proposed Torrens Title lots. In this regard, we confirm our assessment does not rely on the provision of future rainwater tanks on Torrens Title lots to meet water quality targets prescribed by Council.
3.a.xviii	The Engineering Report (C&M Consulting Engineers, 4 June 2021) makes assumptions regarding the developed conditions of Catchment 3, being the proposed Torrens Title lots fronting Lorikeet Drive and the access driveway for the residential flat buildings. It is unclear how these assumed calculations have been derived or how the consent authority can ensure consistency with these assumptions in the long term.	We refer to drawing C1.01 which depicts the catchments draining to each of the proposed basins. A DRAINS model has been prepared to size the OSD basins to ensure post-development flows do not exceed pre-developed conditions for a range of storm events from the 1 Year ARI to 100 Year ARI flood event plus climate change.
3.a.xviii	For the purpose of assessing water management and flooding, is it unclear whether the relevant technical consultants have relied upon the architectural plans or the civil plans, which significantly differ with respect to the earthworks proposed and resultant ground levels.	We confirm our revised documents are consistent with the details depicted on Site Plan prepared by Archidrome, Drawing No.A03, Revision 10, dated 11 December 2023.

No.	Contention	Response
3.b	Clause C6.1 (Integrated Water Cycle Management) of P21 DCP and the Water Management Specification require a cohesive, site specific solution for water management across a development site.	We confirm our revised documents are consistent with the details depicted on Site Plan prepared by Archidrome, Drawing No.A03, Revision 10, dated 11 December 2023.
3.c	Although individual technical reports have been provided, they are internally inconsistent, and with each other, and do not satisfactorily demonstrate how the water cycle is cohesively managed on the site.	
3.e	Without consistency with the Water Management Specification or adequate consideration of impacts associated with the proposal, it is also inconsistent with the requirements and objectives of cl.5.21 (Flood planning) of PLEP 2014.	
3.d	Without consistency with the Water Management Specification or adequate consideration of impacts associated with the proposal, it is also inconsistent with the requirements and objectives of cl.6.1(3) of PLEP 2014.	

4 Stormwater Quality

Stormwater runoff quality from the development has been assessed using a MUSIC model which considers the treatment train depicted in Figure 1. The minimum pollutant capture targets achieved are outlined in Table 2.

Table 2: Pollutant capture targets.

Pollutant	Target
Total suspended solids (TSS)	80% capture
Total phosphorus (TP)	65% capture
Total nitrogen (TN)	45% capture
Gross pollutants (GP)	90% capture

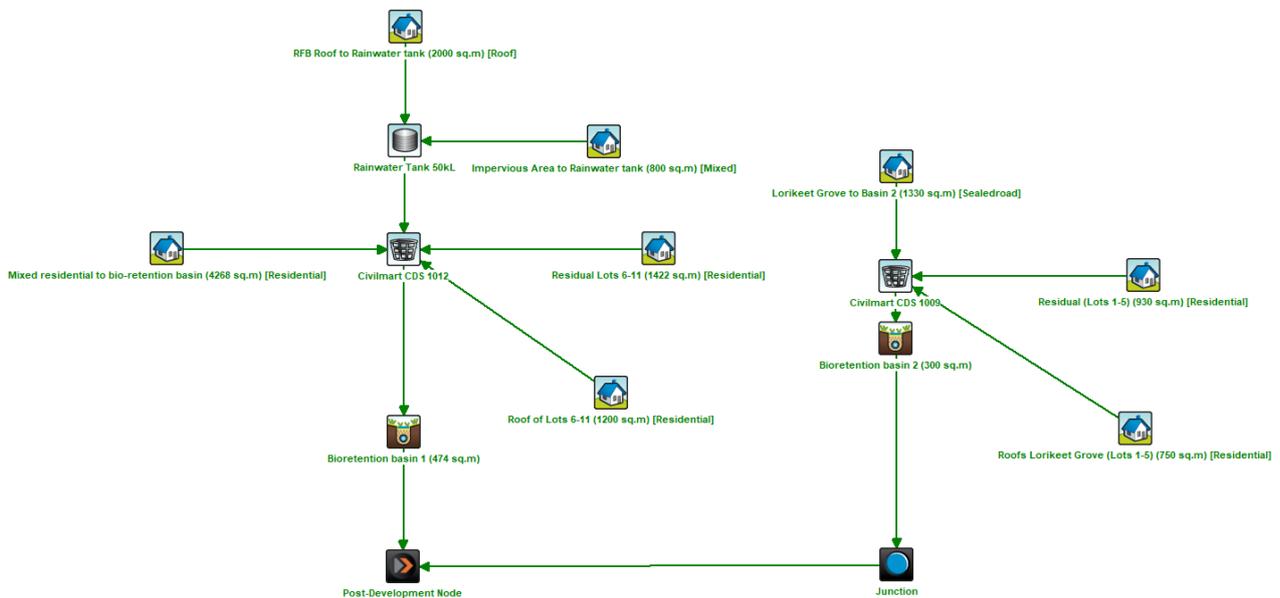


Figure 1: MUSIC model layout.

5 On-site Detention (OSD)

We refer to our document CC230177, sheets C1.00 to C3.16 (22 sheets), revision A, dated 15 December 2023 which depicts two OSD basins. A total OSD storage volume of 540 m³ has been provided which limits post-development flows to pre-development conditions for all storm events ranging from the 1 Year ARI storm event up to the 100 Year ARI storm event plus climate change. A copy of our DRAINS modelling can be provided to Council.

6 Conclusion

Based on the foregoing, we are of the view that the current list of civil engineering contentions before the court can be satisfactorily addressed based on the contents of our revised documents.

Yours faithfully,
ACOR Consultants (CC) Pty Ltd

A handwritten signature in black ink, appearing to read 'N Broadbent'.

Nathan Broadbent
BEng(Civil) CPEng NER



Annexure A ACOR Consultants (CC) Pty Ltd Civil Engineering Plans, reference CC230177, sheets C1.00 to C3.16 (22 sheets), Revision A dated 15 December 2023

PROPOSED DEVELOPMENT (No.43-49) WARRIEWOOD ROAD, WARRIEWOOD CIVIL ENGINEERING PLANS

GENERAL NOTES	
1.	THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED.
2.	ALL DIMENSIONS RELEVANT TO SETTING OUT AND OFF-SITE WORK SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION
3.	DIMENSIONS SHALL NOT BE OBTAINED BY SCALING THE DRAWINGS.
4.	ALL DIMENSIONS ON DETAILS ARE IN MILLIMETRES UNLESS STATED OTHERWISE. ALL PLANS AND LEVELS ARE EXPRESSED IN METRES.
5.	DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STRUCTURAL STABILITY OF THE WORKS AND ENSURE NO PARTS BE OVER STRESSED UNDER CONSTRUCTION ACTIVITIES.
6.	WORKMANSHIP AND MATERIALS ARE TO BE IN ACCORDANCE WITH THE RELEVANT CURRENT S.A.A. CODES INCLUDING ALL AMENDMENTS, AND THE LOCAL STATUTORY AUTHORITIES, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
7.	THE APPROVAL OF A SUBSTITUTION SHALL BE SOUGHT FROM THE ENGINEER BUT IS NOT AN AUTHORISATION FOR A VARIATION. ANY VARIATIONS INVOLVED MUST BE TAKEN UP WITH THE ARCHITECT OR PROJECT MANAGER BEFORE THE WORK COMMENCES.
8.	ANY DISCREPANCIES OR OMISSIONS SHALL BE REFERRED TO THE ENGINEER FOR A DECISION BEFORE PROCEEDING WITH THE WORK.
9.	THE BUILDER SHALL GIVE 48 HOURS NOTICE FOR ALL ENGINEERING INSPECTIONS.
10.	BUILDING FROM THESE DRAWINGS IS NOT TO COMMENCE UNTIL APPROVED BY THE LOCAL AUTHORITIES
11.	THE WORD 'ENGINEER' USED IN THESE NOTES REFER TO AN EMPLOYEE OR NOMINATED REPRESENTATIVE OF ACOR CONSULTANTS PTY.LTD.

ROADWORKS NOTES	
1.	ALL BASECOURSE AND SUB-BASECOURSE MATERIALS SHALL CONFORM WITH AUSTRALIAN STANDARDS.
2.	ALL BASECOURSE AND SUB-BASE MATERIALS SHALL BE COMPACTED TO ACHIEVE A MINIMUM OF 100% STANDARD MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT OF +OR- 2% IN ACCORDANCE WITH AS1289 E1.1.
3.	ALL WEARING SURFACES SHALL BE ASPHALTIC CONCRETE LAID TO THE THICKNESS SPECIFIED AND IN ACCORDANCE WITH THE SPECIFICATION.
4.	CONCRETE FOR KERB SHALL HAVE A CONCRETE STRENGTH OF 20MPa AT 28 DAYS, MINIMUM SLUMP OF 60mm AND MAXIMUM AGGREGATE SIZE OF 40mm.

EXISTING SERVICES AND FEATURES	
1.	THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION, REMOVAL AND DISPOSAL IF REQUIRED OF ALL EXISTING SERVICES IN AREAS AFFECTED BY WORKS WITHIN THE CONTRACT AREA, AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT.
2.	THE CONTRACTOR IS TO CONDUCT A THOROUGH UNDERGROUND SERVICES INVESTIGATION TO LOCATE ALL SERVICES WITHIN THE AREA OF WORKS PRIOR TO ANY DEMOLITION WORKS COMMENCING
3.	THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES SERVICES TO ALL BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED.
4.	PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL GAIN WRITTEN APPROVAL OF HIS PROGRAMME FOR THE RELOCATION/CONSTRUCTION OF TEMPORARY SERVICES.
5.	EXISTING BUILDINGS, EXTERNAL STRUCTURES, AND TREES SHOWN ON THESE DRAWINGS ARE FEATURES EXISTING PRIOR TO ANY DEMOLITION WORKS.
6.	CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
7.	INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE TO THE PRINCIPAL. CONTRACTOR TO GAIN APPROVAL OF SUPERINTENDENT FOR TIME OF INTERRUPTION.

SITEWORKS NOTES	
1.	ORIGIN OF LEVELS :- AUSTRALIAN HEIGHT DATUM (A.H.D.)
2.	CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK.
3.	ALL WORK IS TO BE UNDERTAKEN IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS, THE SPECIFICATIONS AND THE DIRECTIONS OF THE PRINCIPAL'S REPRESENTATIVE.
4.	EXISTING SERVICES HAVE BEEN PLOTTED FROM SUPPLIED DATA AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE PRINCIPAL'S REPRESENTATIVE. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
5.	WHERE NEW WORKS ABOUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS OBTAINED.
6.	THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
7.	CARE IS TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATIONS ARE TO BE UNDERTAKEN OVER COMMUNICATIONS OR ELECTRICAL SERVICES. HAND EXCAVATE IN THESE AREAS.
8.	ALL SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED WITH AN APPROVED NON-NATURAL GRANULAR MATERIAL AND COMPACTED TO 98% STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 S.1.1.
9.	ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL.
10.	ON COMPLETION OF PIPE INSTALLATION ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AND GRASSED AREAS AND ROAD PAVEMENTS.
11.	PROVIDE 12mm WIDE EXPANDING CORK JOINTS BETWEEN CONCRETE PAVEMENTS AND ALL BUILDINGS, WALLS, FOOTINGS, COLUMNS, KERBS, DISH DRAINS, GRATED DRAINS, BOLLARD FOOTINGS ETC
12.	CONTRACTOR TO OBTAIN ALL AUTHORITY APPROVALS.
13.	ALL BATTERS TO BE GRASSED LINED WITH MINIMUM 100 TOPSOIL AND APPROVED COUCH LAID AS TURF.
14.	MAKE SMOOTH TRANSITION TO EXISTING SERVICES AND MAKE GOOD.
15.	THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY DIVERSION DRAINS AND MOUNDS TO ENSURE THAT AT ALL TIMES EXPOSED SURFACES ARE FREE DRAINING AND WHERE NECESSARY EXCAVATE SUMPS AND PROVIDE PUMPING EQUIPMENT TO DRAIN EXPOSED AREAS.
16.	THESE PLANS SHALL BE READ IN CONJUNCTION WITH APPROVED ARCHITECTURAL, STRUCTURAL, HYDRAULIC AND MECHANICAL DRAWINGS AND SPECIFICATIONS.
17.	TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MIN 50mm IN BITUMINOUS PAVING.
18.	ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN 800 UPVC SEWER GRADE CONDUITS EXTENDING A MIN OF 500mm PAST PAVING.
19.	ON COMPLETION OF WORKS ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL INCLUDING, BUT NOT LIMITED TO, KERBS, FOOTPATHS, CONCRETE AREAS, GRASS AND LANDSCAPED AREAS.

COMPACTION NOTES	
1.	ALL SOFT, WET OR UNSUITABLE MATERIAL TO BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS LISTED BELOW.
2.	ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING: <ul style="list-style-type: none"> a. FREE FROM ORGANIC, PERISHABLE AND CONTAMINATED MATTER b. MAXIMUM PARTICLE SIZE 75MM c. PLASTICITY INDEX BETWEEN 2% AND 15%
3.	THE CONTRACTOR SHALL PROGRAM THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED BY THE CONTRACTOR AT THEIR COST.
4.	TESTING OF THE SUBGRADE SHALL BE CARRIED OUT BY AN APPROVED NATA REGISTERED LABORATORY AT THE CONTRACTORS EXPENSE.

STORMWATER NOTES	
1.	ALL 225 DIA. DRAINAGE PIPES AND LARGER SHALL BE CLASS '2" APPROVED SPIGOT AND SOCKET FRC OR RCP PIPES WITH RUBBER RING JOINTS. (U.N.O.) ALL DOWNPIPE DRAINAGE LINES SHALL BE SEWER GRADE uPVC WITH SOLVENT WELD JOINTS. (U.N.O.)
2.	EQUIVALENT STRENGTH REINFORCED CONCRETE PIPES MAY BE USED.
3.	ALL PIPE JOINTS UP TO AND INCLUDING 450 DIA. AND TAPERS SHALL BE VIA PURPOSE MADE FITTINGS.
4.	MINIMUM GRADE TO STORMWATER LINES TO BE 1%. (U.N.O.)
5.	CONTRACTOR TO SUPPLY AND INSTALL ALL FITTINGS AND SPECIALS INCLUDING VARIOUS PIPE ADAPTORS TO ENSURE PROPER CONNECTION BETWEEN DISSIMILAR PIPEWORK.
6.	ALL CONNECTIONS TO EXISTING DRAINAGE PITS SHALL BE MADE IN A TRADESMAN-LIKE MANNER AND THE INTERNAL WALL OF THE PIT AT THE POINT OF ENTRY SHALL BE CEMENT RENDERED TO ENSURE A SMOOTH FINISH.
7.	PRECAST PITS SHALL NOT BE USED UNLESS WRITTEN APPROVAL IS OBTAINED FROM THE SUPERINTENDENT.
8.	WHERE TRENCHES ARE IN ROCK, THE PIPE SHALL BE BEDDED ON A MIN. 50MM CONCRETE BED (OR 75MM THICK BED OF 12MM BLUE METAL) UNDER THE BARREL OF THE PIPE. THE PIPE COLLAR AT NO POINT SHALL BEAR ON THE ROCK. IN OTHER THAN ROCK, PIPES SHALL BE LAID ON A 75MM THICK SAND BED. IN ALL CASES BACKFILL THE TRENCH WITH SAND TO 200MM ABOVE THE PIPE. WHERE THE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH WITH SAND OR APPROVED GRANULAR BACKFILL COMPACTED IN 150MM LAYERS TO 98% STANDARD MAX. DRY DENSITY.
9.	BEDDING SHALL BE (U.N.O.) TYPE H1, IN ACCORDANCE WITH CURRENT RELEVANT AUSTRALIAN STANDARDS.
10.	WHERE STORMWATER LINES PASS UNDER FLOOR SLABS SEWER GRADE RUBBER RING JOINTS ARE TO BE USED.
11.	WHERE SUBSOIL DRAINAGE LINES PASS UNDER FLOOR SLABS AND VEHICULAR PAVEMENTS UNSLOTTED UPVC SEWER GRADE PIPE SHALL BE USED.
12.	PROVIDE 3.0M LENGTH OF 100 DIA. SUBSOIL DRAINAGE PIPE WRAPPED IN FABRIC SOCK, AT UPSTREAM END OF EACH PIT.

CONCRETE PAVEMENT NOTES	
1.	CONCRETE MIX PARAMETERS : <ul style="list-style-type: none"> - MAXIMUM AGGREGATE SIZE 20mm - FLEXURAL STRENGTH AT 28 DAYS = 3.5MPa - FLEXURAL STRENGTH AT 90 DAYS = 3.85 MPa - MAXIMUM WATER / CEMENT RATIO = 0.55 - MAXIMUM SHRINKAGE LIMIT = 650 MICRON STRAINS (AS 1012 P1 13) - MINIMUM CEMENT CONTENT = 300kg/m³ - CEMENT TO BE TYPE 'A' (NORMAL CEMENT) TO AS 1315 - SLUMP = 50mm
2.	JOINT TO BE SAWN AS SOON AS CONCRETE HAS HARDENED SUFFICIENTLY THAT IT WILL NOT BE DAMAGED BY SAWING. IF AN UNPLANNED CRACK OCCURS THE CONTRACTOR SHALL REPLACE WHOLE SLABS EITHER SIDE OF THE UNPLANNED CRACK, UNLESS DIRECTED OTHERWISE.
3.	CONSTRUCT JOINTS AS DETAILED
4.	CONSTRUCTION JOINTS WHERE REQUIRED BUT NOT SHOWN, SHALL BE LOCATED TO THE APPROVAL OF THE ENGINEER AND CONSTRUCTED AT THE CONTRACTORS EXPENSE.
5.	ALL LONGITUDINAL CONSTRUCTION JOINTS SHALL BE FORMED AND INCLUDE DOWEL BARS AS SPECIFIED. ALL TRANSVERSE CONSTRUCTION JOINTS SHALL BE FORMED AND INCLUDE DOWEL BARS AS SPECIFIED.
6.	BOND BREAKER TO BE TWO (2) UNIFORM COATS OF BITUMEN EMULSION ALL OVER THE EXPOSED SURFACE AND ON END.
7.	DOWELS AND TIE BARS TO MEET STRENGTH REQUIREMENTS OF STRUCTURAL GRADE STEEL IN ACCORDANCE AS 1302. DOWELS AND TIE BARS SHALL BE :- <ul style="list-style-type: none"> - STRAIGHT - TO LENGTH SPECIFIED - CLEAN AND FREE FROM MILL SCALE, RUST AND OIL. - SAWN TO LENGTH NOT CROPPED.
8.	DIMENSIONS OF SEALANT RESERVOIR DEPENDANT ON THE SEALANT TYPE ADOPTED. ENGINEERS APPROVAL TO BE OBTAINED FOR SEALANT AND RESERVOIR DIMENSIONS AND DETAIL PROPOSED BY THE CONTRACTOR. REFER DETAIL 'B' FOR TYPICAL ARRANGEMENT AND SEALANT.
9.	PRIOR TO THE PLACEMENT OF CONCRETE IN THE ADJACENT SLAB, SELF EXPANDING CORK FILLER SHALL BE ADHERED TO THE ALREADY CAST AND CLEANED CONCRETE FACE USING AN APPROVED WATERPROOF ADHESIVE. ADHESIVE SHALL BE LIBERALLY APPLIED TO THE FULL FACE OF THE CONCRETE SLAB TO BE COVERED BY THE FILLER, AND ON THE FULL FACE OF THE FILLER TO BE ADHERED.
10.	REFER TO COMPACTION NOTES FOR PREPARATION OF SUB-BASE AND SUB-GRADE.
11.	ALL WORK TO BE BROOM FINISH.

ASPHALTIC CONCRETE NOTES											
1.	GENERAL <ul style="list-style-type: none"> a) MINERAL AGGREGATES TO COMPLY WITH AUSTRALIAN STANDARDS b) MINERAL FILLER TO COMPLY WITH AS 2357 MINERAL FILLERS OR ASPHALT. c) BITUMEN BINDER SHALL COMPLY WITH AS 2008 										
2.	MIX PROPORTIONS <ul style="list-style-type: none"> a) JOB MIX - 10mm NOMINAL SIZE AGGREGATE. MINIMUM BITUMEN CONTENT BY MASS OF TOTAL MASS - 5.1% b) MIX STABILITY - BETWEEN 16kN AND 36kN AS DETERMINED BY AS 2891 c) AIR VOIDS IN COMPACTED MIX - BETWEEN 4% AND 7% OF THE VOLUME OF THE MIX. d) VOIDS FILLED IN BINDER - 65-80% OF AIR VOIDS IN THE TOTAL MINERAL AGGREGATE FILLED BY BINDER IN ACCORDANCE WITH AUSTRALIAN STANDARDS 										
3.	PAVEMENT PREPARATION <ul style="list-style-type: none"> a) THE EXISTING SURFACE TO BE SEALED SHALL BE DRY AND BROOMED BEFORE COMMENCEMENT OF WORK TO ENSURE COMPLETE REMOVAL OF ALL SUPERFICIAL FOREIGN MATTER. b) ALL DEPRESSIONS OR UNEVEN AREAS ARE TO BE TACK-COATED AND BROUGHT UP TO GENERAL LEVEL OF PAVEMENT WITH ASPHALTIC CONCRETE BEFORE LAYING OF MAIN COURSE. 										
4.	TACK COAT <ul style="list-style-type: none"> a) THE WHOLE OF THE AREA TO BE SHEETED WITH ASPHALTIC CONCRETE SHALL BE LIGHTLY AND EVENLY COATED WITH RAPID SETTING BITUMEN COMPLYING WITH AUSTRALIAN STANDARDS. APPLICATION RATE FOR RESIDUAL BITUMEN SHALL BE 0.15 TO 0.30 LITRES/SQUARE METRE. APPLICATION SHALL BE BY MEANS OF A MECHANICAL SPRAYER WITH SPRAY BAR. 										
5.	SPREADING <ul style="list-style-type: none"> a) ALL ASPHALTIC CONCRETE SHALL BE SPREAD WITH A SELF PROPELLED PAVING MACHINE. b) THE ASPHALTIC CONCRETE SHALL BE LAID AT A MIX TEMPERATURE AS SHOWN BELOW; <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>ROAD SURFACE TEMPERATURE IN SHADE (°C)</th> <th>MIX TEMPERATURES (°C)</th> </tr> </thead> <tbody> <tr> <td>5 - 10</td> <td>NOT PERMITTED</td> </tr> <tr> <td>10 - 15</td> <td>150</td> </tr> <tr> <td>15 - 25</td> <td>145</td> </tr> <tr> <td>OVER 25</td> <td>140</td> </tr> </tbody> </table>	ROAD SURFACE TEMPERATURE IN SHADE (°C)	MIX TEMPERATURES (°C)	5 - 10	NOT PERMITTED	10 - 15	150	15 - 25	145	OVER 25	140
ROAD SURFACE TEMPERATURE IN SHADE (°C)	MIX TEMPERATURES (°C)										
5 - 10	NOT PERMITTED										
10 - 15	150										
15 - 25	145										
OVER 25	140										
6.	JOINTS <ul style="list-style-type: none"> a) THE NUMBER OF JOINTS BOTH LONGITUDINAL AND TRANSVERSE SHALL BE KEPT TO A MINIMUM. b) THE DENSITY AND SURFACE FINISH AT JOINTS SHALL BE SIMILAR TO THOSE OF THE REMAINDER OF THE LAYER. 										
7.	COMPACTION <ul style="list-style-type: none"> a) ALL COMPACTION SHALL BE UNDERTAKEN USING SELF PROPELLED ROLLERS. b) INITIAL ROLLING SHALL BE COMPLETE BEFORE THE MIX TEMPERATURE FALLS BELOW 105°C c) SECONDARY ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 60°C d) MINIMUM CHARACTERISTICS VALUE OF RELATIVE COMPACTION OF A LOT WHEN TESTED IN ACCORDANCE WITH AS2150 										
8.	FINISHED PAVEMENT PROPERTIES <ul style="list-style-type: none"> a) FINISHED SURFACES SHALL BE SMOOTH, DENSE AND TRUE TO SHAPE AND SHALL NOT VARY MORE THAN 10mm FROM THE SPECIFIED PLAN LEVEL AT ANY POINT AND SHALL NOT DEVIATE FROM THE BOTTOM OF A 3m STRAIGHT EDGE LAID IN ANY DIRECTION BY MORE THAN 5mm. 										

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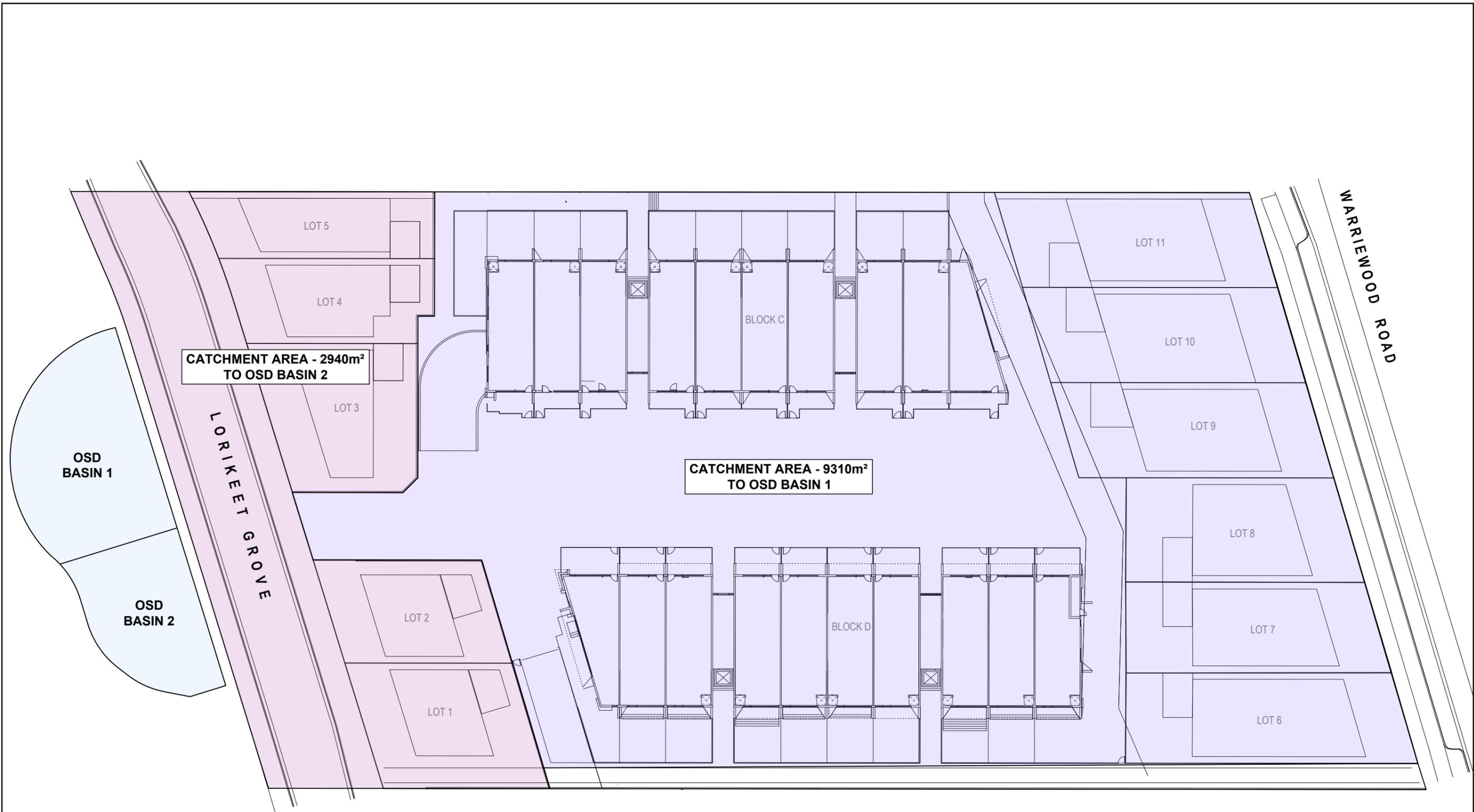
IMPORTANT: THE CONTRACTOR IS TO MAINTAIN A CURRENT SET OF "DIAL BEFORE YOU DIG" DRAWINGS ON SITE AT ALL TIMES.

SHEET INDEX	
COVER SHEET & NOTES	SHEET C1.00
DRAINAGE CATCHMENT PLAN	SHEET C1.01
KEY PLAN - SITE STORMWATER MANAGEMENT	SHEET C2.00
STORMWATER MANAGEMENT PLAN SHEET 1 OF 2	SHEET C2.01
STORMWATER MANAGEMENT PLAN SHEET 2 OF 2	SHEET C2.02
KEY PLAN - ROADWORKS & DRAINAGE GENERAL ARRANGEMENT	SHEET C3.00
ROADWORKS & DRAINAGE PLAN SHEET 1 OF 5	SHEET C3.01
ROADWORKS & DRAINAGE PLAN SHEET 2 OF 5	SHEET C3.02
ROADWORKS & DRAINAGE PLAN SHEET 3 OF 5	SHEET C3.03
ROADWORKS & DRAINAGE PLAN SHEET 4 OF 5	SHEET C3.04
ROADWORKS & DRAINAGE PLAN SHEET 5 OF 5	SHEET C3.05
ROAD LONGITUDINAL SECTION (MC01) - LORIKEET GROVE	SHEET C3.06
ROAD CROSS SECTIONS (MC01) LORIKEET GROVE SHEET 1 OF 3	SHEET C3.07
ROAD CROSS SECTIONS (MC01) LORIKEET GROVE SHEET 2 OF 3	SHEET C3.08
ROAD CROSS SECTIONS (MC01) LORIKEET GROVE SHEET 3 OF 3	SHEET C3.09
ROAD LONGITUDINAL SECTION (MC02) - WARRIEWOOD ROAD	SHEET C3.10
ROAD CROSS SECTIONS (MC02) WARRIEWOOD ROAD SHEET 1 OF 2	SHEET C3.11
ROAD CROSS SECTIONS (MC02) WARRIEWOOD ROAD SHEET 2 OF 2	SHEET C3.12
DRAINAGE EASEMENT LONGITUDINAL SECTION (DR01)	SHEET C3.13
DRAINAGE PIT & PIPE LONGITUDINAL SECTION	SHEET C3.14
TYPICAL DETAIL SHEET 1 OF 2	SHEET C3.15
TYPICAL DETAIL SHEET 2 OF 2	SHEET C3.16

DRAWINGS MUST BE PRINTED IN COLOUR

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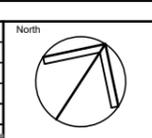
North	WARRIEWOOD DEVELOPERS PTY LTD	Architect 	ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499	Project PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD	Drawing Title COVER SHEET & NOTES
Issue Description Date Drawn Approved A ISSUED FOR APPROVAL 15.12.23 RH BK					Drawn Date Scale A1 Q.A. Check Date RH SEPT 23 AS NOTED - - Designed Project No. Dwg. No. Issue BK CC230177 C1.00 A



DRAINAGE CATCHMENT PLAN
 SCALE - 1:250/A1, 1:500/A3
 0 2.5 5 10 15 20 25m

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Issue	Description	Date	Drawn	Approved
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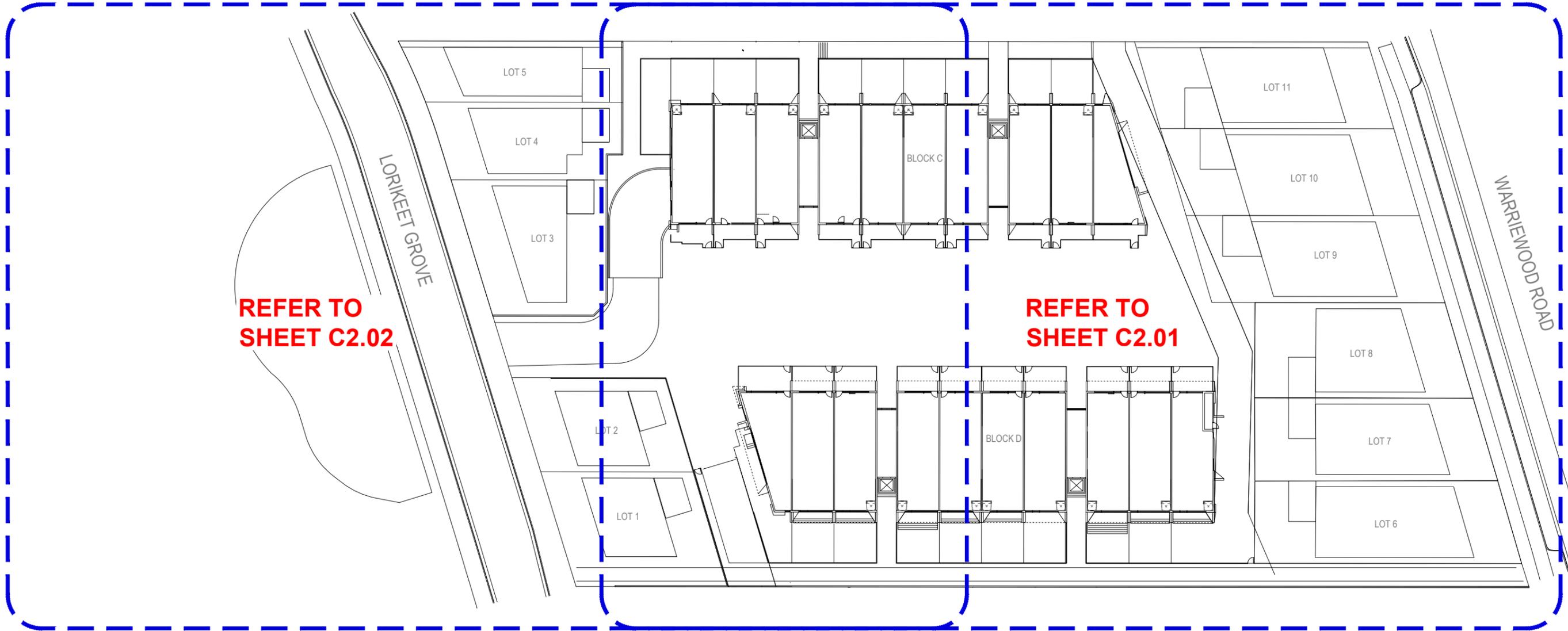
Architect

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 WARRIEWOOD ROAD
 WARRIEWOOD

Drawing Title					
DRAINAGE CATCHMENT PLAN					
Drawn	Date	Scale	A1	Q.A. Check	Date
LW	SEPT 2023	AS NOTED	-	-	-
Designed	Project No.	Dwg. No.		Issue	
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KEY PLAN
 SCALE - 1:300/A1, 1:600/A3
 0 2 4 8 12 16 20m

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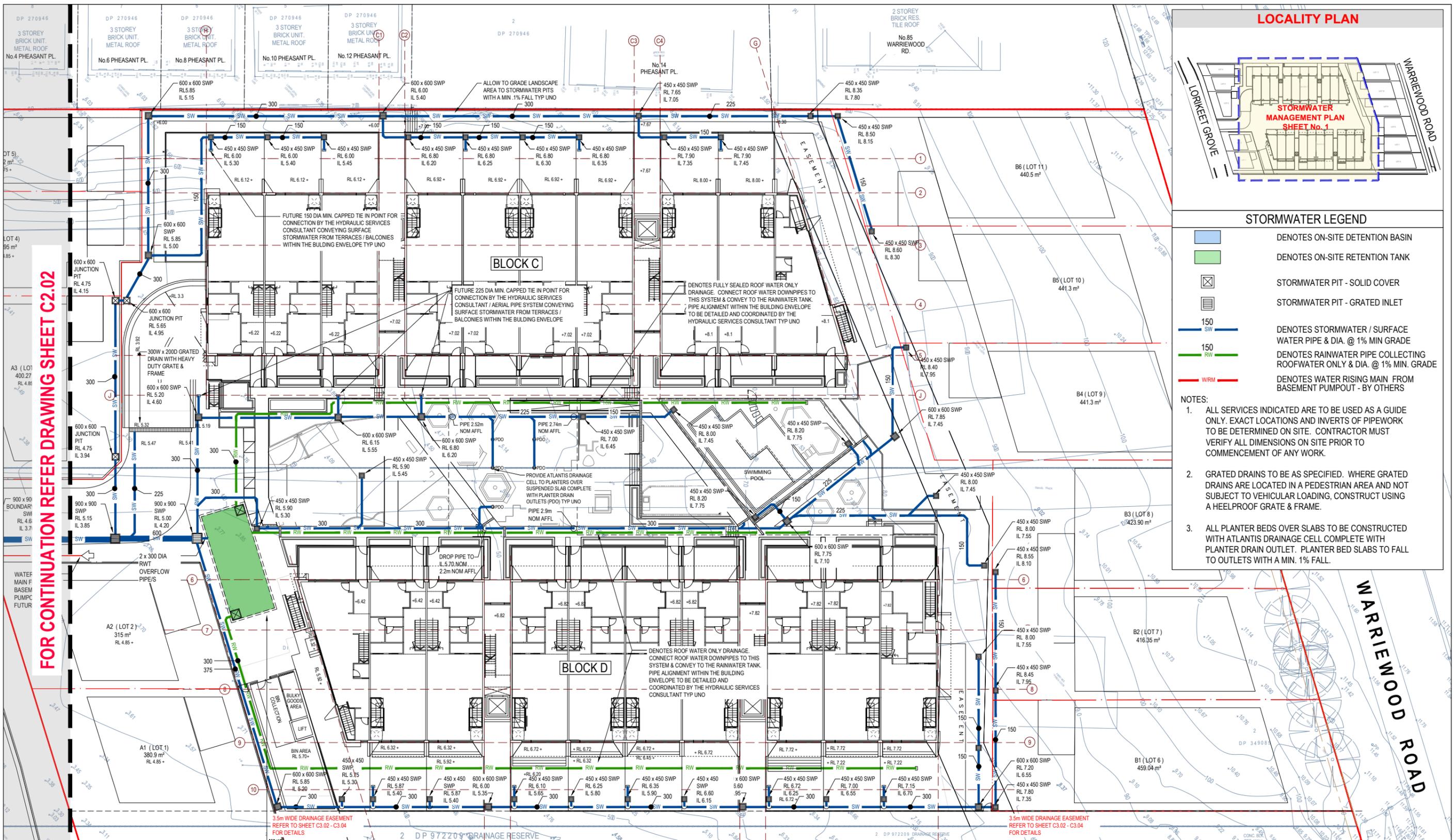
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Project
PROPOSED RESIDENTIAL DEVELOPMENT
 (No. 43 - 49)
 WARRIEWOOD ROAD
 WARRIEWOOD

Drawing Title				
KEY PLAN - SITE STORMWATER MANAGEMENT				
Drawn	Date	Scale	A1	Q.A. Check
RH	SEPT 2023	AS NOTED	-	-
Designed	Project No.	Dwg. No.	Issue	
BK	CC230177	C2.00	A	



LOCALITY PLAN



STORMWATER LEGEND

- DENOTES ON-SITE DETENTION BASIN
- DENOTES ON-SITE RETENTION TANK
- STORMWATER PIT - SOLID COVER
- STORMWATER PIT - GRATED INLET
- 150 SW DENOTES STORMWATER / SURFACE WATER PIPE & DIA. @ 1% MIN GRADE
- 150 RW DENOTES RAINWATER PIPE COLLECTING ROOFWATER ONLY & DIA. @ 1% MIN. GRADE
- WRM DENOTES WATER RISING MAIN FROM BASEMENT PUMPOUT - BY OTHERS

- NOTES:**
1. ALL SERVICES INDICATED ARE TO BE USED AS A GUIDE ONLY. EXACT LOCATIONS AND INVERTS OF PIPEWORK TO BE DETERMINED ON SITE. CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF ANY WORK.
 2. GRATED DRAINS TO BE AS SPECIFIED. WHERE GRATED DRAINS ARE LOCATED IN A PEDESTRIAN AREA AND NOT SUBJECT TO VEHICULAR LOADING, CONSTRUCT USING A HEELPROOF GRATE & FRAME.
 3. ALL PLANTER BEDS OVER SLABS TO BE CONSTRUCTED WITH ATLANTIS DRAINAGE CELL COMPLETE WITH PLANTER DRAIN OUTLET. PLANTER BED SLABS TO FALL TO OUTLETS WITH A MIN. 1% FALL.

FOR CONTINUATION REFER DRAWING SHEET C2.02

RAINWATER RE-USE TANK (OSR)
 PROVIDE RAINWATER RE-USE TANK WITH:
 STORAGE VOLUME: 50m³
 (IN ACCORDANCE WITH THE BASIX REQUIREMENT)
 INTERNAL FOOTPRINT: 57m² x 1.14m DEEP

STORMWATER MANAGEMENT PLAN

SCALE - 1:200/A1, 1:400/A3



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		Architect	
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		Plan	
		Date	
		Scale	
		Q.A. Check	
		Date	
		Designed	
		Project No.	
		Dwg. No.	
		Issue	

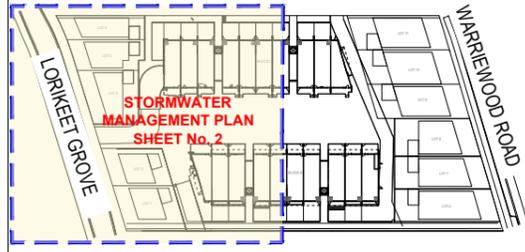
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PROPOSED RESIDENTIAL DEVELOPMENT
 (No. 43 - 49)
 WARRIEWOOD ROAD
 WARRIEWOOD

Drawn	Date	Scale	Q.A. Check	Date
RH	SEPT 2023	AS NOTED	-	-
Designed	Project No.	Dwg. No.		
BK	CC230177	C2.01	A	

LOCALITY PLAN

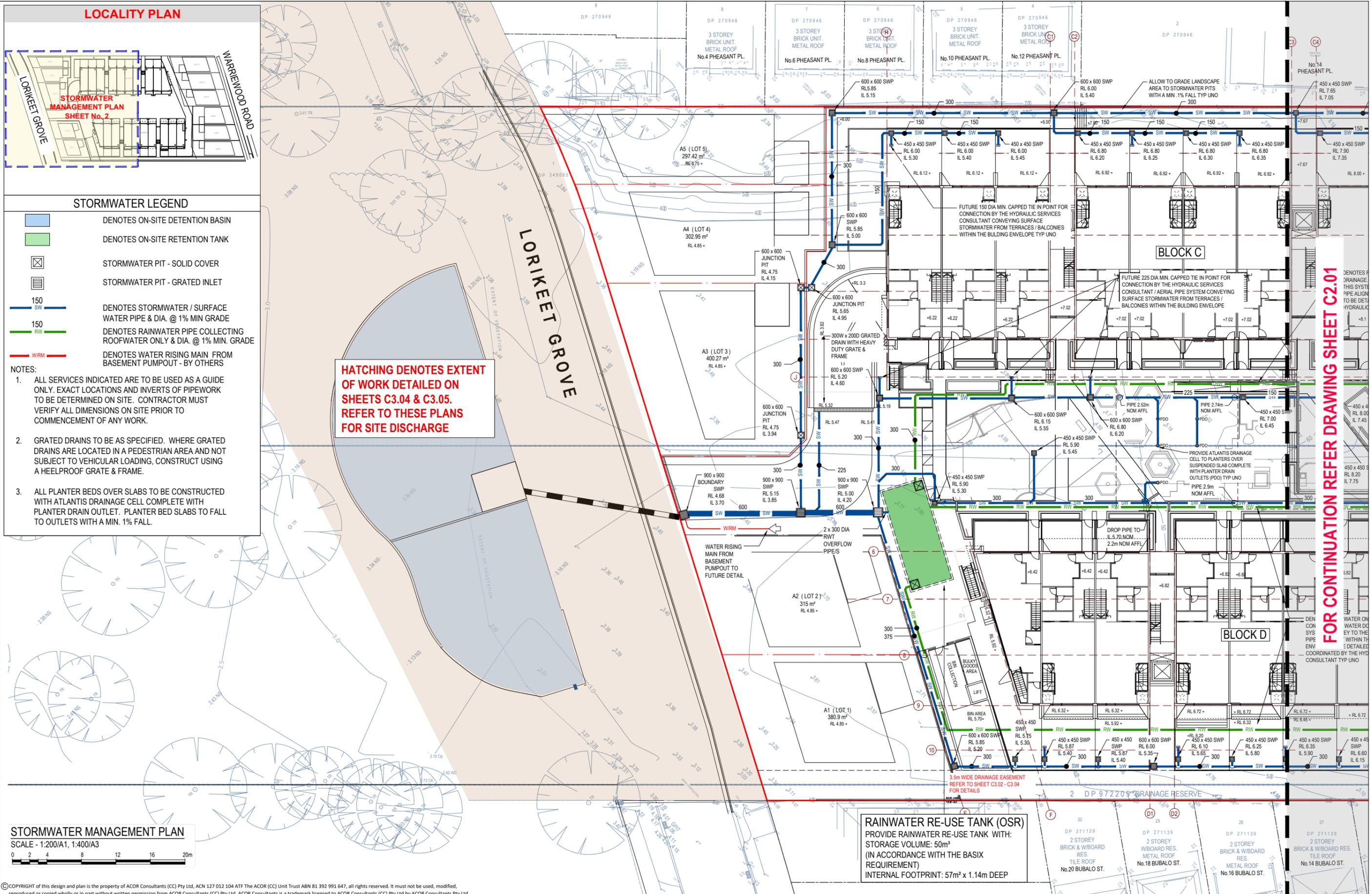


STORMWATER LEGEND

- DENOTES ON-SITE DETENTION BASIN
- DENOTES ON-SITE RETENTION TANK
- STORMWATER PIT - SOLID COVER
- STORMWATER PIT - GRATED INLET
- 150 SW DENOTES STORMWATER / SURFACE WATER PIPE & DIA. @ 1% MIN GRADE
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- NOTES:**
- ALL SERVICES INDICATED ARE TO BE USED AS A GUIDE ONLY. EXACT LOCATIONS AND INVERTS OF PIPEWORK TO BE DETERMINED ON SITE. CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF ANY WORK.
 - GRATED DRAINS TO BE AS SPECIFIED. WHERE GRATED DRAINS ARE LOCATED IN A PEDESTRIAN AREA AND NOT SUBJECT TO VEHICULAR LOADING, CONSTRUCT USING A HEELPROOF GRATE & FRAME.
 - ALL PLANTER BEDS OVER SLABS TO BE CONSTRUCTED WITH ATLANTIS DRAINAGE CELL COMPLETE WITH PLANTER DRAIN OUTLET. PLANTER BED SLABS TO FALL TO OUTLETS WITH A MIN. 1% FALL.

HATCHING DENOTES EXTENT OF WORK DETAILED ON SHEETS C3.04 & C3.05. REFER TO THESE PLANS FOR SITE DISCHARGE



STORMWATER MANAGEMENT PLAN
SCALE - 1:200/A1, 1:400/A3

RAINWATER RE-USE TANK (OSR)
PROVIDE RAINWATER RE-USE TANK WITH:
STORAGE VOLUME: 50m³
(IN ACCORDANCE WITH THE BASIX REQUIREMENT)
INTERNAL FOOTPRINT: 57m² x 1.14m DEEP

FOR CONTINUATION REFER DRAWING SHEET C2.01

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Issue	Description	Date	Drawn	Approved		

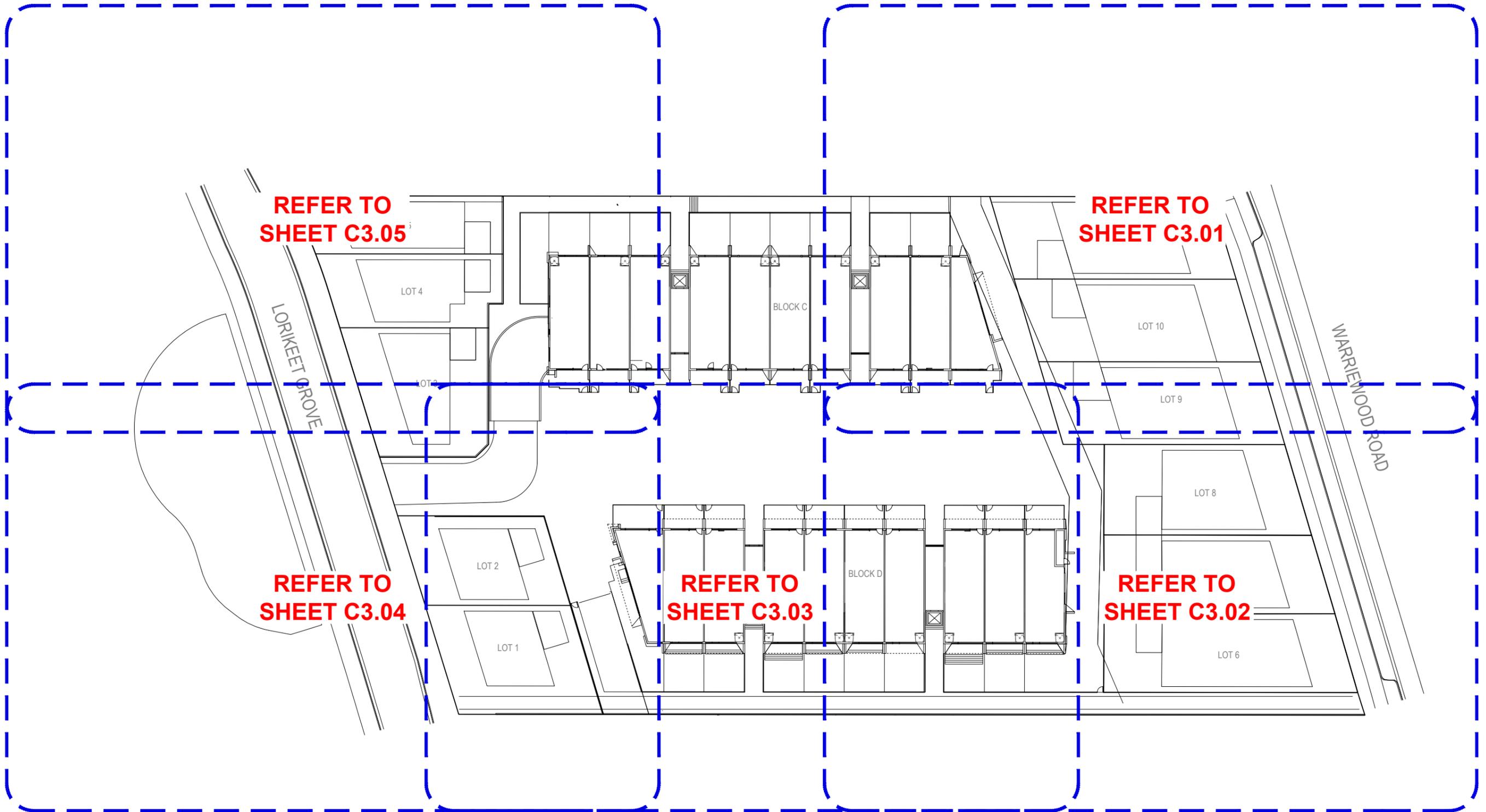
Client
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Project
PROPOSED RESIDENTIAL DEVELOPMENT
(No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD

Drawn	Date	Scale	A1	Q.A. Check	Date
RH	SEPT 2023	AS NOTED	-	-	-
Designed	Project No.	Dwg. No.	Issue		
BK	CC230177	C2.02	A		

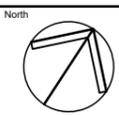
Drawing Title
STORMWATER MANAGEMENT PLAN SHEET 2 OF 2



KEY PLAN
 SCALE - 1:300/A1, 1:600/A3
 0 2 4 8 12 16 20m

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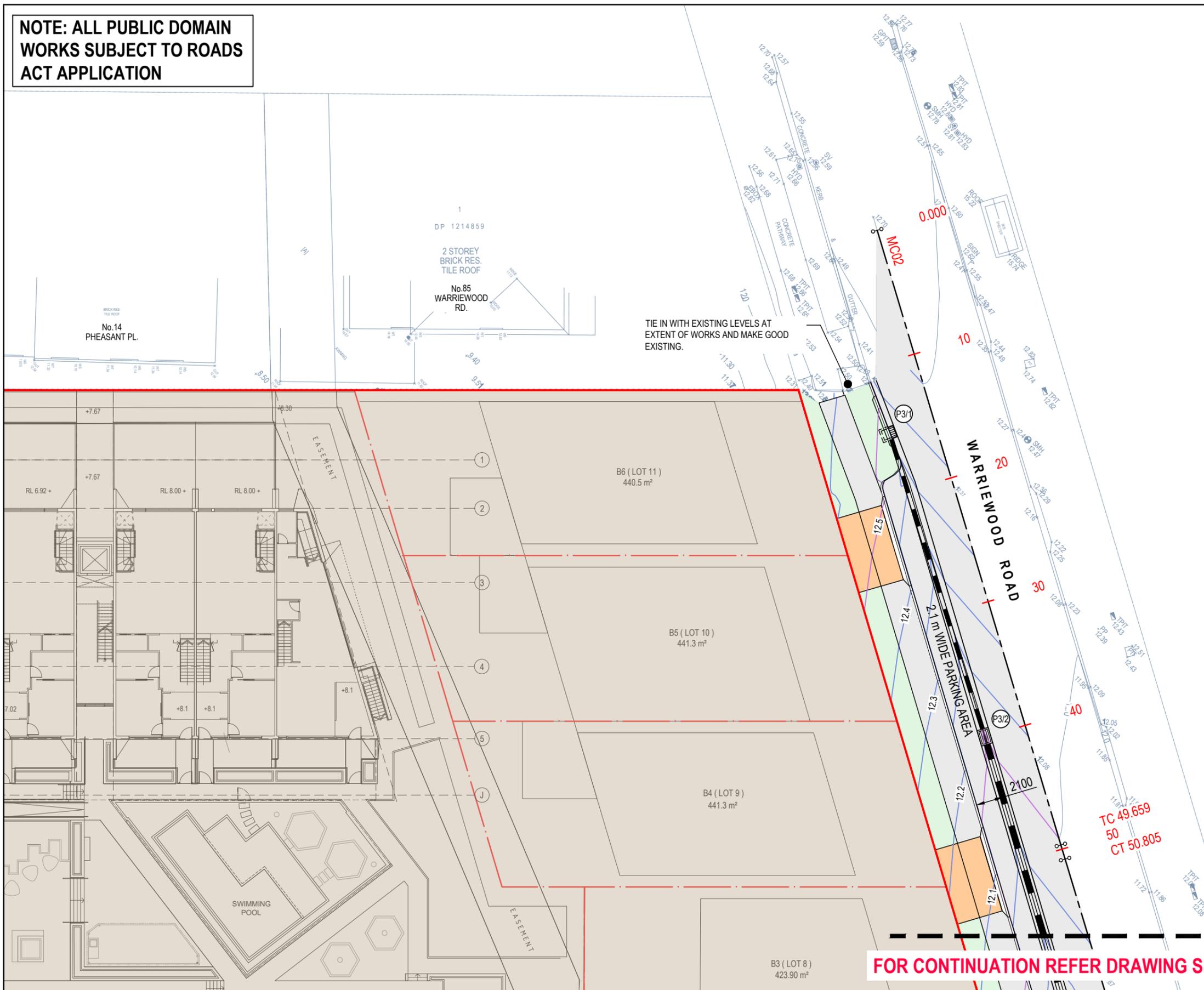
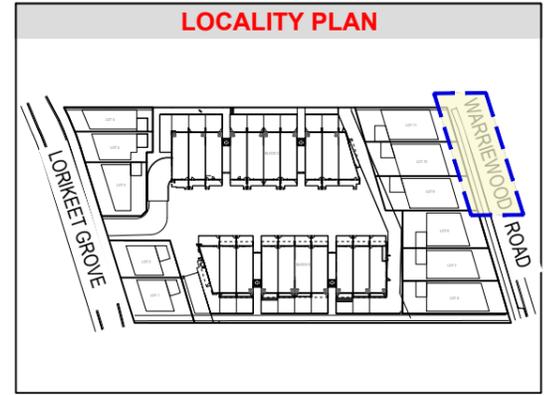
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Project
PROPOSED RESIDENTIAL DEVELOPMENT
 (No. 43 - 49)
 WARRIEWOOD ROAD
 WARRIEWOOD

Drawing Title		Scale		Q.A. Check		Date	
KEY PLAN - ROADWORKS & DRAINAGE GENERAL ARRANGEMENT		A1		AS NOTED		-	
Drawn	Date	Scale	A1	Q.A. Check	Date		
LW	DEC 2023	AS NOTED		-	-		
Designed	Project No.	Dwg. No.		Issue			
BK	CC230177	C3.00		A			

NOTE: ALL PUBLIC DOMAIN WORKS SUBJECT TO ROADS ACT APPLICATION



PIT SCHEDULE				
PIT No.	TYPE	SIZE	TOP GRATE RL	INVERT OF OUTLET
P1 / 1	KIP	1.8m EKI	4.32	3.70
P1 / 2	KIP	1.8m EKI	4.32	3.60
P1 / 3	KIP	1.8m EKI	4.20	3.35
P2 / 1	KIP	1.8m EKI	4.10	3.50
P2 / 2	KIP	1.8m EKI	4.10	3.40
P3 / 1	KIP	1.8m EKI	12.35	11.30
P3 / 2	KIP	V GRATE	12.00	10.95
P3 / 3	KIP	V GRATE	11.70	10.50
P3 / 4	KIP	1.8m EKI	11.50	9.50
P3 / 5	PIT	1200 x 1200	10.00	8.78
P3 / 6	PIT	1200 x 1200	7.25	6.05
P3 / 7	PIT	1200 x 1200	6.31	5.20
P3 / 8	PIT	1200 x 1200	5.35	3.94
P3 / 9	PIT	1200 x 1200	3.30	3.31

PROPOSED PIT SURFACE LEVELS AND INVERTS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION

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FOR CONTINUATION REFER DRAWING SHEET C3.02

ROADWORKS & DRAINAGE PLAN
SCALE - 1:150/A1, 1:300/A3

Issue	Description	Date	Drawn	Approved
A	ISSUED FOR APPROVAL	15.12.23	RH	BK

Client
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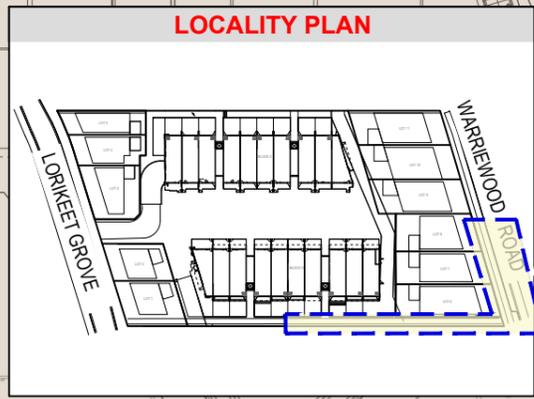
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Project
PROPOSED RESIDENTIAL DEVELOPMENT
(No. 43 - 49)
WARRIEWOOD ROAD
WARRIEWOOD

Drawing Title					
ROAD WORKS & DRAINAGE PLAN SHEET 1 OF 5					
Drawn	Date	Scale	A1	Q.A. Check	Date
LW	DEC 2023	AS NOTED	-	-	-
Designed	Project No.	Dwg. No.	Issue		
BK	CC230177	C3.01	A		

PIT SCHEDULE				
PIT No.	TYPE	SIZE	TOP GRATE RL	INVERT OF OUTLET
P1/1	KIP	1.8m EKI	4.32	3.70
P1/2	KIP	1.8m EKI	4.32	3.60
P1/3	KIP	1.8m EKI	4.20	3.35
P2/1	KIP	1.8m EKI	4.10	3.50
P2/2	KIP	1.8m EKI	4.10	3.40
P3/1	KIP	1.8m EKI	12.35	11.30
P3/2	KIP	V GRATE	12.00	10.95
P3/3	KIP	V GRATE	11.70	10.50
P3/4	KIP	1.8m EKI	11.50	9.50
P3/5	PIT	1200 x 1200	10.00	8.78
P3/6	PIT	1200 x 1200	7.25	6.05
P3/7	PIT	1200 x 1200	6.31	5.20
P3/8	PIT	1200 x 1200	5.35	3.94
P3/9	PIT	1200 x 1200	3.30	3.31



NOTE: ALL PUBLIC DOMAIN WORKS SUBJECT TO ROADS ACT APPLICATION

FOR CONTINUATION REFER DRAWING SHEET C3.01

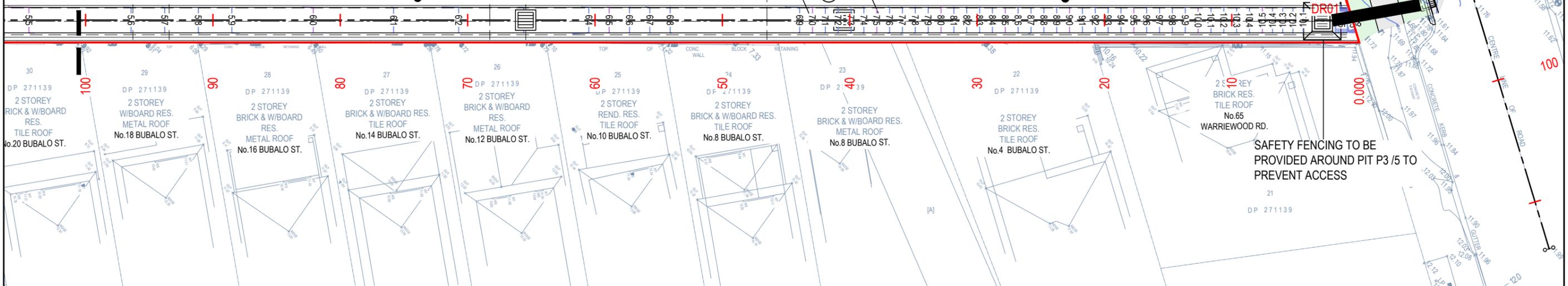
PROPOSED PIT SURFACE LEVELS AND INVERTS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION

FOR CONTINUATION REFER DRAWING SHEET C3.03

3.5m WIDE DRAINAGE EASEMENT AND CULVERT TYP UNO

TOW PROVIDES 250mm FREEBOARD MIN. TO INVERT OF FLOW PATH BUT DOES NOT EXCEED 350 mm IN HEIGHT ADJACENT TO THE BLOCK D. THEREFORE SAFETY FENCING NOT REQUIRED.

TOW PROVIDES 250mm FREEBOARD MIN. TO INVERT OF FLOW PATH



SAFETY FENCING TO BE PROVIDED AROUND PIT P3/5 TO PREVENT ACCESS

ROADWORKS & DRAINAGE PLAN
SCALE - 1:150/A1, 1:300/A3

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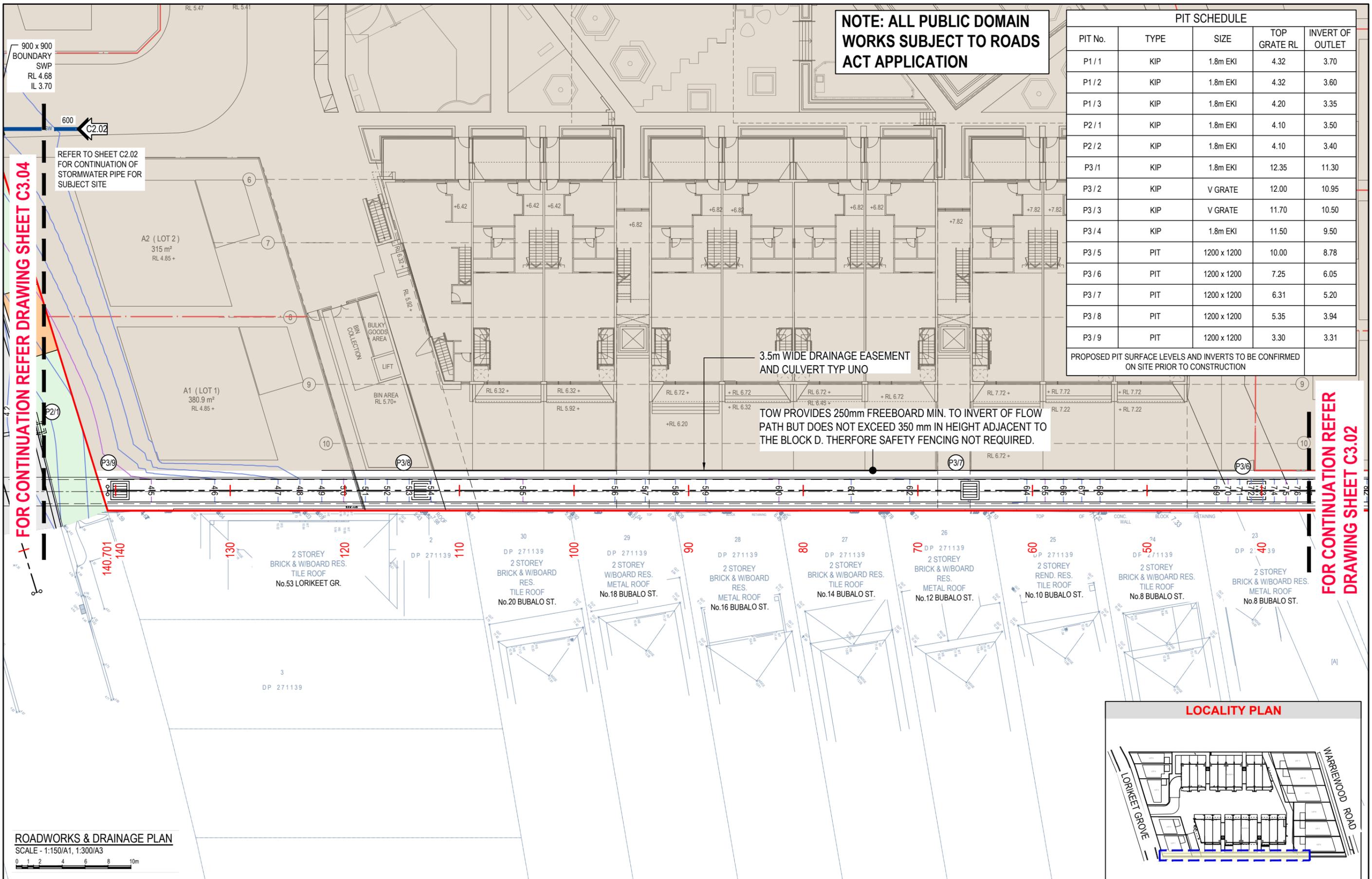
North		Client	
		WARRIEWOOD DEVELOPERS PTY LTD	
A ISSUED FOR APPROVAL Date: 15.12.23 Drawn: RH Approved: BK		Architect ACOR CONSULTANTS ENGINEERS MANAGERS INFRASTRUCTURE PLANNERS DEVELOPMENT CONSULTANTS	

Client
WARRIEWOOD DEVELOPERS
PTY LTD

Architect
ACOR CONSULTANTS
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project
PROPOSED RESIDENTIAL DEVELOPMENT
(No. 43 - 49)
WARRIEWOOD ROAD
WARRIEWOOD

Drawing Title			
ROADWORKS & DRAINAGE PLAN SHEET 2 OF 5			
Drawn	Date	Scale	A1
LW	DEC 2023	AS NOTED	-
Designed	Project No.	Dwg. No.	Issue
BK	CC230177	C3.02	A



ROADWORKS & DRAINAGE PLAN
SCALE - 1:150/A1, 1:300/A3

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Issue	Description	Date	Drawn	Approved
A	ISSUED FOR APPROVAL	15.12.23	RH	BK

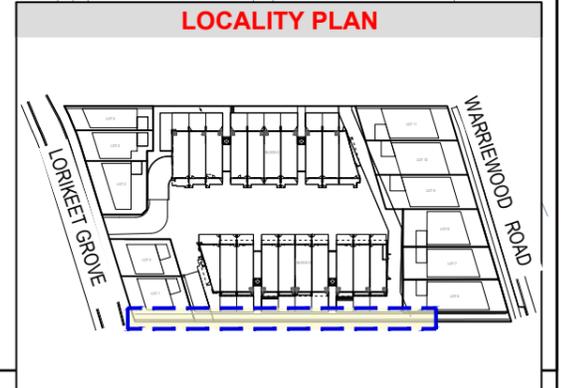
Client
WARRIEWOOD DEVELOPERS PTY LTD

Architect
ACOR CONSULTANTS

Project
ACOR Consultants (CC) Pty Ltd
Platinum Building, Suite 2.01, 4 Ilya Avenue
ERINA NSW 2250, Australia
T +61 2 4324 3499

Project
PROPOSED RESIDENTIAL DEVELOPMENT
(No. 43 - 49)
WARRIEWOOD ROAD
WARRIEWOOD

Drawn	Date	Scale	A1	Q.A. Check	Date
LW	DEC 2023	AS NOTED	-	-	-
Designed	Project No.	Dwg. No.	Issue		
BK	CC230177	C3.03	A		



FOR CONTINUATION REFER DRAWING SHEET C3.05

ON-SITE DETENTION/ BIORETENTION BASIN 1
 ABOVE GROUND STORAGE AREA (SHOWN SHADED)
 BASIN STORAGE VOLUME = 400 m³
 TOP STORED WSL = RL 4.60
 BASIN INVERT RL 3.10 NOM.
 MAX STORED OSD WATER DEPTH - 0.97m NOM
 MAX STORED WATER DEPTH - 1.5m NOM
 CONSTRUCT 474m² OF BASIN SURFACE AREA
 NOTE: CONSTRUCT 12m LONG OVERFLOW WEIR
 TOP OF WEIR RL 4.52
 NOTE: PROVIDE BASIN WITH IMPERMEABLE LINER TYP.

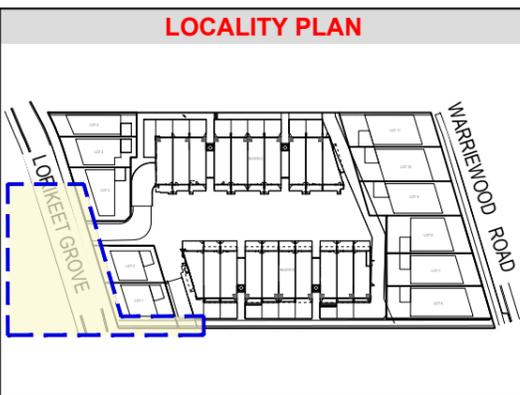
BASIN PUMP NOTE
 PROVIDE PIT AND PUMP DESIGNED TO TO MANAGE BASE FLOWS SERVICING SENSITIVE VEGETATION. DETAILS TO BE CONFIRMED AT CC STAGE

ON-SITE DETENTION/ BIORETENTION BASIN 2
 ABOVE GROUND STORAGE AREA (SHOWN SHADED)
 BASIN STORAGE VOLUME = 140 m³
 TOP STORED WSL = RL 4.20
 BASIN INVERT RL 3.10 NOM.
 MAX STORED OSD WATER DEPTH - 0.57m NOM
 MAX STORED TOTAL WATER DEPTH - 1.1m NOM
 CONSTRUCT 300m² OF BASIN SURFACE AREA
 NOTE: PROVIDE BASIN WITH IMPERMEABLE LINER TYP.

100 DIA. SLOTTED PIPE FROM PUMP SYSTEM BE SECURED WITHIN ENERGY DISSIPATION SWALE AT RL 3.0 NOM.

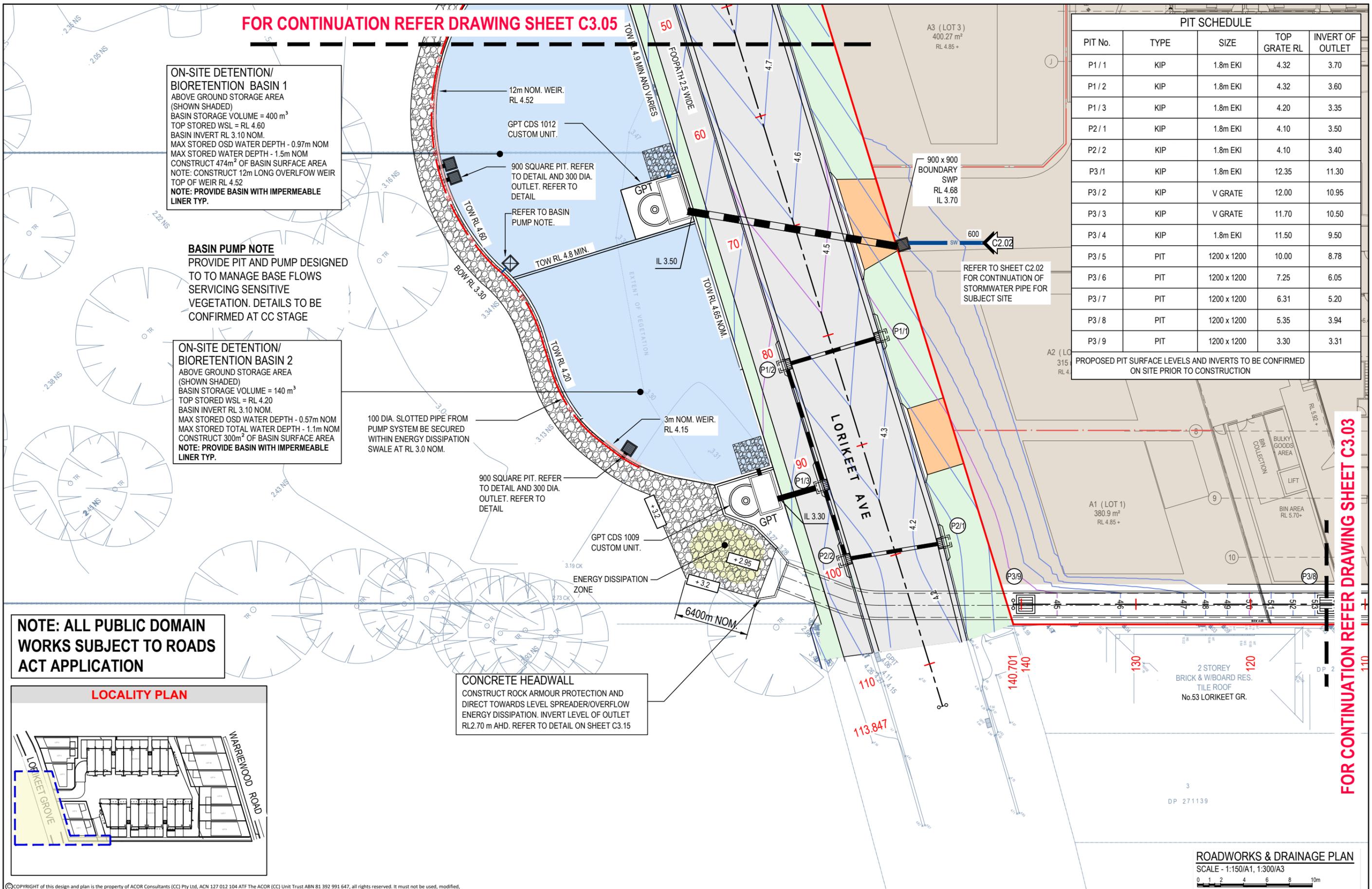
CONCRETE HEADWALL
 CONSTRUCT ROCK ARMOUR PROTECTION AND DIRECT TOWARDS LEVEL SPREADER/OVERFLOW ENERGY DISSIPATION. INVERT LEVEL OF OUTLET RL2.70 m AHD. REFER TO DETAIL ON SHEET C3.15

NOTE: ALL PUBLIC DOMAIN WORKS SUBJECT TO ROADS ACT APPLICATION



PIT SCHEDULE				
PIT No.	TYPE	SIZE	TOP GRATE RL	INVERT OF OUTLET
P1 / 1	KIP	1.8m EKI	4.32	3.70
P1 / 2	KIP	1.8m EKI	4.32	3.60
P1 / 3	KIP	1.8m EKI	4.20	3.35
P2 / 1	KIP	1.8m EKI	4.10	3.50
P2 / 2	KIP	1.8m EKI	4.10	3.40
P3 / 1	KIP	1.8m EKI	12.35	11.30
P3 / 2	KIP	V GRATE	12.00	10.95
P3 / 3	KIP	V GRATE	11.70	10.50
P3 / 4	KIP	1.8m EKI	11.50	9.50
P3 / 5	PIT	1200 x 1200	10.00	8.78
P3 / 6	PIT	1200 x 1200	7.25	6.05
P3 / 7	PIT	1200 x 1200	6.31	5.20
P3 / 8	PIT	1200 x 1200	5.35	3.94
P3 / 9	PIT	1200 x 1200	3.30	3.31

PROPOSED PIT SURFACE LEVELS AND INVERTS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION



ROADWORKS & DRAINAGE PLAN
 SCALE - 1:150/A1, 1:300/A3
 0 1 2 4 6 8 10m

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Issue	Description	Date	Drawn	Approved
A	ISSUED FOR APPROVAL	15.12.23	RH	BK

Client
WARRIEWOOD DEVELOPERS
 PTY LTD

Architect
ACOR CONSULTANTS
 ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

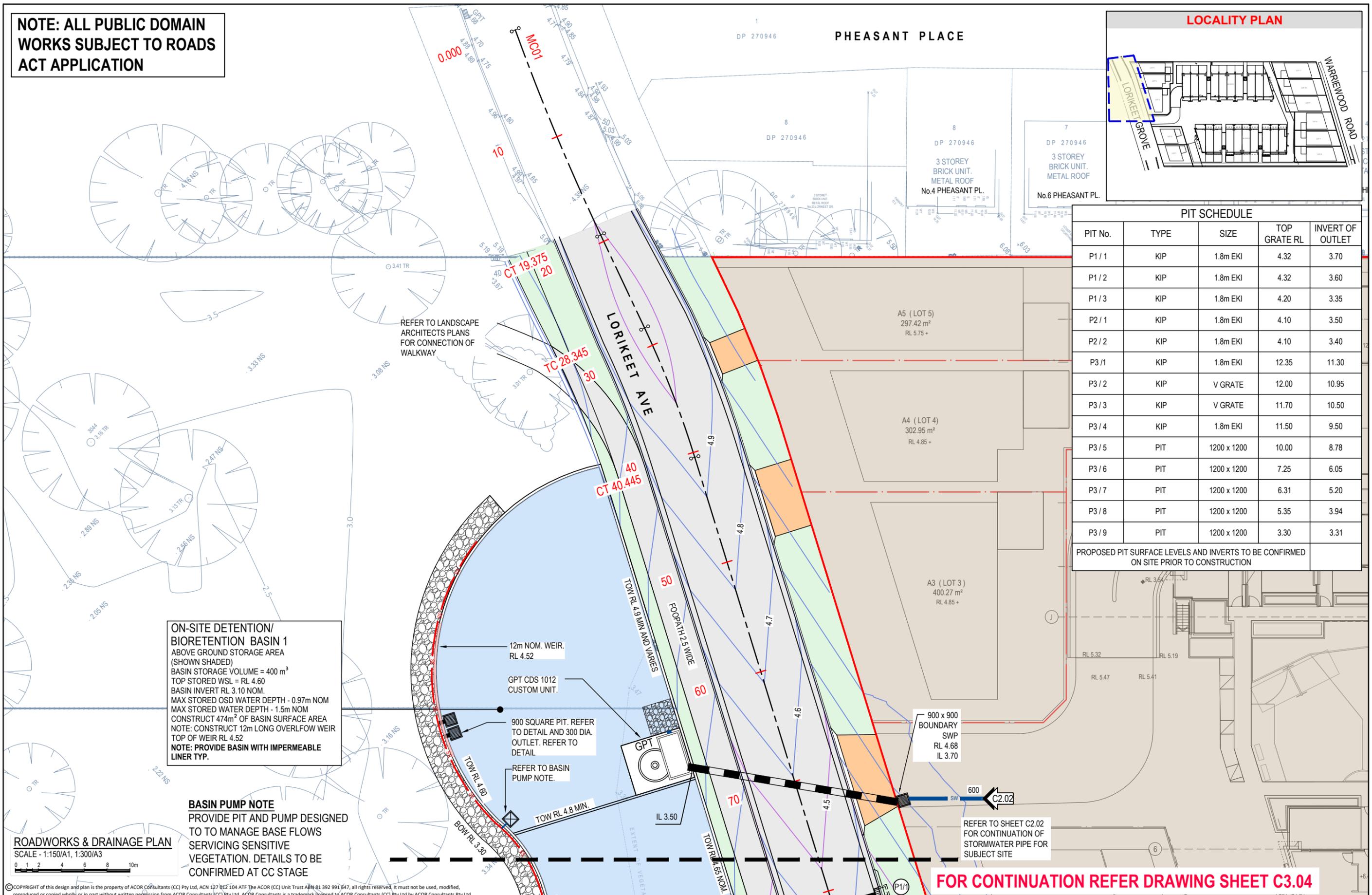
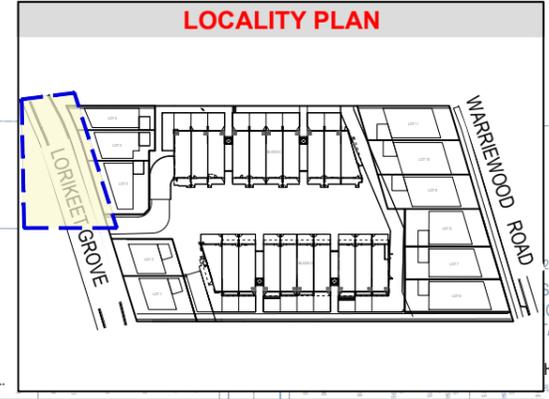
Project
ACOR Consultants (CC) Pty Ltd
 Platinum Building, Suite 2.01, 4 Ilya Avenue
 ERINA NSW 2250, Australia
 T +61 2 4324 3499

Project
PROPOSED RESIDENTIAL DEVELOPMENT
 (No. 43 - 49)
 WARRIEWOOD ROAD
 WARRIEWOOD

Drawn	Date	Scale	A1	Q.A. Check	Date
LW	DEC 2023	AS NOTED	-	-	-
Designed	Project No.	Dwg. No.	Issue		
BK	CC230177	C3.04	A		

FOR CONTINUATION REFER DRAWING SHEET C3.03

NOTE: ALL PUBLIC DOMAIN WORKS SUBJECT TO ROADS ACT APPLICATION



PIT SCHEDULE				
PIT No.	TYPE	SIZE	TOP GRATE RL	INVERT OF OUTLET
P1 / 1	KIP	1.8m EKI	4.32	3.70
P1 / 2	KIP	1.8m EKI	4.32	3.60
P1 / 3	KIP	1.8m EKI	4.20	3.35
P2 / 1	KIP	1.8m EKI	4.10	3.50
P2 / 2	KIP	1.8m EKI	4.10	3.40
P3 / 1	KIP	1.8m EKI	12.35	11.30
P3 / 2	KIP	V GRATE	12.00	10.95
P3 / 3	KIP	V GRATE	11.70	10.50
P3 / 4	KIP	1.8m EKI	11.50	9.50
P3 / 5	PIT	1200 x 1200	10.00	8.78
P3 / 6	PIT	1200 x 1200	7.25	6.05
P3 / 7	PIT	1200 x 1200	6.31	5.20
P3 / 8	PIT	1200 x 1200	5.35	3.94
P3 / 9	PIT	1200 x 1200	3.30	3.31

PROPOSED PIT SURFACE LEVELS AND INVERTS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION

ON-SITE DETENTION/ BIORETENTION BASIN 1
 ABOVE GROUND STORAGE AREA (SHOWN SHADED)
 BASIN STORAGE VOLUME = 400 m³
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 MAX STORED WATER DEPTH - 1.5m NOM
 CONSTRUCT 474m² OF BASIN SURFACE AREA
 NOTE: CONSTRUCT 12m LONG OVERFLOW WEIR TOP OF WEIR RL 4.52
 NOTE: PROVIDE BASIN WITH IMPERMEABLE LINER TYP.

BASIN PUMP NOTE
 PROVIDE PIT AND PUMP DESIGNED TO MANAGE BASE FLOWS SERVICING SENSITIVE VEGETATION. DETAILS TO BE CONFIRMED AT CC STAGE

ROADWORKS & DRAINAGE PLAN
 SCALE - 1:150/A1, 1:300/A3

FOR CONTINUATION REFER DRAWING SHEET C3.04

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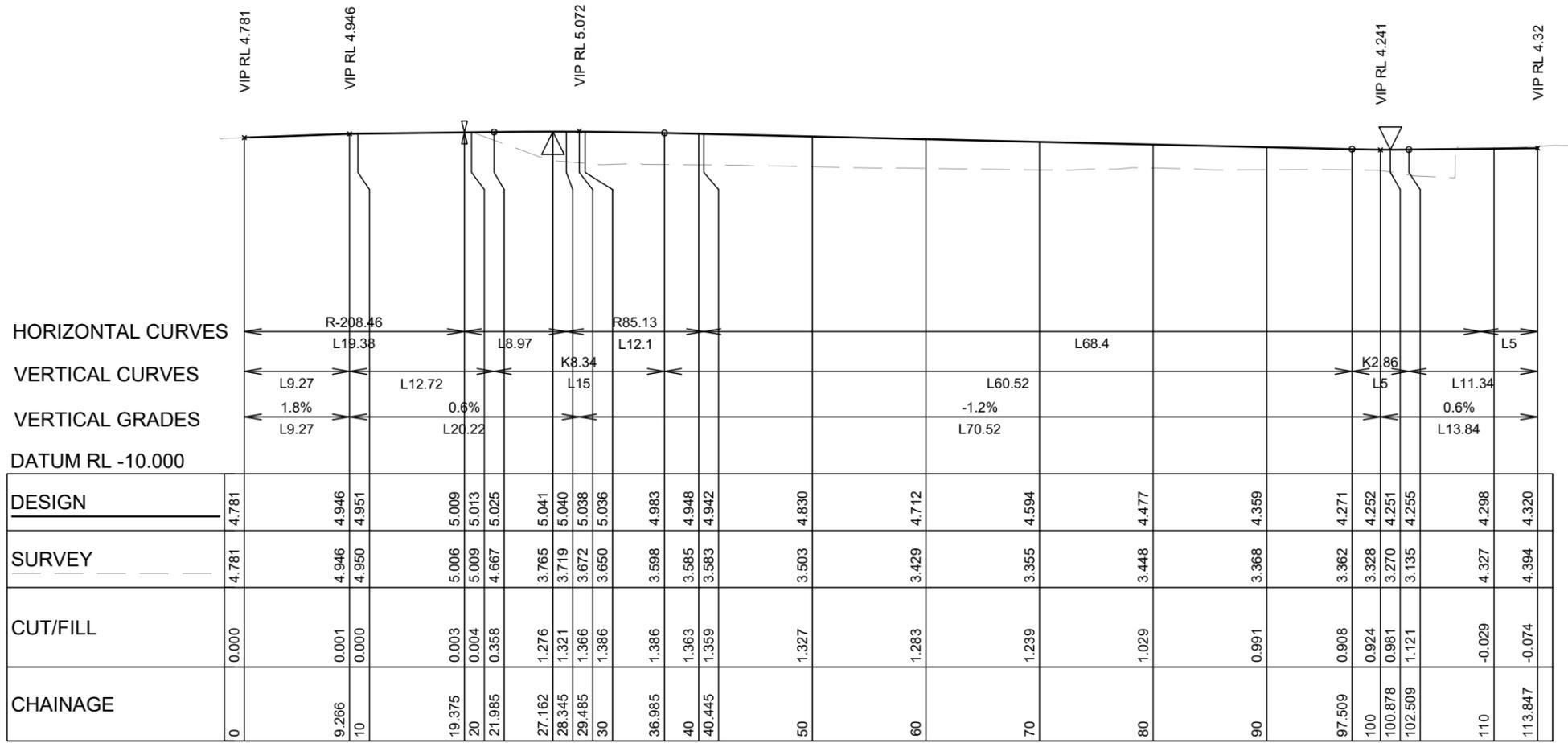
North		Warriewood Developers Pty Ltd	
Issue	Description	Date	Drawn / Approved
A	ISSUED FOR APPROVAL	15.12.23	RH / BK

Client: **WARRIEWOOD DEVELOPERS PTY LTD**

Architect: **ACOR CONSULTANTS**
 ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project: **PROPOSED RESIDENTIAL DEVELOPMENT**
 (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD

Drawn	Date	Scale	A1	Q.A. Check	Date
LW	DEC 2023	AS NOTED	-	-	-
Designed	Project No.	Dwg. No.	Issue		
BK	CC230177	C3.05	A		



MC01 - LONGITUDINAL SECTION
 HORZ SCALE 1:500
 VERT SCALE 1:250

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A		ISSUED FOR APPROVAL	15.12.23	RH	BK
Issue	Description	Date	Drawn	Approved	

Client
WARRIEWOOD DEVELOPERS
 PTY LTD

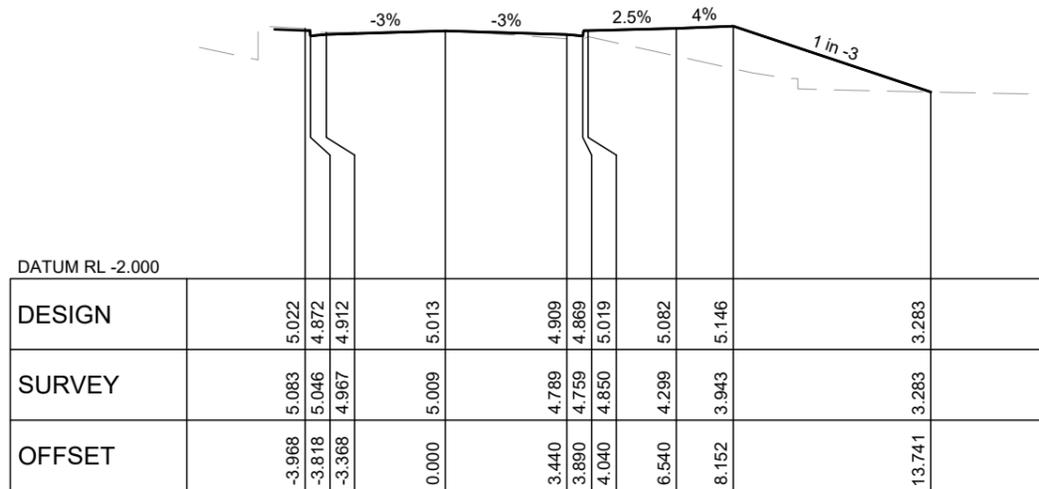
Architect

ACOR CONSULTANTS
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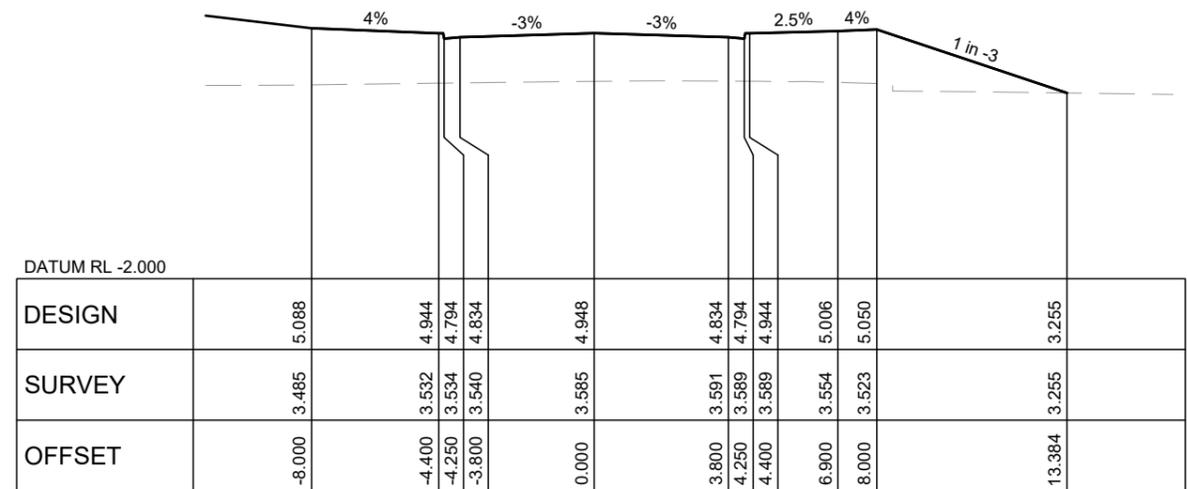
ACOR Consultants (CC) Pty Ltd
 Platinum Building, Suite 2.01, 4 Ilya Avenue
 ERINA NSW 2250, Australia
 T +61 2 4324 3499

Project
PROPOSED RESIDENTIAL DEVELOPMENT
 (No. 43 - 49)
 WARRIEWOOD ROAD
 WARRIEWOOD

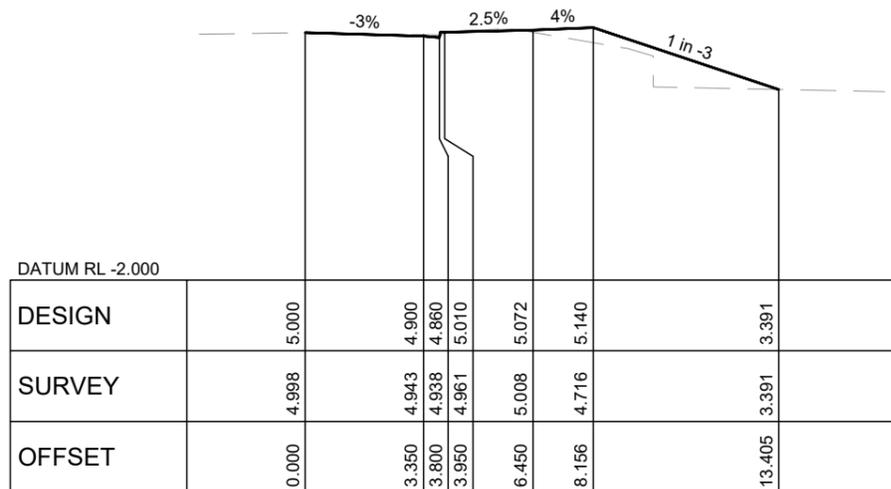
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Drawn	Date	Scale	A1	Q.A. Check	Date
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Designed	Project No.	Dwg. No.	Issue		
BK	CC230177	C3.06	A		



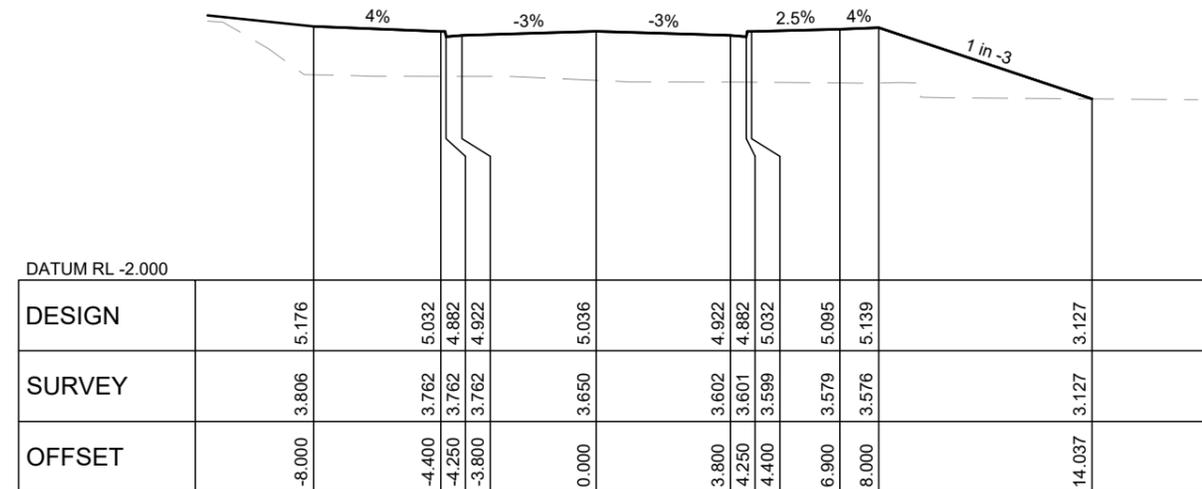
CH 20



CH 40



CH 18



CH 30

HORZ SCALE 1:200
VERT SCALE 1:400

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Issue	Description	Date	Drawn	Approved
A	ISSUED FOR APPROVAL	15.12.23	RH	BK

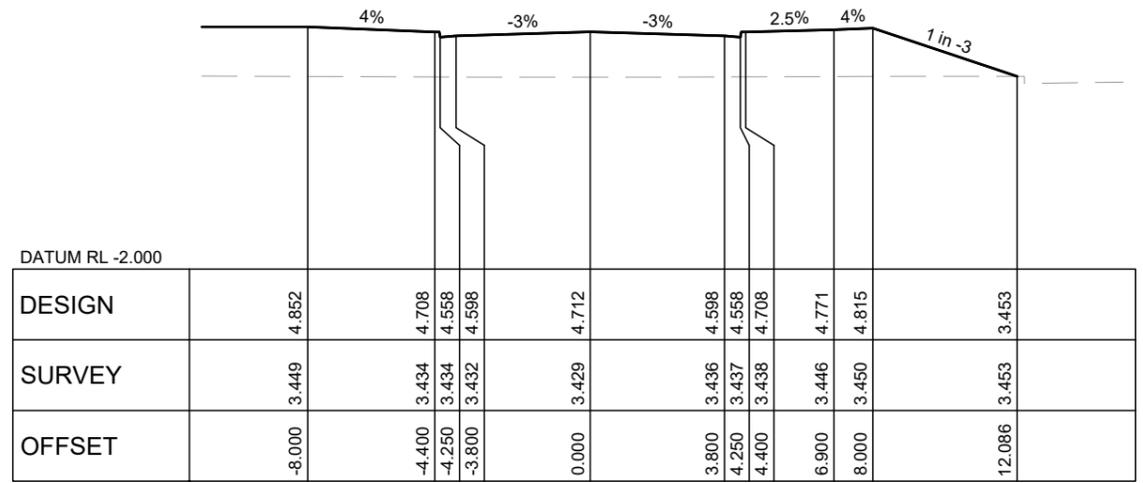
Client
WARRIEWOOD DEVELOPERS PTY LTD

Architect

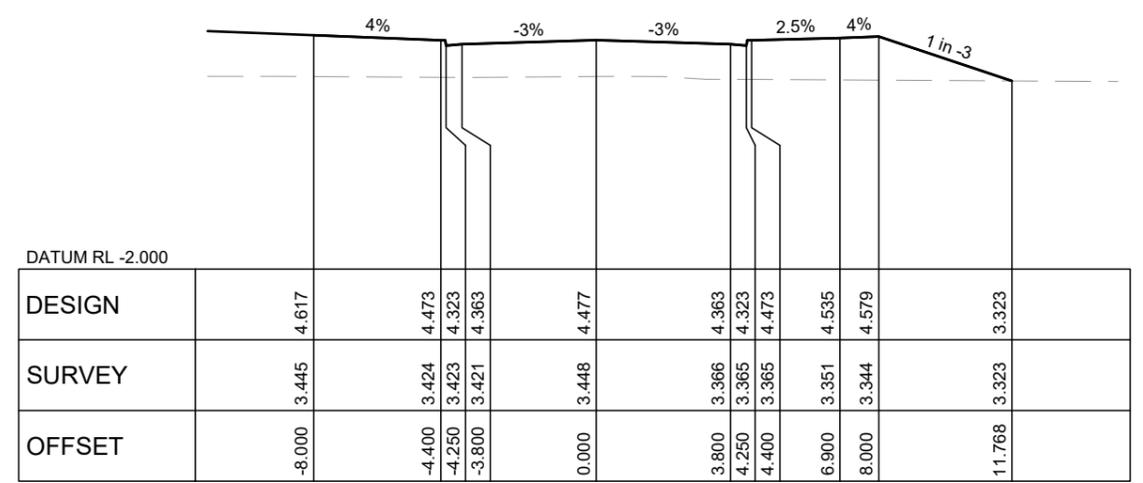
ACOR CONSULTANTS
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project
PROPOSED RESIDENTIAL DEVELOPMENT
(No. 43 - 49)
WARRIEWOOD ROAD
WARRIEWOOD

Drawing Title				
ROAD CROSS SECTIONS (MC01) LORIKEET GROVE SHEET 1 OF 3				
Drawn	Date	Scale	A1	Q.A. Check
LW	DEC 2023	AS NOTED	-	-
Designed	Project No.	Dwg. No.	Issue	
BK	CC230177	C3.07	A	



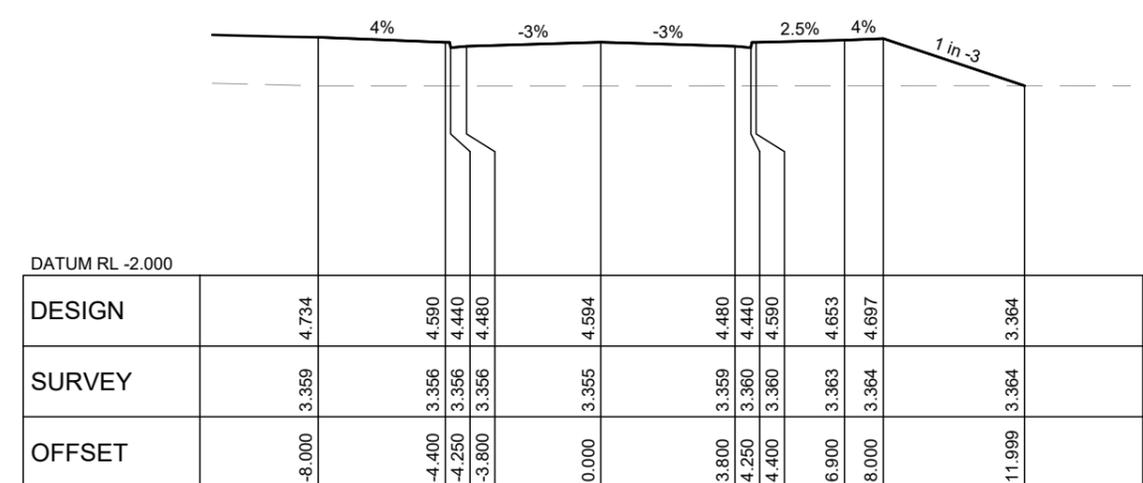
CH 60



CH 80



CH 50



CH 70

HORZ SCALE 1:200
VERT SCALE 1:400

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North				
A ISSUED FOR APPROVAL 15.12.23 RH BK				
Issue	Description	Date	Drawn	Approved

Client
WARRIEWOOD DEVELOPERS PTY LTD

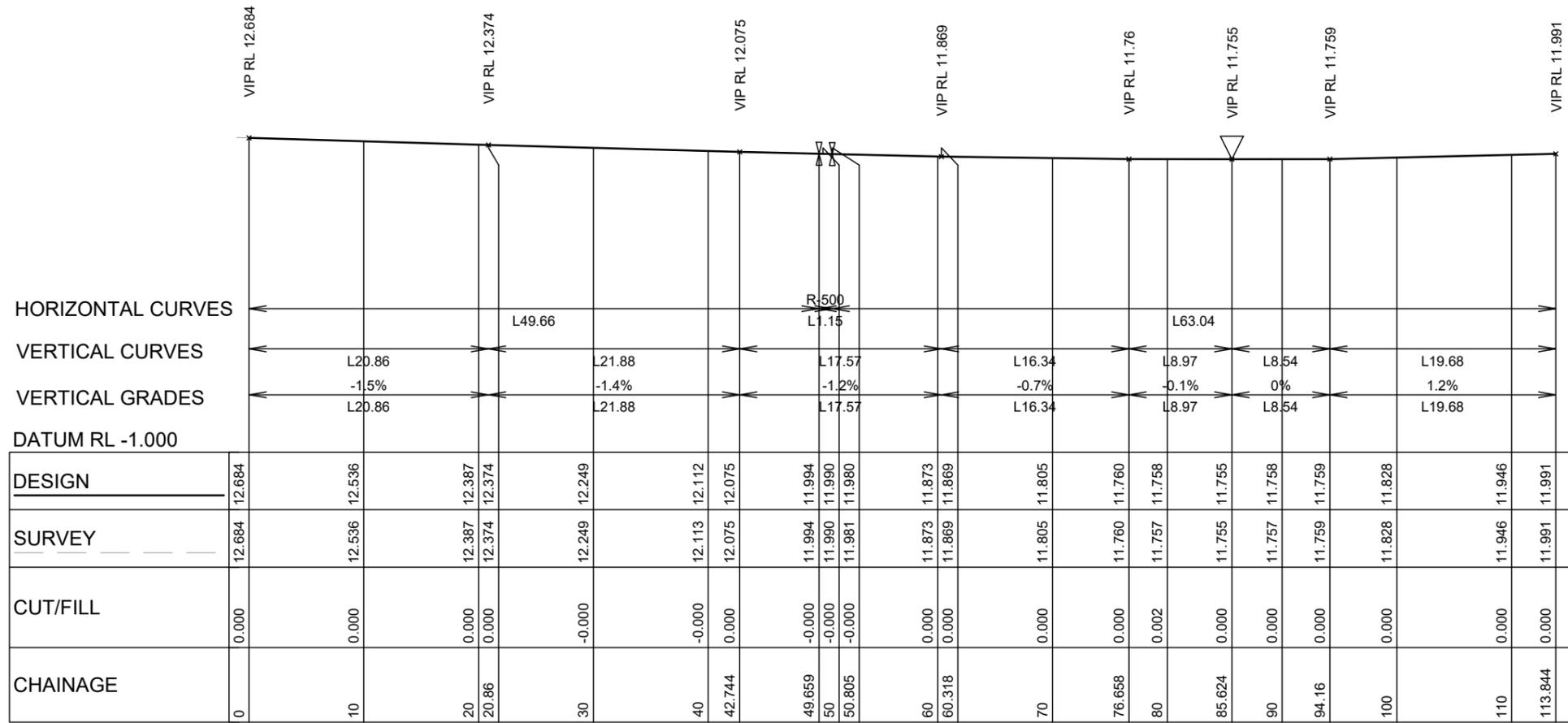
Architect

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Project
PROPOSED RESIDENTIAL DEVELOPMENT
(No. 43 - 49)
WARRIEWOOD ROAD
WARRIEWOOD

Drawing Title ROAD CROSS SECTIONS (MC01) LORIKEET GROVE SHEET 2 OF 3				
Drawn	Date	Scale	A1	Q.A. Check
LW	DEC 2023	AS NOTED	-	-
Designed	Project No.	Dwg. No.	Issue	
BK	CC230177	C3.08	A	

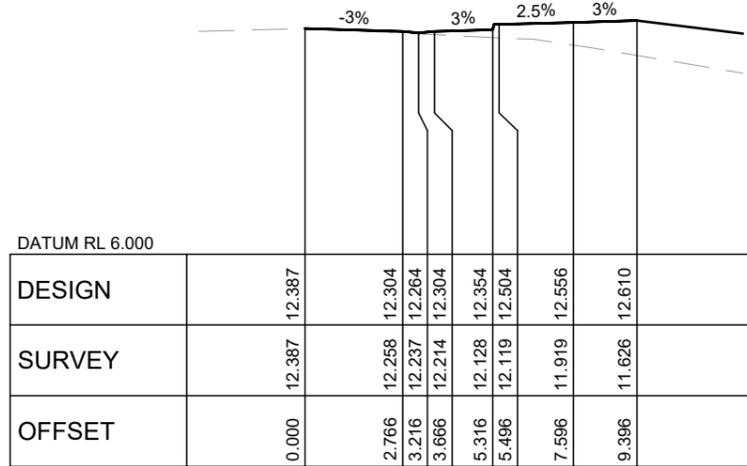


MC02 - LONGITUDINAL SECTION

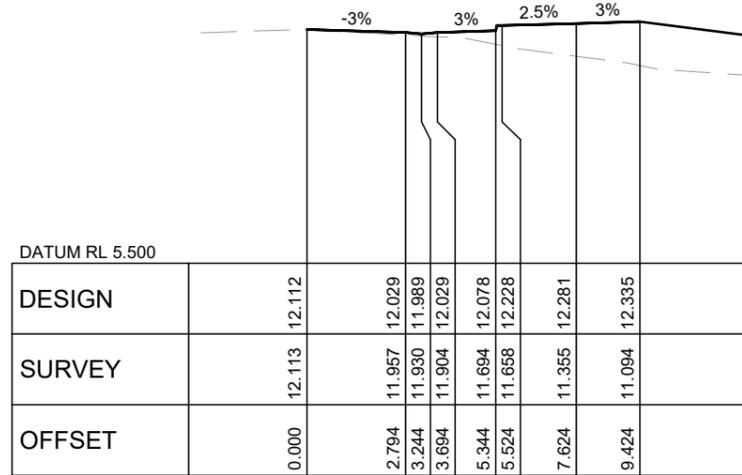
HORZ SCALE 1:500
VERT SCALE 1:250

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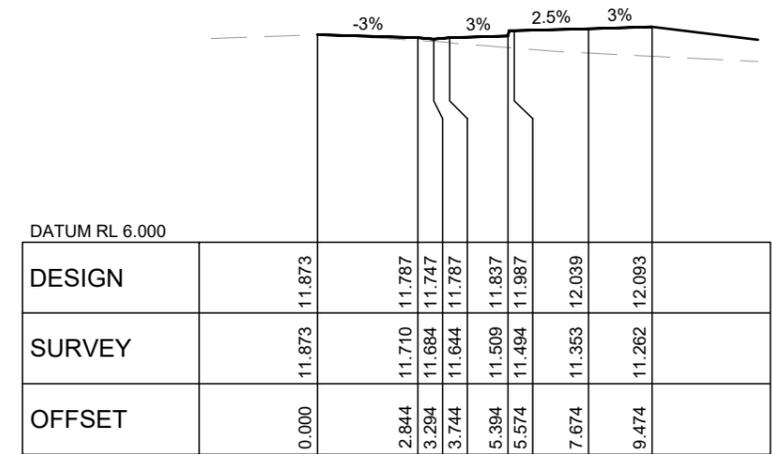
Client WARRIEWOOD DEVELOPERS PTY LTD		Architect 		Project PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD		Drawing Title ROAD LONGITUDINAL SECTION (MC02) - WARRIEWOOD ROAD			
Drawn LW	Date DEC 2023	Scale AS NOTED	A1	Q.A. Check -	Date -	Designed BK	Project No. CC230177	Dwg. No. C3.10	Issue A



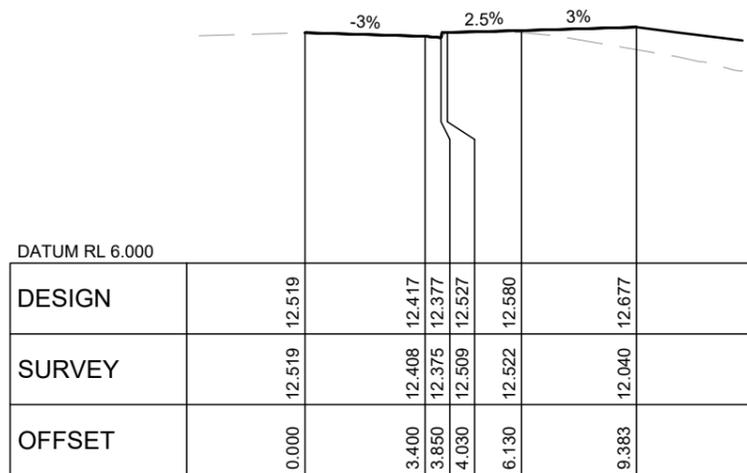
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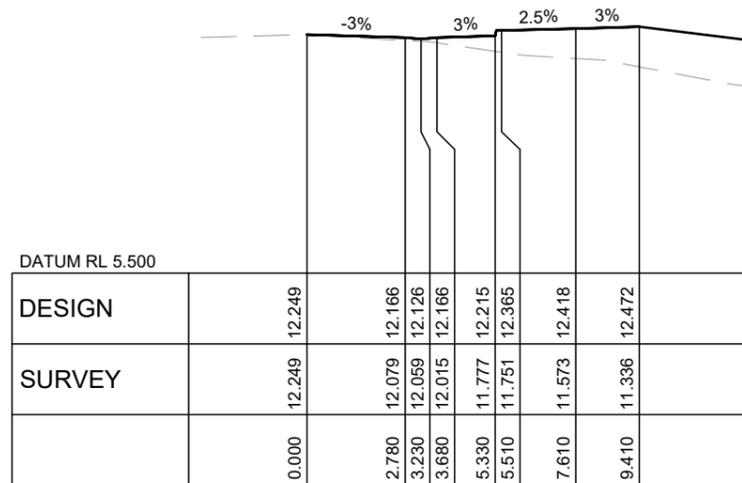
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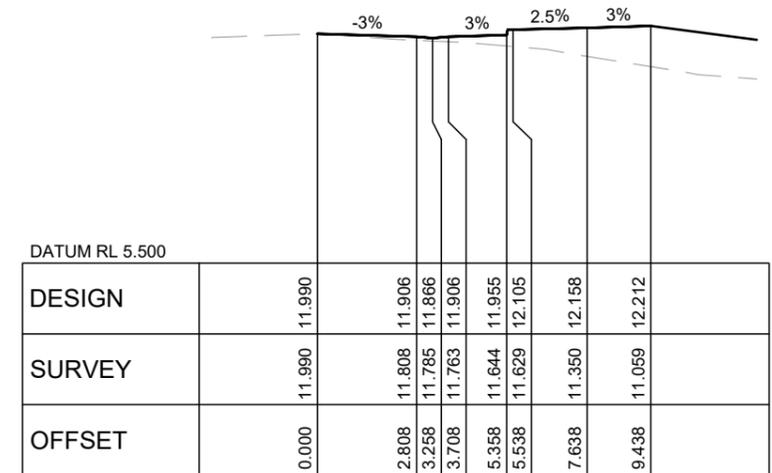
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CH 11.122



CH 30



CH 50

HORZ SCALE 1:200
VERT SCALE 1:400

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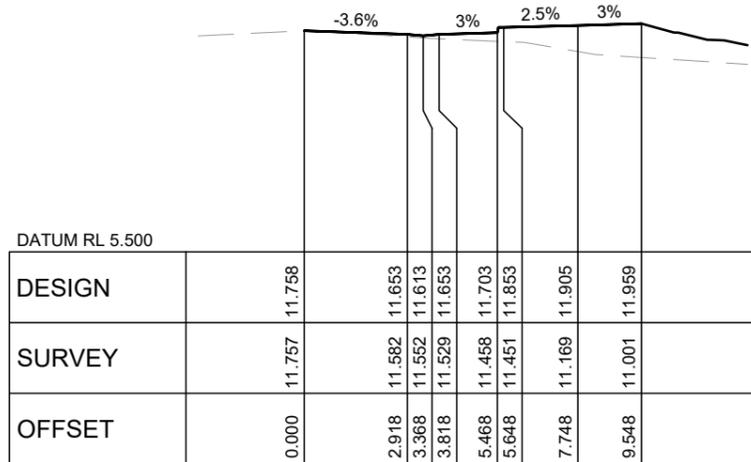
North		Client	
A		WARRIEWOOD DEVELOPERS PTY LTD	
ISSUED FOR APPROVAL	15.12.23	RH	BK
Issue	Description	Date	Drawn
1	15.12.23	RH	BK

Architect		ACOR CONSULTANTS	
Platinum Building, Suite 2.01, 4 Ilya Avenue		ERINA NSW 2250, Australia	
T +61 2 4324 3499		ENGINEERS MANAGERS INFRASTRUCTURE PLANNERS DEVELOPMENT CONSULTANTS	

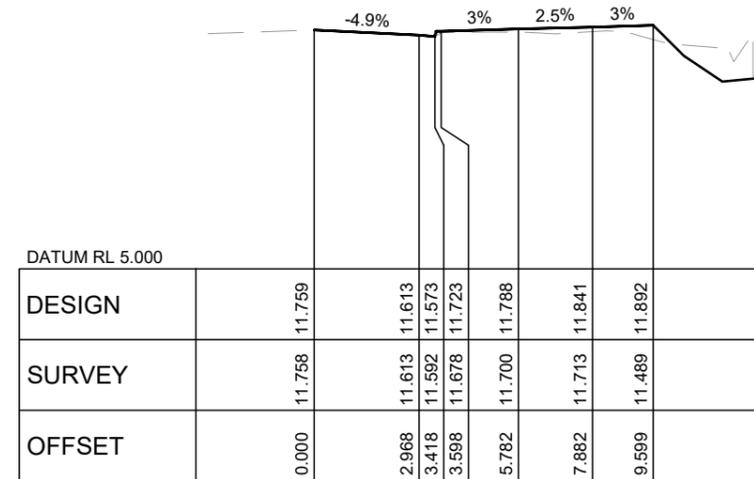
Project		PROPOSED RESIDENTIAL DEVELOPMENT	
(No. 43 - 49)		WARRIEWOOD ROAD WARRIEWOOD	

Drawing Title		ROAD CROSS SECTIONS (MC02) WARRIEWOOD ROAD SHEET 1 OF 2	
Drawn	Date	Scale	A1
LW	DEC 2023	AS NOTED	-
Designed	Project No.	Dwg. No.	Issue
BK	CC230177	C3.11	A

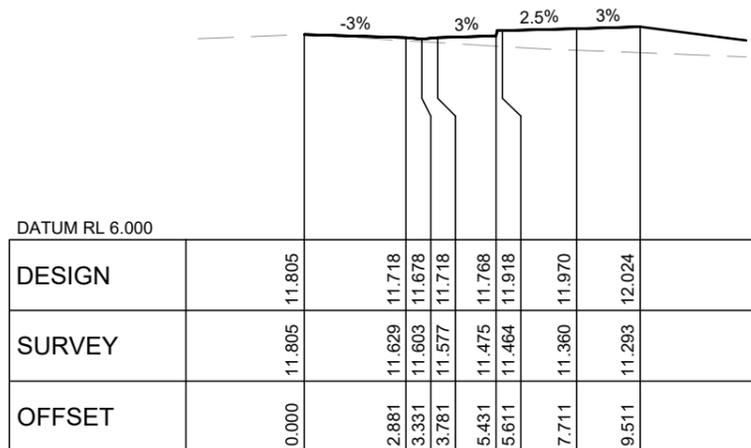
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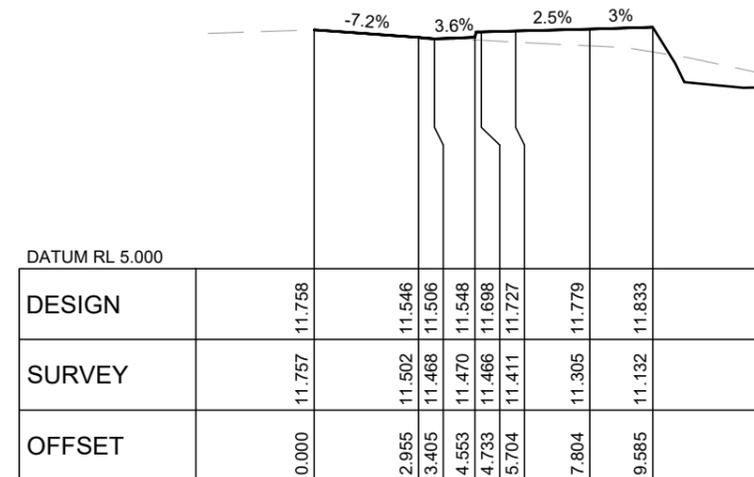
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CH 93.576



CH 70

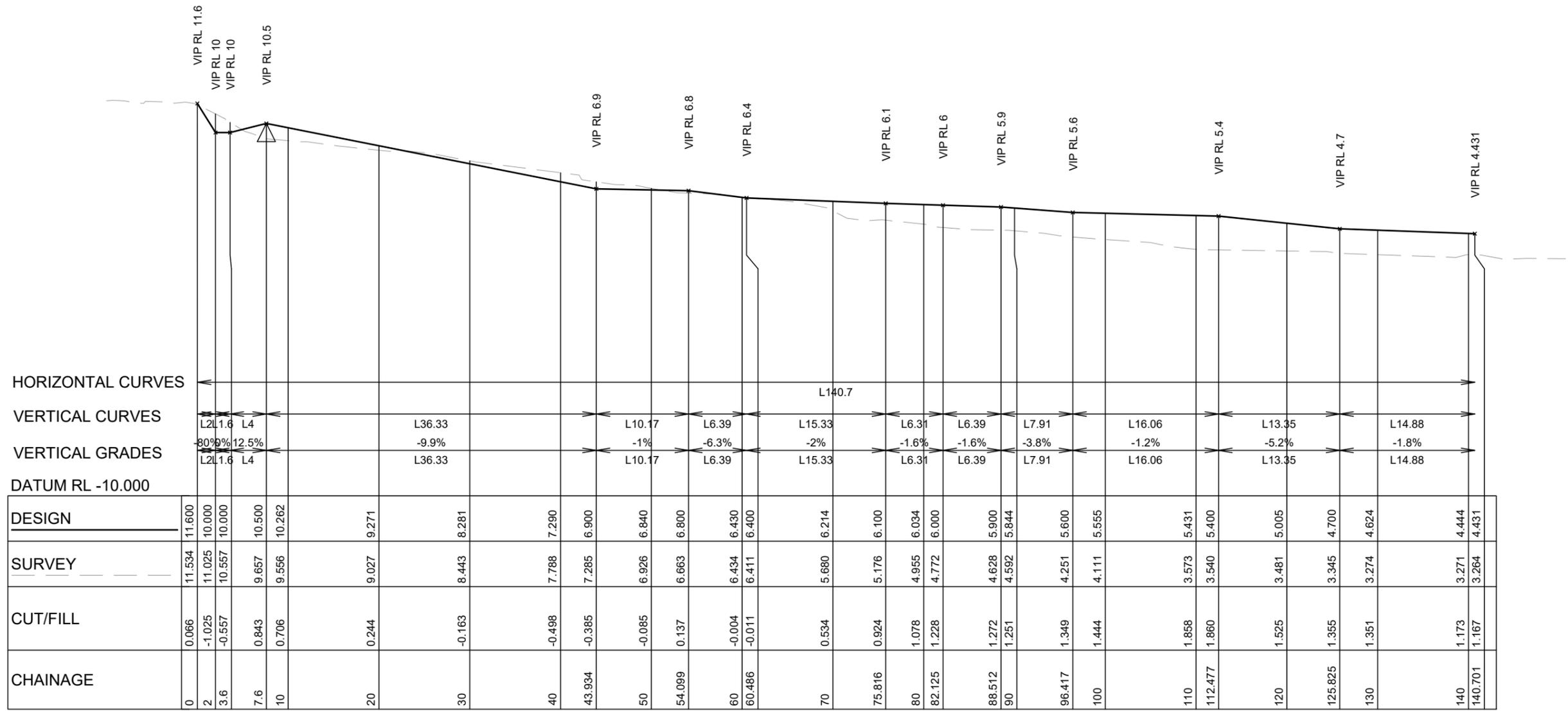


CH 90

HORZ SCALE 1:200
VERT SCALE 1:400

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Issue	Description	Date	Drawn	Approved																																			
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LW	DEC 2023	AS NOTED	-	-	-																																		
Designed	Project No.	Dwg. No.	Issue																																				
BK	CC230177	C3.12	A																																				



DR01 - LONGITUDINAL SECTION
 HORZ SCALE 1:500
 VERT SCALE 1:250

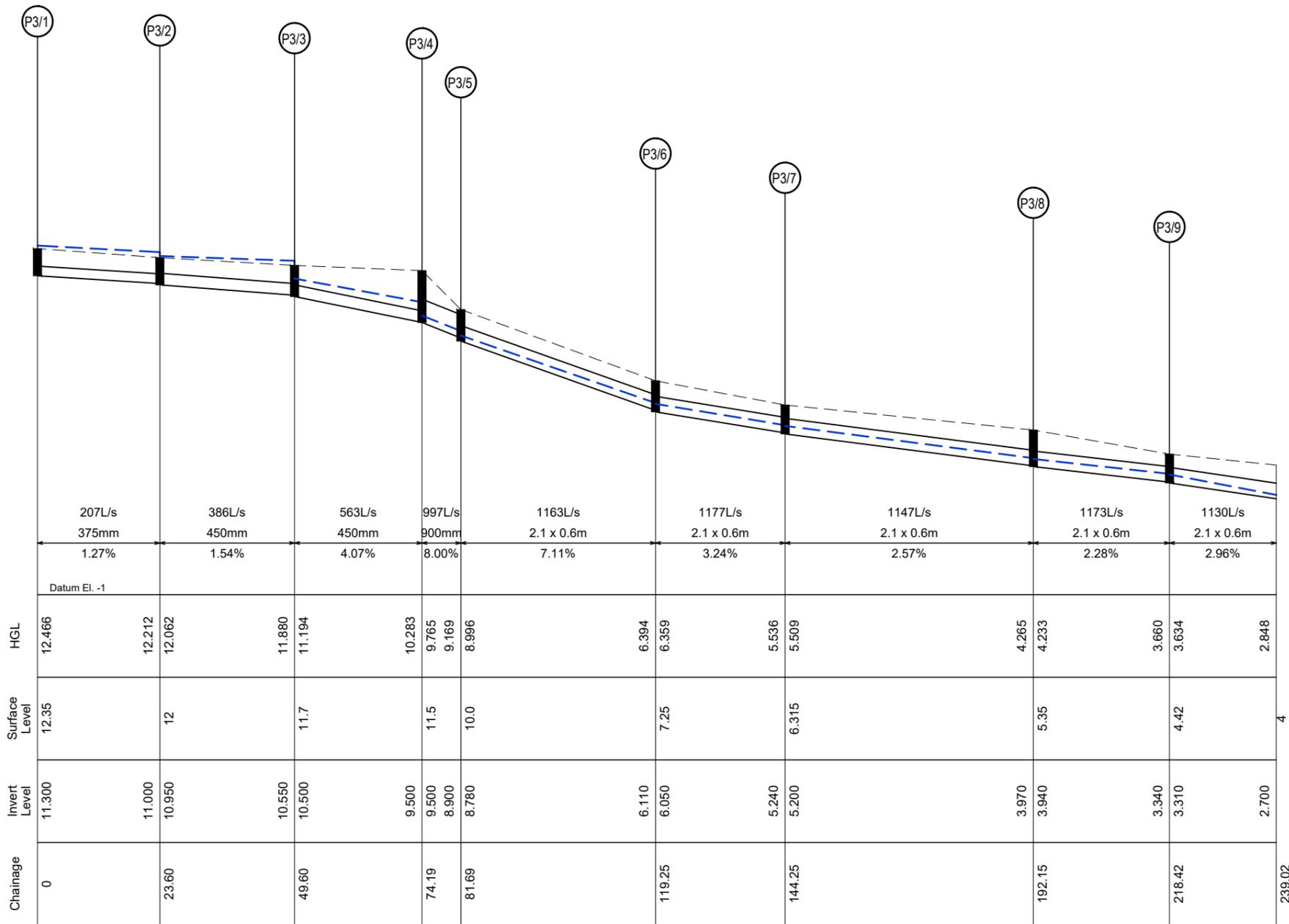
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North		Client		Architect	
A		WARRIEWOOD DEVELOPERS PTY LTD		ACOR CONSULTANTS	
ISSUED FOR APPROVAL	15.12.23	RH	BK	ENGINEERS MANAGERS INFRASTRUCTURE PLANNERS DEVELOPMENT CONSULTANTS	
Issue	Description	Date	Drawn	Approved	

Project		Drawing Title	
ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		DRAINAGE EASEMENT LONGITUDINAL SECTION (DR01)	
PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD		Drawn	Date
Project No. CC230177		LW	DEC 2023
Dwg. No. C3.13		Scale	A1
Issue		AS NOTED	-
A		Q.A. Check	-

Project		Drawing Title	
ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		DRAINAGE EASEMENT LONGITUDINAL SECTION (DR01)	
PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD		Drawn	Date
Project No. CC230177		LW	DEC 2023
Dwg. No. C3.13		Scale	A1
Issue		AS NOTED	-
A		Q.A. Check	-

Project		Drawing Title	
ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		DRAINAGE EASEMENT LONGITUDINAL SECTION (DR01)	
PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD		Drawn	Date
Project No. CC230177		LW	DEC 2023
Dwg. No. C3.13		Scale	A1
Issue		AS NOTED	-
A		Q.A. Check	-



**LONG SECTION (100YR ARI + CC)
DRAINAGE LINE 3**

HORIZONTAL SCALE - 1:500/A1, 1:1000/A3



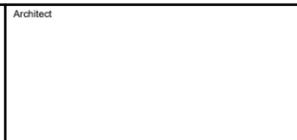
VERTICAL SCALE - 1:100/A1, 1:200/A3



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North		Client	
A		WARRIEWOOD DEVELOPERS PTY LTD	
ISSUED FOR APPROVAL	15.12.23	RH	BK
Issue	Description	Date	Drawn
0	1:1000 at full size		

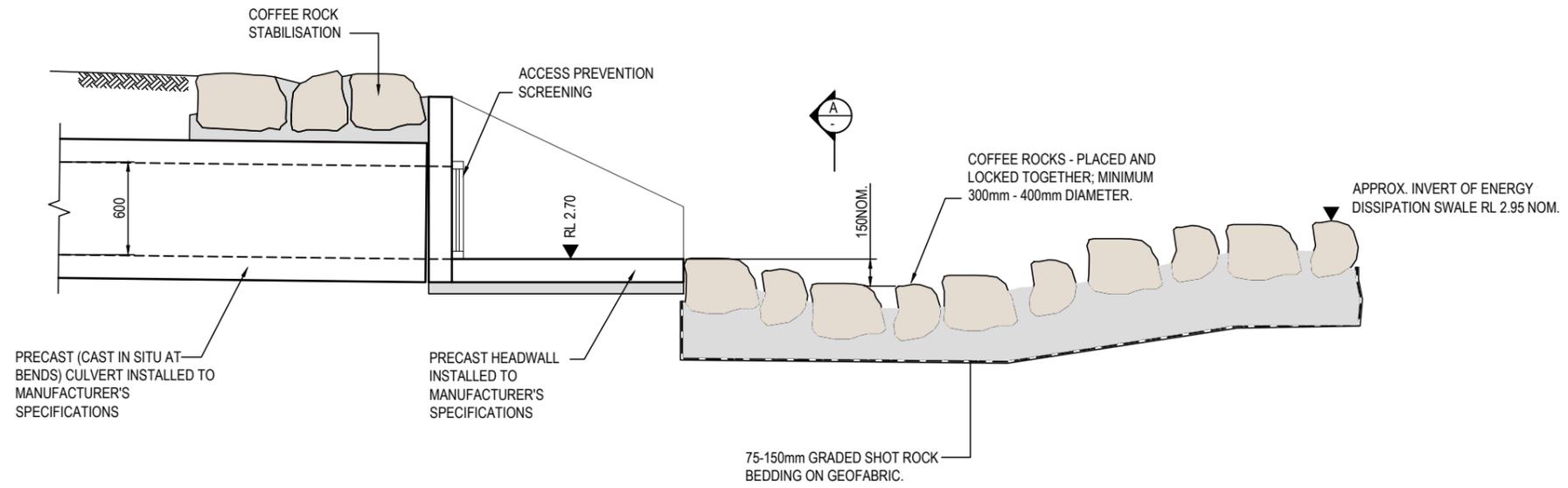
Architect



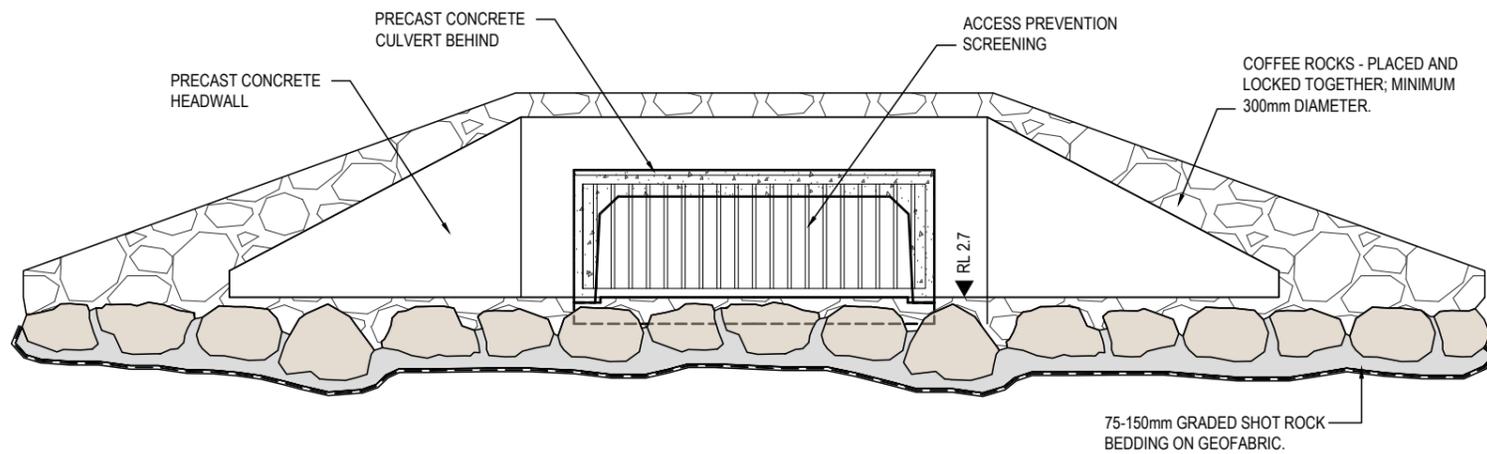
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Platinum Building, Suite 2.01, 4 Ilya Avenue
ERINA NSW 2250, Australia
T +61 2 4324 3499

Project
PROPOSED RESIDENTIAL DEVELOPMENT
(No. 43 - 49)
WARRIEWOOD ROAD
WARRIEWOOD

Drawing Title			
DRAINAGE PIT & PIPE LONGITUDINAL SECTION			
Drawn	Date	Scale	A1
LW	DEC 2023	AS NOTED	-
Designed	Project No.	Dwg. No.	Issue
BK	CC230177	C3.14	A



CULVERT HEADWALL SECTION
SCALE - 1:20/A1, 1:40/A3



SECTION
SCALE: 1:20/A1, 1:40/A3

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		North	
		WARRIEWOOD DEVELOPERS PTY LTD	
		Architect	
		ACOR CONSULTANTS	
		ENGINEERS MANAGERS INFRASTRUCTURE PLANNERS DEVELOPMENT CONSULTANTS	
		Project	
		PROPOSED RESIDENTIAL DEVELOPMENT	
		(No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD	
		Drawing Title	
		TYPICAL DETAIL SHEET	
		1 OF 2	
		Scale A1 AS NOTED	
		Q.A. Check -	
		Date -	
		Designed BK	
		Project No. CC230177	
		Dwg. No. C3.15	
		Issue A	

Client	WARRIEWOOD DEVELOPERS PTY LTD
Architect	ACOR CONSULTANTS
Project	PROPOSED RESIDENTIAL DEVELOPMENT
Project No.	CC230177
Dwg. No.	C3.15
Issue	A

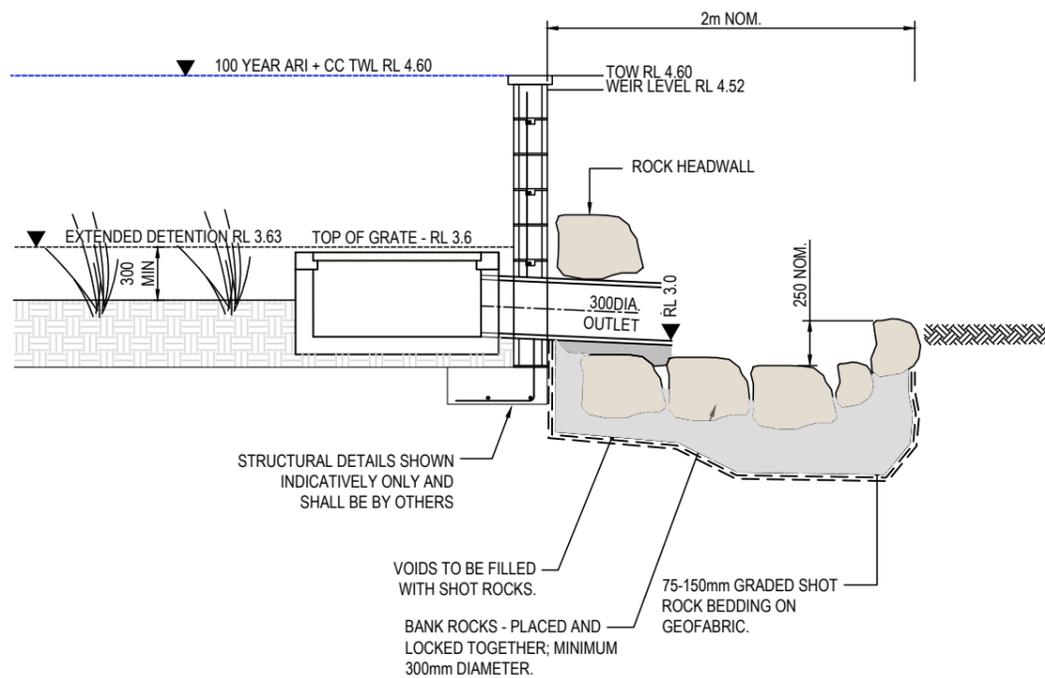
Drawn	LW
Date	DEC 2023
Scale	A1 AS NOTED
Q.A. Check	-
Date	-

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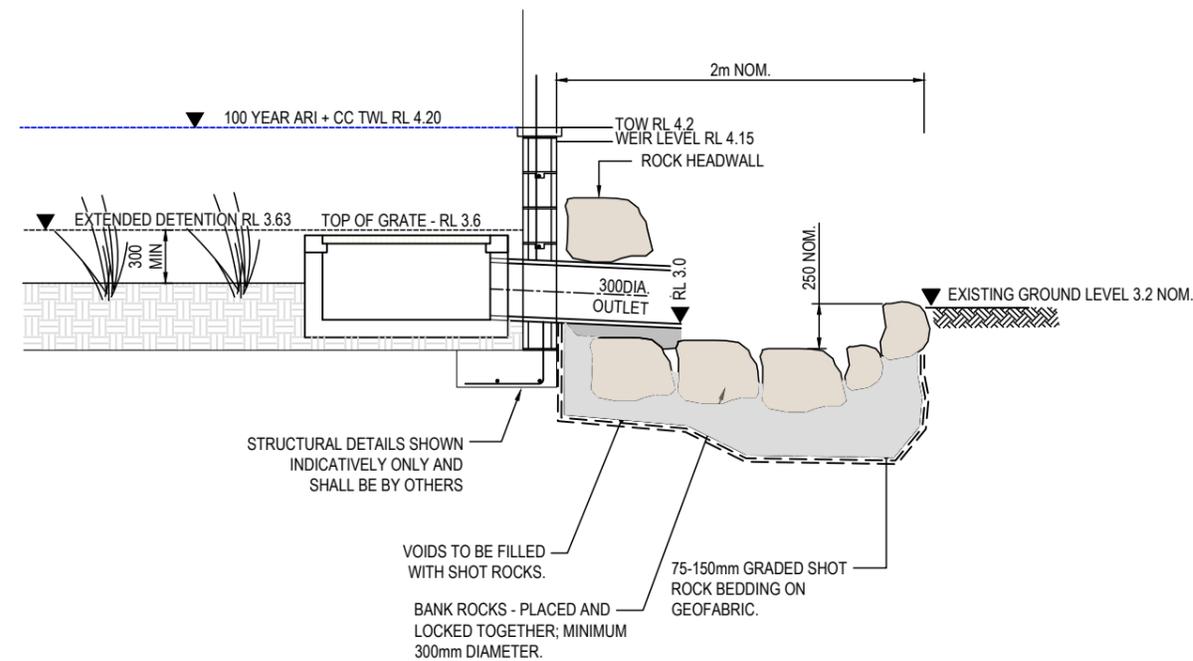
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Drawn	LW
Date	DEC 2023
Scale	A1 AS NOTED
Q.A. Check	-
Date	-

Client	WARRIEWOOD DEVELOPERS PTY LTD
Architect	ACOR CONSULTANTS
Project	PROPOSED RESIDENTIAL DEVELOPMENT
Project No.	CC230177
Dwg. No.	C3.15
Issue	A



OUTLET AND ENERGY DISSIPATION SWALE - BASIN 1
NOT TO SCALE



OUTLET AND ENERGY DISSIPATION SWALE - BASIN 2
NOT TO SCALE

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		North	
A		ISSUED FOR APPROVAL	
15.12.23	RH	BK	
Date	Drawn	Approved	

Client
WARRIEWOOD DEVELOPERS PTY LTD

Architect

ACOR CONSULTANTS
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

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Project
PROPOSED RESIDENTIAL DEVELOPMENT
(No. 43 - 49)
WARRIEWOOD ROAD
WARRIEWOOD

Drawing Title TYPICAL DETAIL SHEET 2 OF 2			
Drawn	Date	Scale	A1
LW	DEC 2023	AS NOTED	-
Designed	Project No.	Dwg. No.	Issue
BK	CC230177	C3.16	A