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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

**Document No.:** CC230177\_WMP

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**Dated:** 15 December 2023

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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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## Annexures

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
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## 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&amp; 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.	

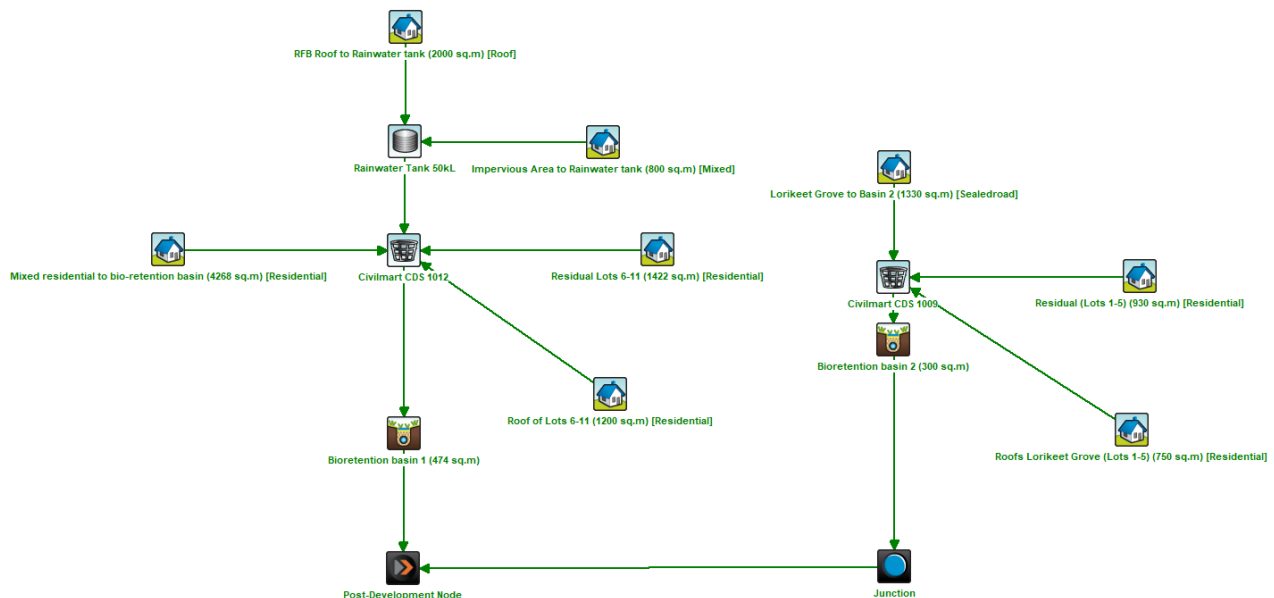


## 4 Stormwater Quality

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 m<sup>3</sup> 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 <b>ACOR CONSULTANTS PTY.LTD.</b>

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 ABUT 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 980 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 : 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 FRIC 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 JUNCTIONS 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 : - 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 P113) - 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 : - 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. <u>GENERAL</u> 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. <u>MIX PROPORTIONS</u> 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. <u>PAVEMENT PREPARATION</u> 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. <u>TACK COAT</u> 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. <u>SPREADING</u> 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><tr><th>ROAD SURFACE TEMPERATURE IN SHADE (°C)</th><th>MIX TEMPERATURES (°C)</th></tr><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></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										
c) ASPHALTIC CONCRETE SHALL NOT BE LAID WHEN THE ROAD SURFACE IS WET OR WHEN COLD WINDS CHILL THE MIX ADVERSELY AFFECT SPREADING AND COMPACTION.											
d) THE MINIMUM COMPACTED THICKNESS IS 30mm OVER EXISTING SEALED PAVEMENTS AND 50mm OVER NEW PAVEMENTS											
6. <u>JOINTS</u> 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. <u>COMPACTION</u> 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. <u>FINISHED PAVEMENT PROPERTIES</u> a) FINISH 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.											



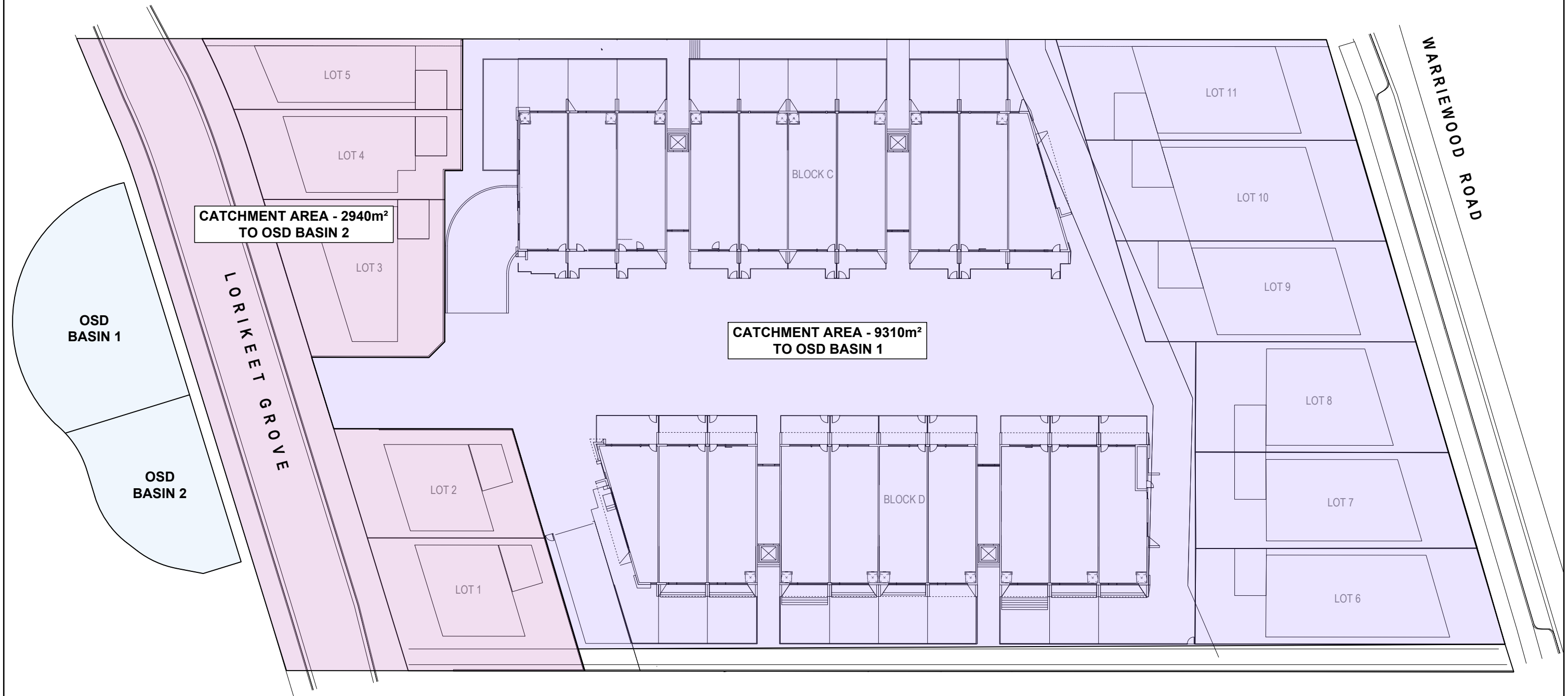
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IMPORTANT: THE CONTRACTOR IS TO MAINTAIN A CURRENT SET OF "DIAL BEFORE YOU DIG" DRAWINGS ON SITE AT ALL TIMES.

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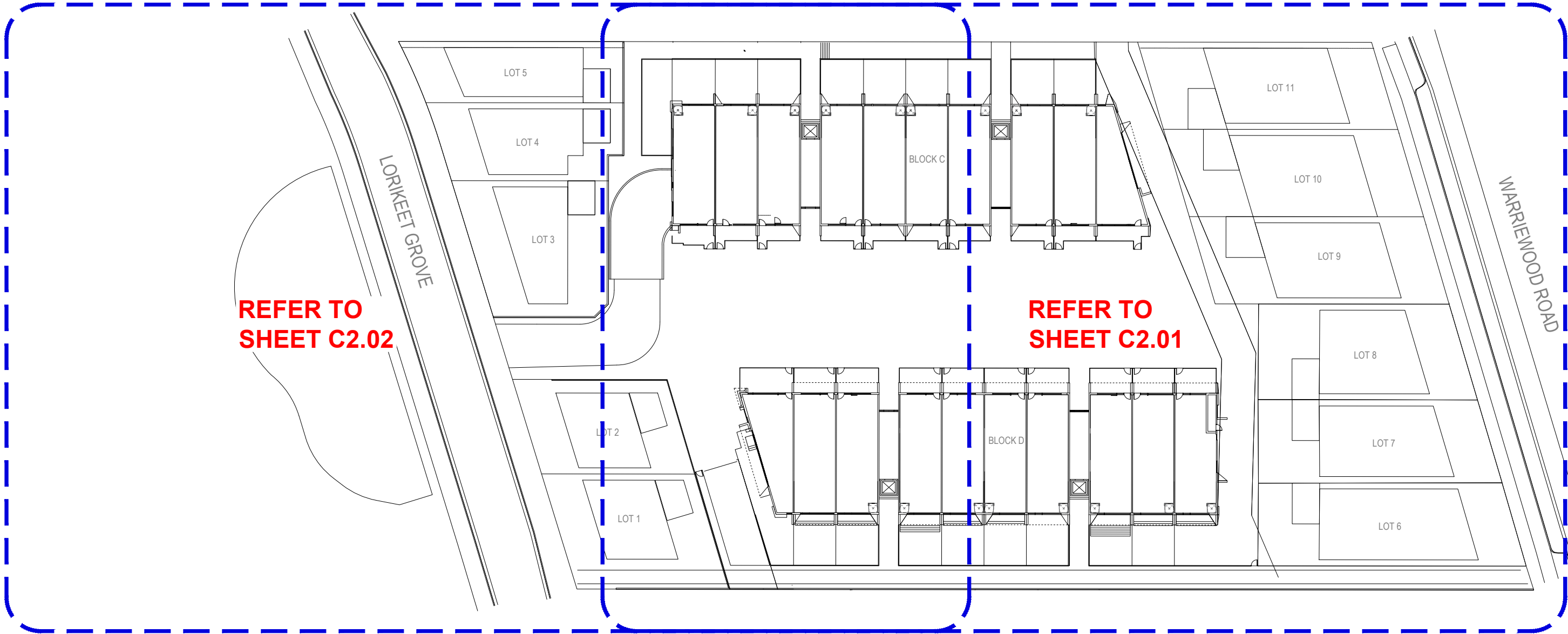
										Client	Architect	<div><div>ACOR CONSULTANTS</div><div>ACOR</div><div>CONSULTANTS</div></div> <div>ENGINEERS   MANAGERS   INFRASTRUCTURE PLANNERS   DEVELOPMENT CONSULTANTS</div>										Project	<div>ACOR Consultants (CC) Pty Ltd</div> <div>Platinum Building, Suite 2.01, 4 Ilya Avenue</div> <div>ERINA NSW 2250, Australia</div> <div>T +61 2 4324 3499</div>										<div>PROPOSED RESIDENTIAL DEVELOPMENT</div> <div>(No. 43 - 49)</div> <div>WARRIEWOOD ROAD</div> <div>WARRIEWOOD</div>										<div>Drawing Title</div> <div>COVER SHEET &amp; NOTES</div>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													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DRAINAGE CATCHMENT PLAN  
SCALE - 1:250/A1, 1:500/A3  
0 2.5 5 10 15 20 25m

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				North		Client		Architect		ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		Project		Drawing Title	
						WARRIEWOOD DEVELOPERS PTY LTD				AcOR CONSULTANTS ENGINEERS   MANAGERS   INFRASTRUCTURE PLANNERS   DEVELOPMENT CONSULTANTS		PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD		DRAINAGE CATCHMENT PLAN	
A				ISSUED FOR APPROVAL		15.12.23		RH		BK		Date		Scale	
Issue				Description		Date		Drawn		Approved		LW		AS NOTED	
0				1cm at full size		10cm						Designed		Project No.	
												BK		CC230177	
														Dwg. No.	
														C1.01	
														Issue	
														A	

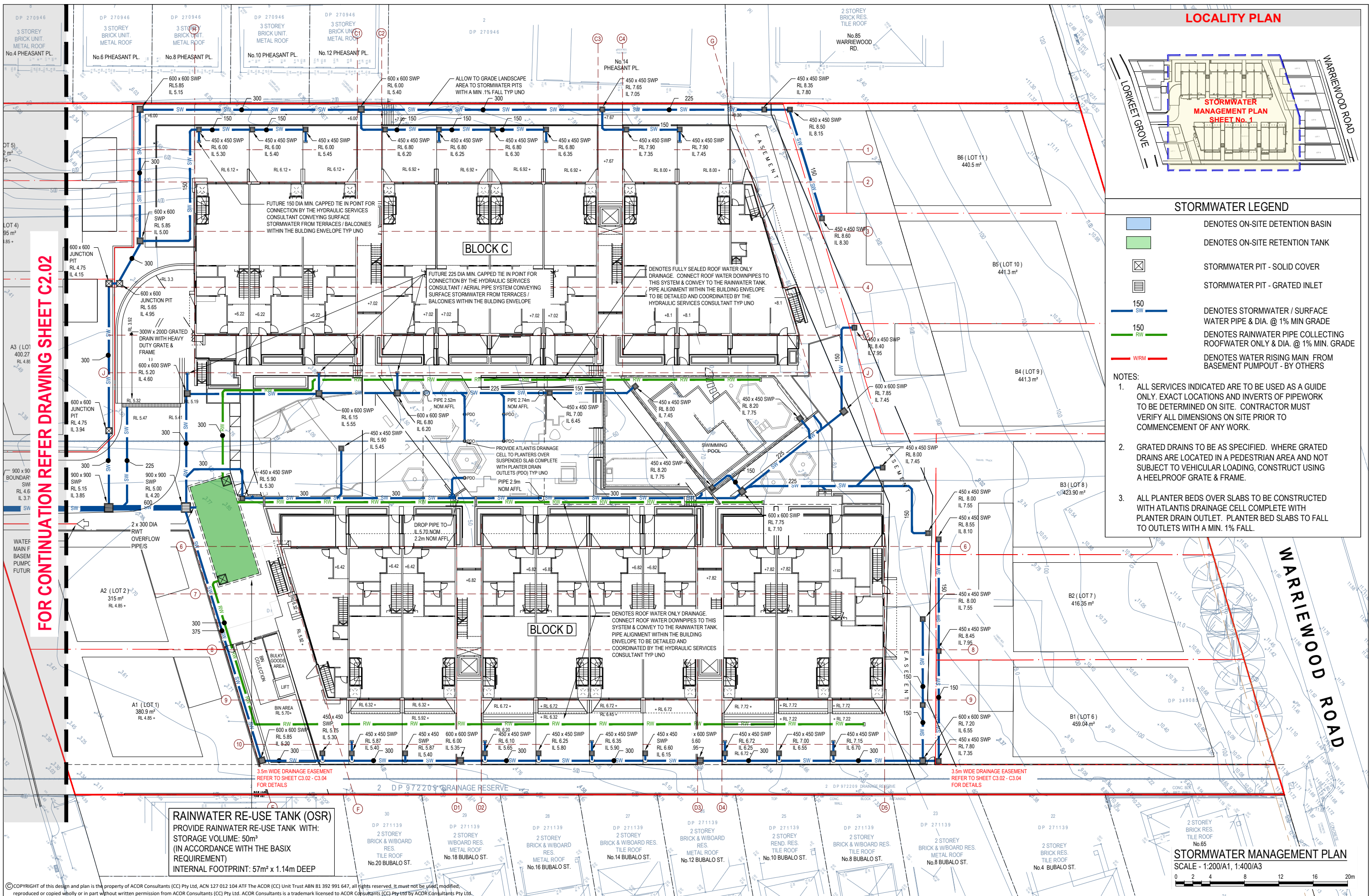


KEY PLAN  
SCALE - 1:300/A1, 1:600/A3  
0 2 4 8 12 16 20m

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						WARRIEWOOD DEVELOPERS PTY LTD				AcOR CONSULTANTS		PROPOSED RESIDENTIAL DEVELOPMENT		KEY PLAN - SITE STORMWATER MANAGEMENT	
A				ISSUED FOR APPROVAL		15.12.23		RH		BK		Date		Scale	
Issue				Description		Date		Drawn		Approved		RH		SEPT 2023	
1				0		1cm at full size		10cm				AS NOTED		A1	
												Q.A. Check		Date	
												-		-	
												Designed		Dwg. No.	
				BK		Project No.		CC230177		C2.00		Issue		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:
- 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.

STORMWATER MANAGEMENT PLAN

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



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A		ISSUED FOR APPROVAL	15.12.23	RH	BK
Issue	Description	Date	Drawn	Approved	
1	10m all full size				

Client  
**WARRIEWOOD DEVELOPERS**  
PTY LTD

Architect

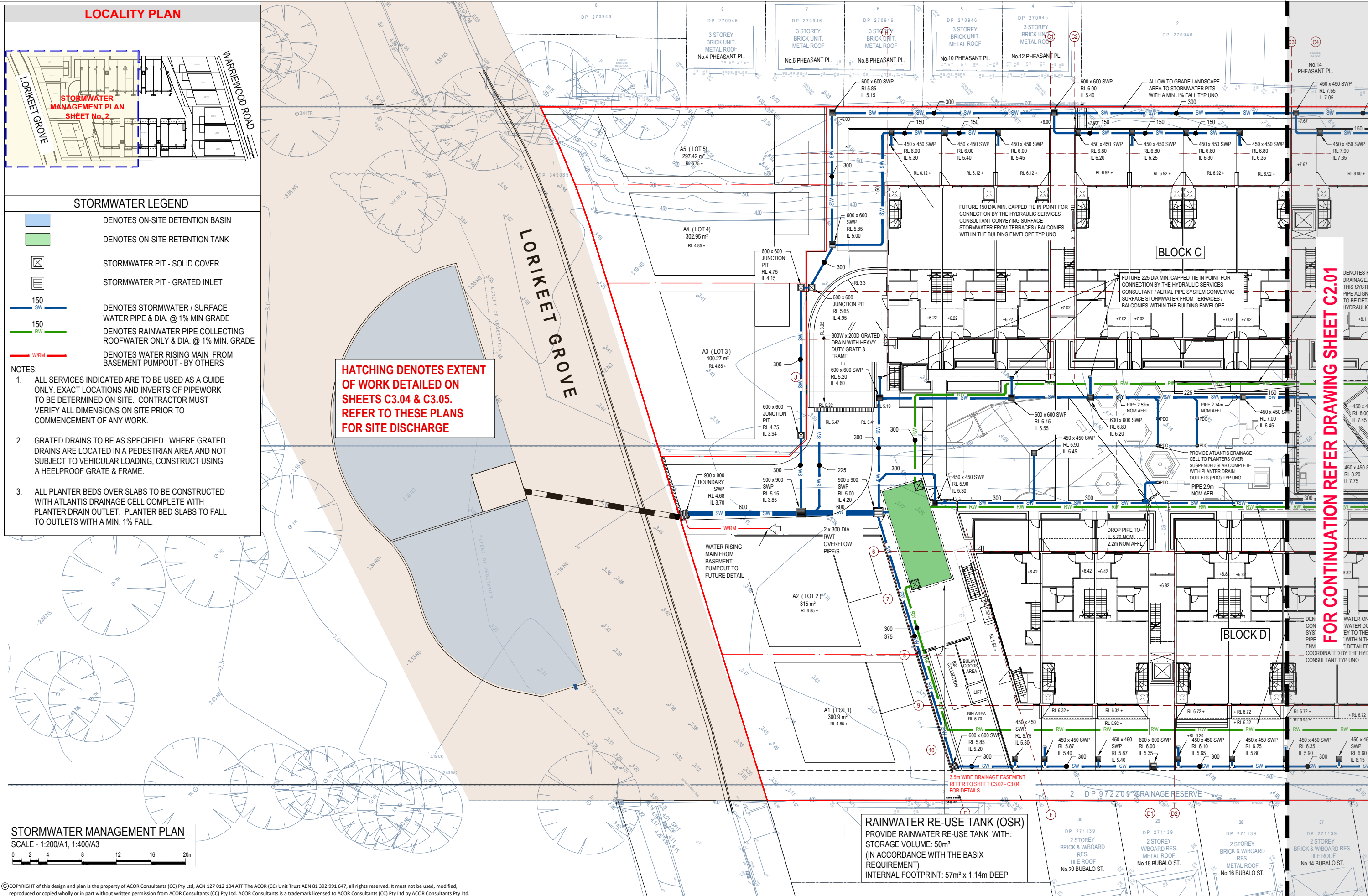


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Project  
**PROPOSED RESIDENTIAL DEVELOPMENT**  
(No. 43 - 49)  
WARRIEWOOD ROAD  
WARRIEWOOD

Drawing Title		STORMWATER MANAGEMENT PLAN - SHEET 1 OF 2	
Drawn	Date	Scale	A1
RH	SEPT 2023	AS NOTED	-
Designed	Project No.	Dwg. No.	Issue
BK	CC230177	C2.01	A





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A	ISSUED FOR APPROVAL	15.12.23	RH BK
Issue	Description	Date	Drawn Approved
1	10m at full size		

Client  
**WARRIEWOOD DEVELOPERS**  
PTY LTD

Architect

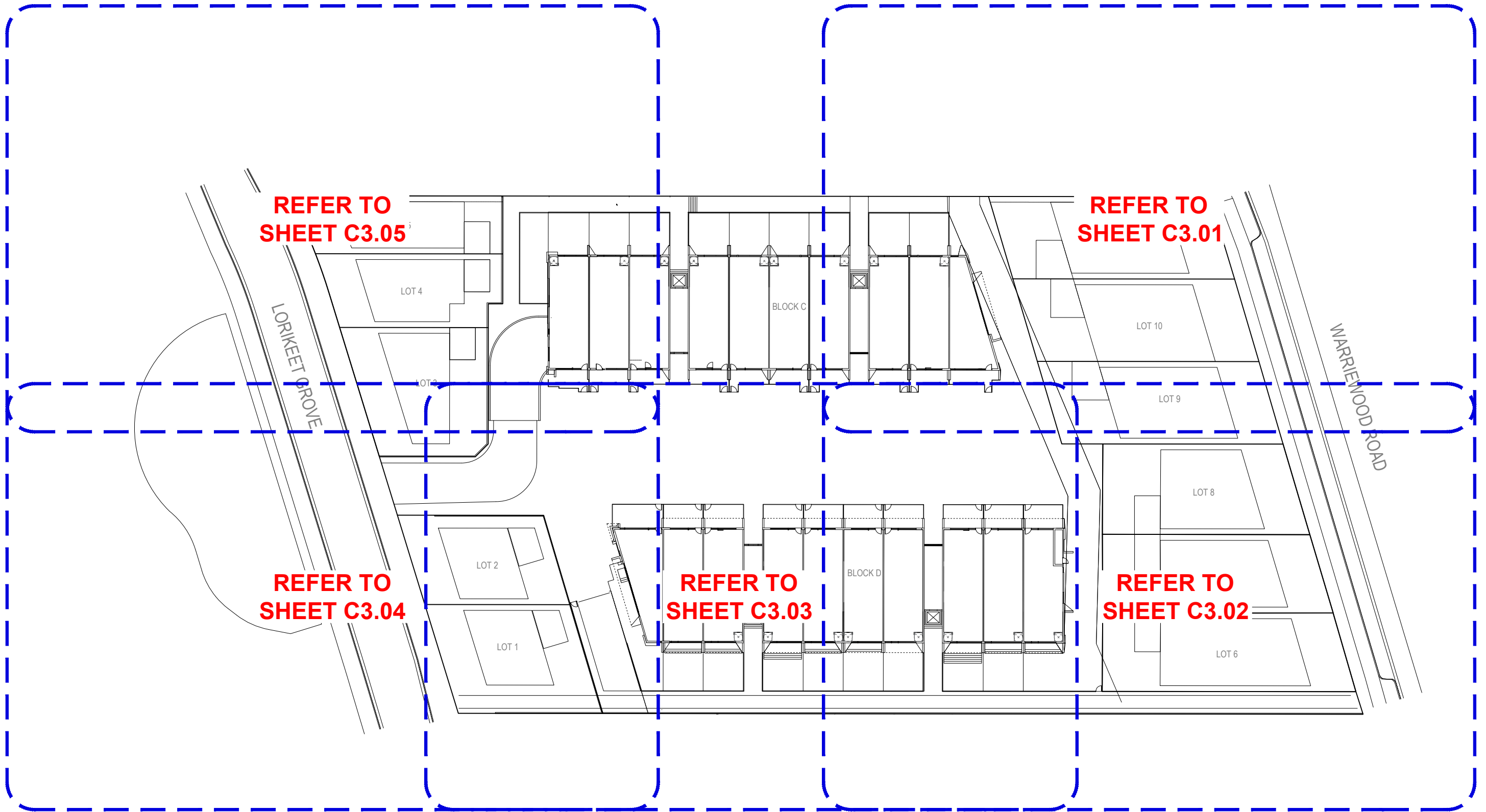
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**PROPOSED RESIDENTIAL DEVELOPMENT**  
(No. 43 - 49)  
WARRIEWOOD ROAD  
WARRIEWOOD

Drawing Title <b>STORMWATER MANAGEMENT PLAN SHEET 2 OF 2</b>			
Drawn RH	Date SEPT 2023	Scale A1 AS NOTED	Q.A. Check - Date -
Designed BK	Project No. <b>CC230177</b>	Dwg. No. <b>C2.02</b>	Issue <b>A</b>



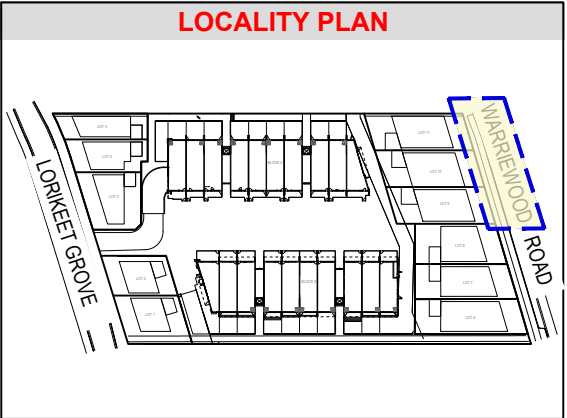
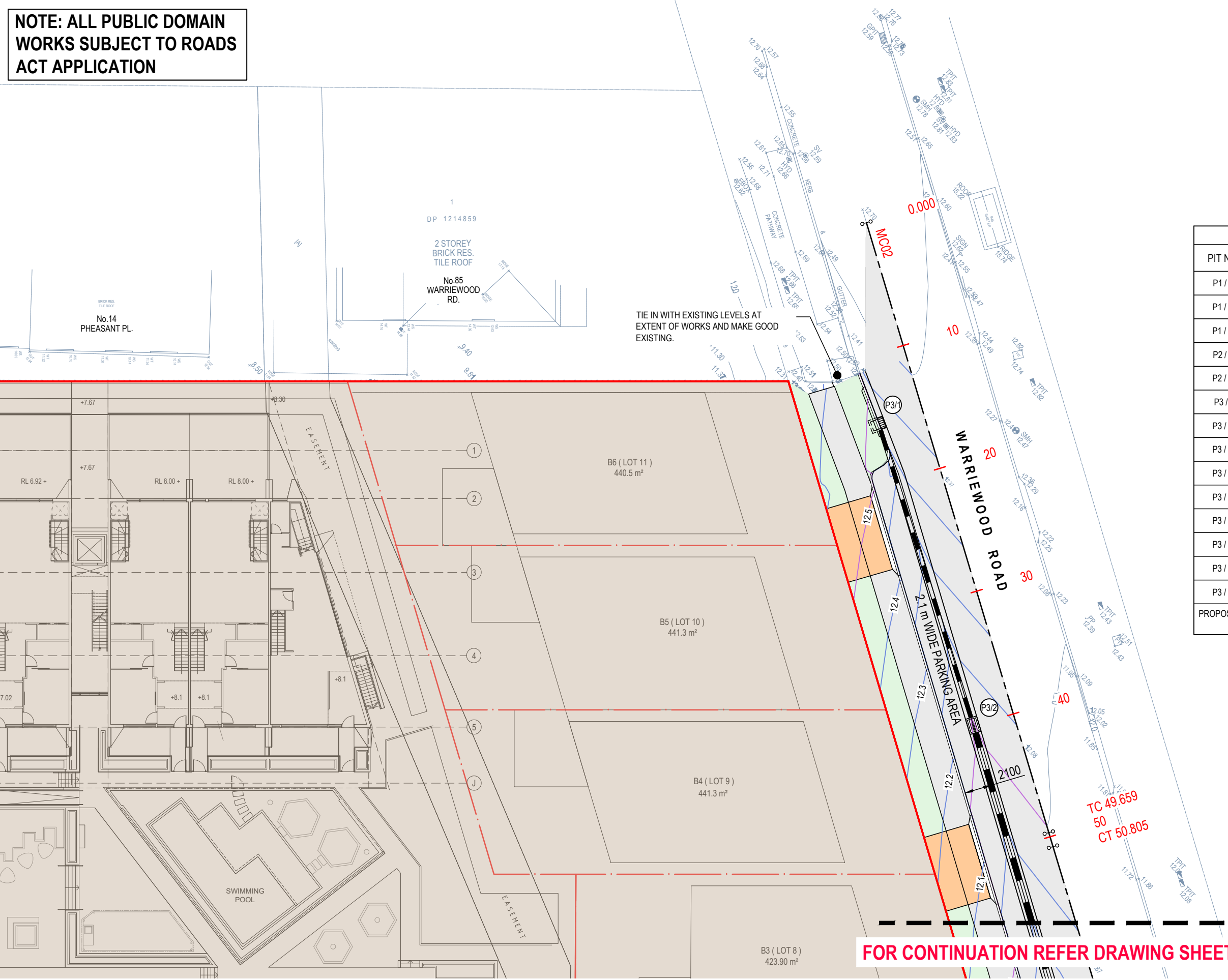


KEY PLAN  
SCALE - 1:300/A1, 1:600/A3  
0 2 4 8 12 16 20m

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A				ISSUED FOR APPROVAL	15.12.23	RH	BK	Drawn		Date		Scale		A1	
Issue				Description	Date	Drawn	Approved	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				

FOR CONTINUATION REFER DRAWING SHEET C3.02

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

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North			
A	ISSUED FOR APPROVAL	15.12.23	RH BK
Issue	Description	Date	Drawn Approved
1:100m at full size			

Client  
**WARRIEWOOD DEVELOPERS**  
PTY LTD

Architect

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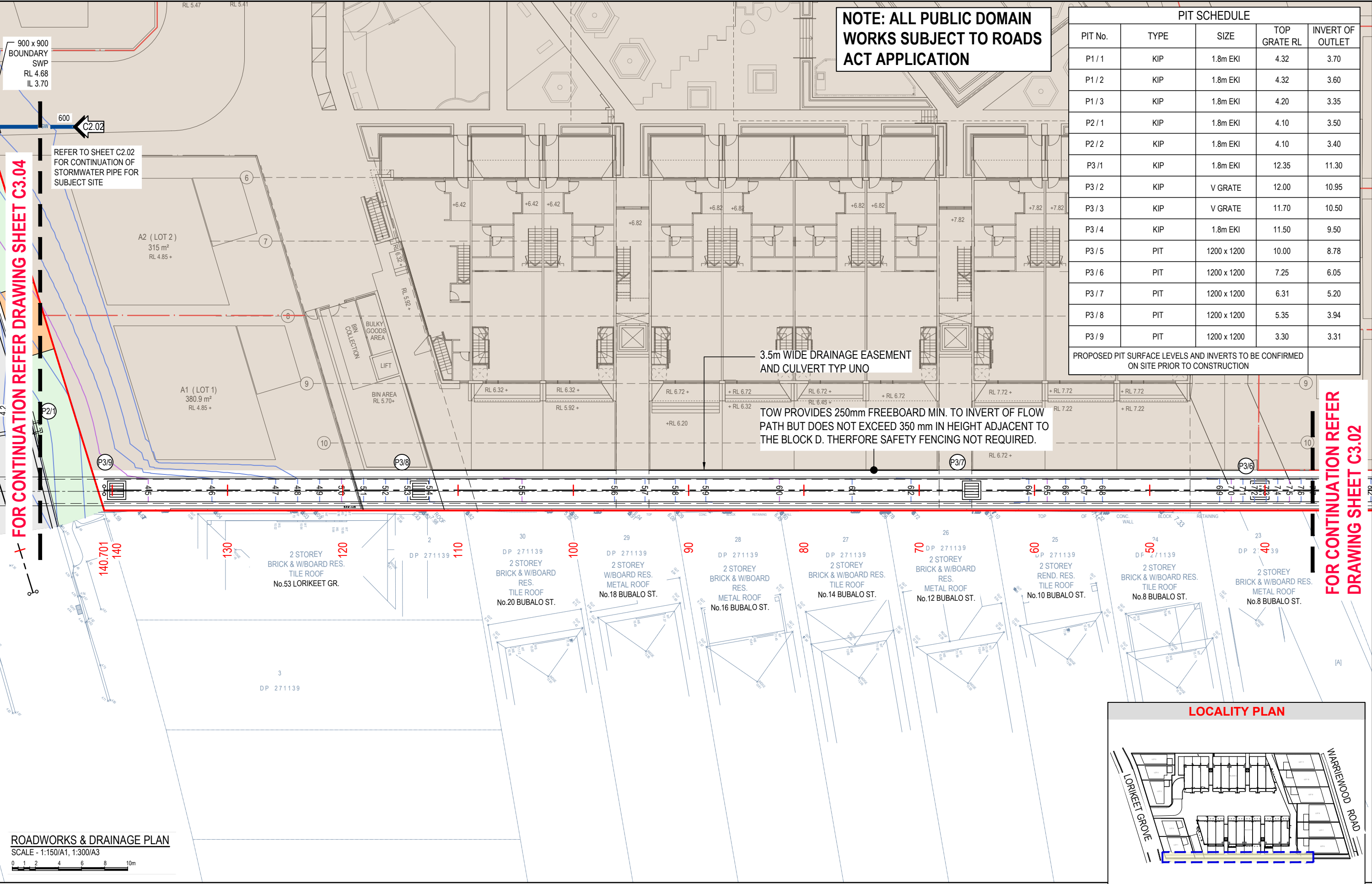
Project  
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**PROPOSED RESIDENTIAL DEVELOPMENT**  
(No. 43 - 49)  
WARRIEWOOD ROAD  
WARRIEWOOD

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







**FOR CONTINUATION REFER DRAWING SHEET C3.05**

**ON-SITE DETENTION/ BIORETENTION BASIN 1**  
ABOVE GROUND STORAGE AREA (SHOWN SHADED)  
BASIN STORAGE VOLUME = 400 m<sup>3</sup>  
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 474m<sup>2</sup> 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 m<sup>3</sup>  
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 300m<sup>2</sup> OF BASIN SURFACE AREA  
NOTE: PROVIDE BASIN WITH IMPERMEABLE LINER TYP.

**NOTE: ALL PUBLIC DOMAIN WORKS SUBJECT TO ROADS ACT APPLICATION**

**LOCALITY PLAN**

**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

**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

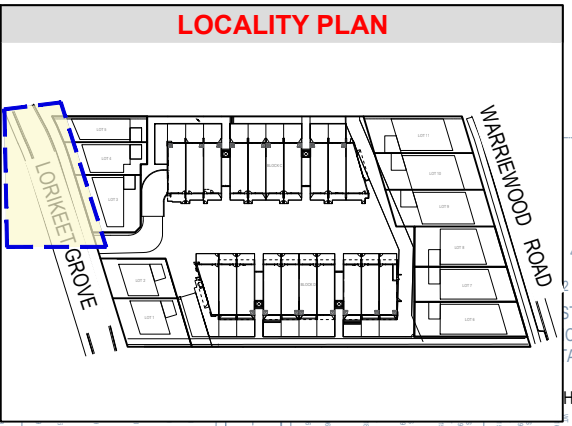
**FOR CONTINUATION REFER DRAWING SHEET C3.03**

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										Client		Project		Drawing Title													
										WARRIEWOOD DEVELOPERS PTY LTD		ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD		ROAD WORKS & DRAINAGE PLAN SHEET 4 OF 5											
										North				Drawn LW		Date DEC 2023		Scale A1 AS NOTED		G.A. Check -		Date -					
A										ISSUED FOR APPROVAL										15.12.23		RH		BK			
Issue										Description										Date		Drawn		Approved			
																											
Designed BK										Project No. CC230177										Dwg. No. C3.04		Issue 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				

ON-SITE DETENTION/  
BIORETENTION BASIN 1  
ABOVE GROUND STORAGE AREA  
(SHOWN SHADED)  
BASIN STORAGE VOLUME = 400 m<sup>3</sup>  
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 474m<sup>2</sup> 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

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



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Issue		Date	Drawn	Approved
A		15.12.23	RH	BK
Description				
1:150 at full size				

Client	Warriewood Developers Pty Ltd
Architect	

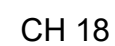
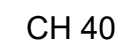
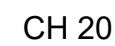
ACOR CONSULTANTS	ENGINEERS   MANAGERS   INFRASTRUCTURE PLANNERS   DEVELOPMENT CONSULTANTS
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Project	PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD
---------	--

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

Drawing Title	ROAD WORKS & DRAINAGE PLAN SHEET 5 OF 5
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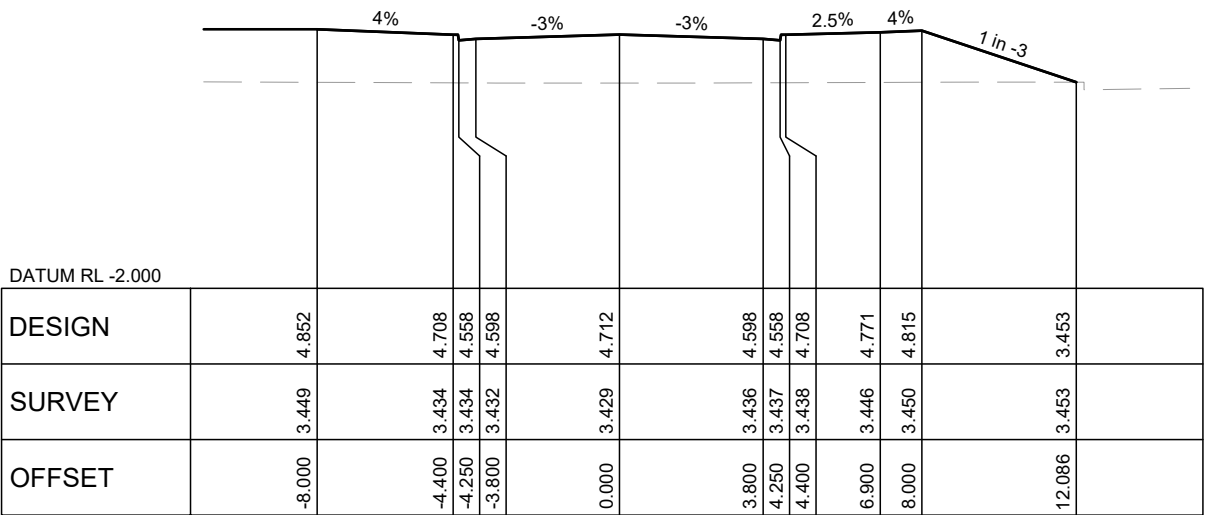




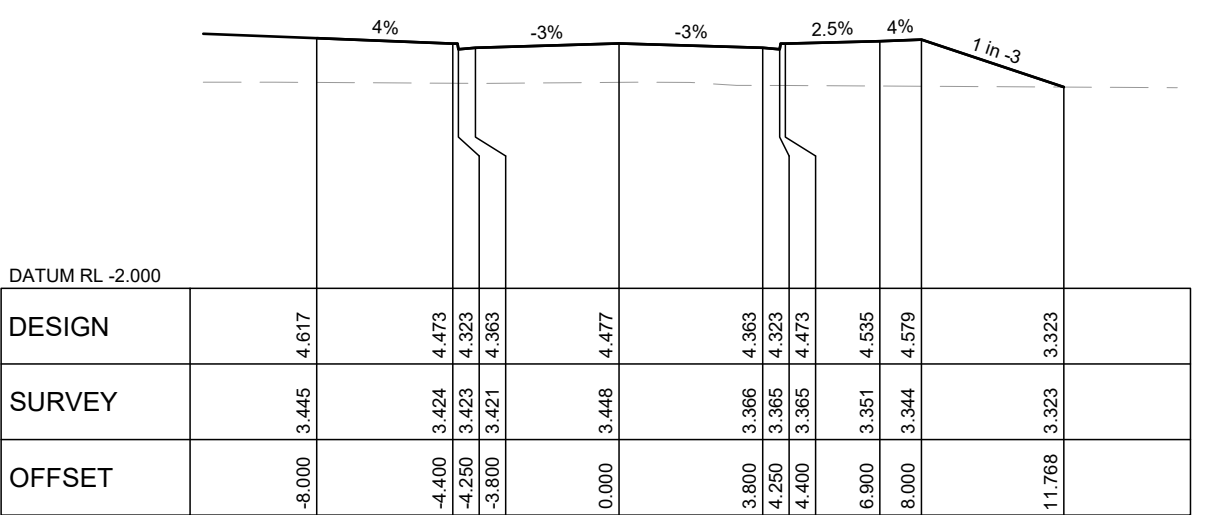
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<p>Client: <b>WARRIEWOOD DEVELOPERS PTY LTD</b></p>									
<p>Architect: <b>ACOR Consultants (CC) Pty Ltd</b>          Platinum Building, Suite 2.01, 4 Ilya Avenue          ERINA NSW 2250, Australia          T +61 2 4324 3499</p>									
<p>Project: <b>PROPOSED RESIDENTIAL DEVELOPMENT</b>          (No. 43 - 49)          WARRIEWOOD ROAD          WARRIEWOOD</p>									
<p>Drawing Title: <b>ROAD CROSS SECTIONS (MC01) LORIKEET GROVE SHEET 1 OF 3</b></p>									
<p>Drawn: <b>LW</b></p>		<p>Date: <b>DEC 2023</b></p>		<p>Scale: <b>AS NOTED</b></p>		<p>A1: <b>Q.A. Check</b></p>		<p>Date: <b>-</b></p>	
<p>Designed: <b>BK</b></p>		<p>Project No: <b>CC230177</b></p>		<p>Dwg. No: <b>C3.07</b></p>		<p>Issue: <b>A</b></p>		<p>Date: <b>-</b></p>	

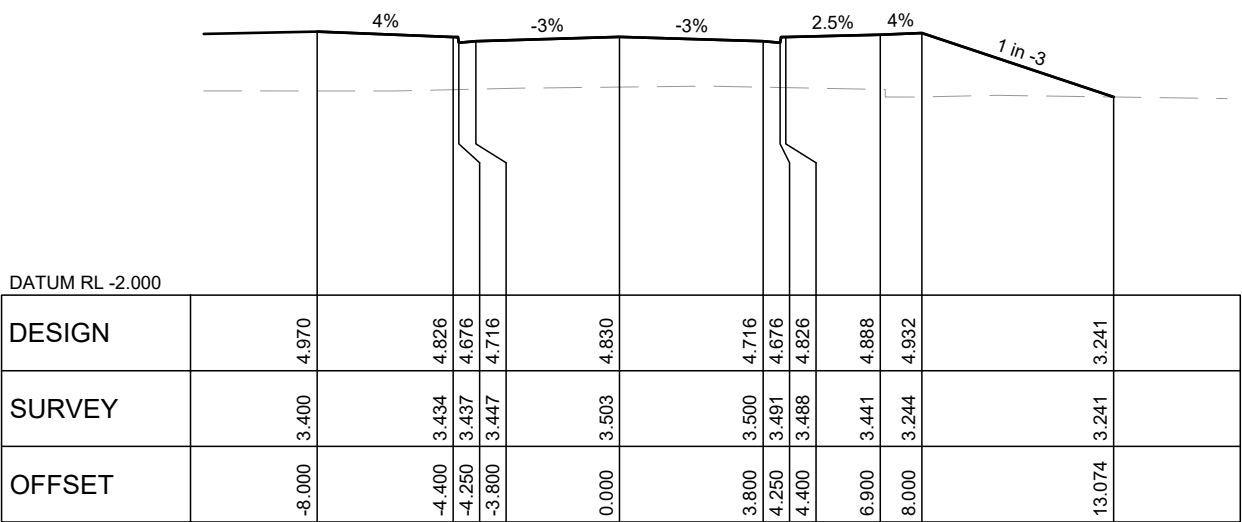




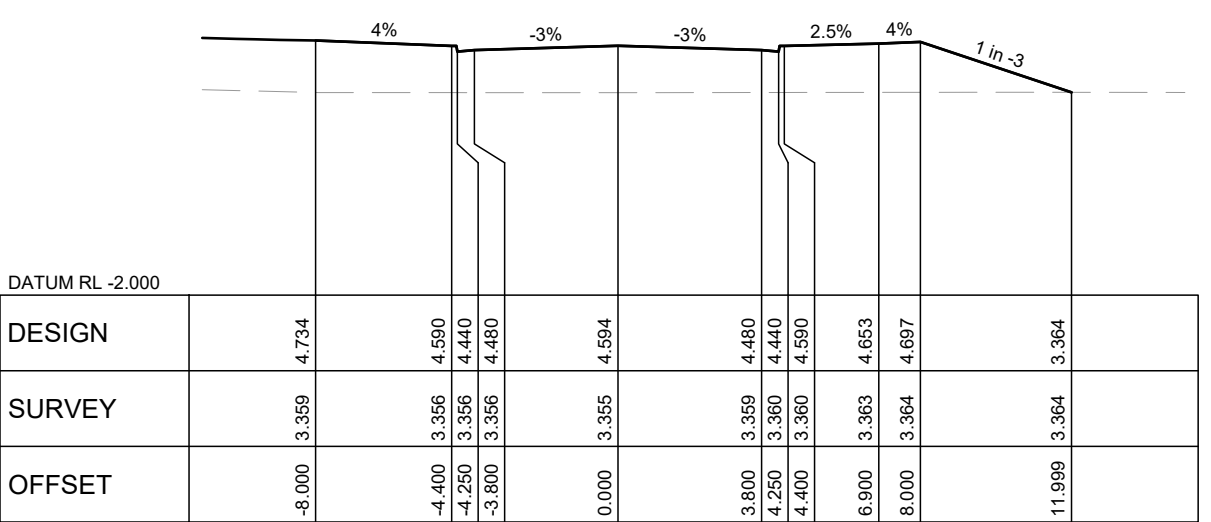
CH 60



CH 80



CH 50

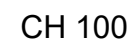


CH 70

HORZ SCALE 1:200  
VERT SCALE 1:400

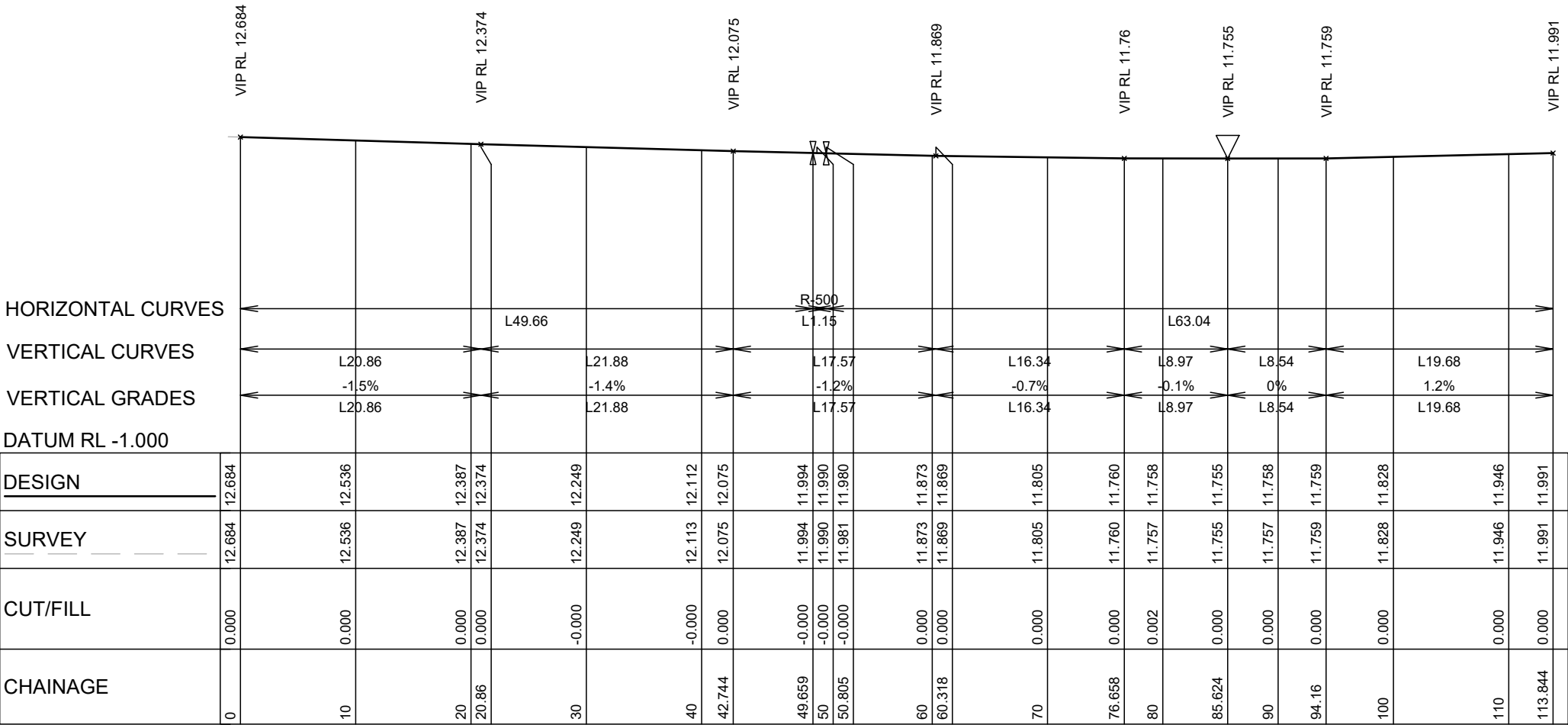
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					Client		Architect		Project		Drawing Title			
					WARRIEWOOD DEVELOPERS PTY LTD				ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		ROAD CROSS SECTIONS (MC01) LORIKEET GROVE SHEET 2 OF 3			
									PROPOSED RESIDENTIAL DEVELOPMENT		Drawn LW		Date DEC 2023	
									(No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD		Scale AS NOTED		A1 Q.A. Check -	
											Designed BK		Project No. CC230177	
													Dwg. No. C3.08	
													Issue A	



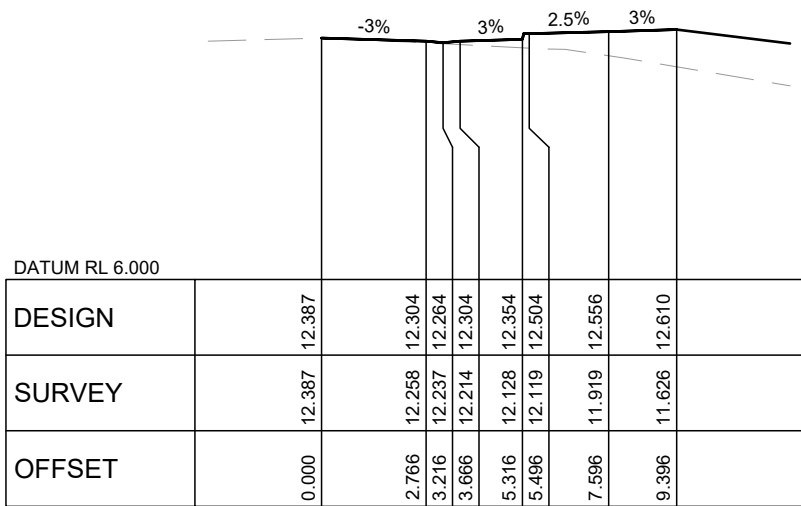
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										North	WARRIEWOOD DEVELOPERS PTY LTD	ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499	PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD	ROAD CROSS SECTIONS (MC01) LORIKEET GROVE SHEET 3 OF 3			
A	ISSUED FOR APPROVAL								15.12.23	RH	BK	Drawn LW	Date DEC 2023	Scale AS NOTED	A1	G.A. Check -	Date -
Issue	Description								Date	Drawn	Approved	Designed BK	Project No. C3230177	Dwg. No. C3.09	Issue A		
1	15m																

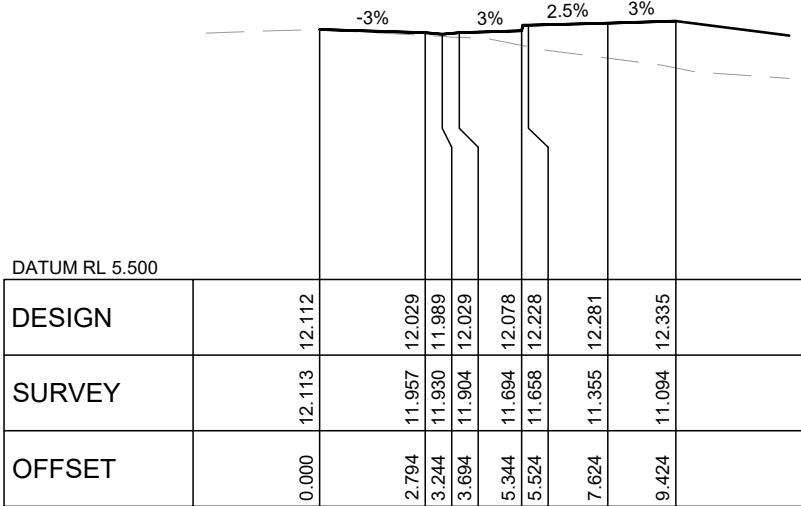


MC02 - LONGITUDINAL SECTION  
HORZ SCALE 1:500  
VERT SCALE 1:250

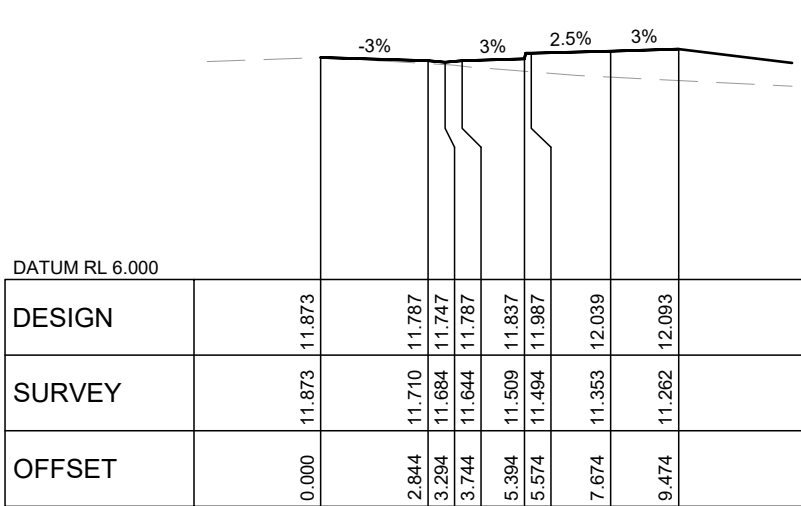
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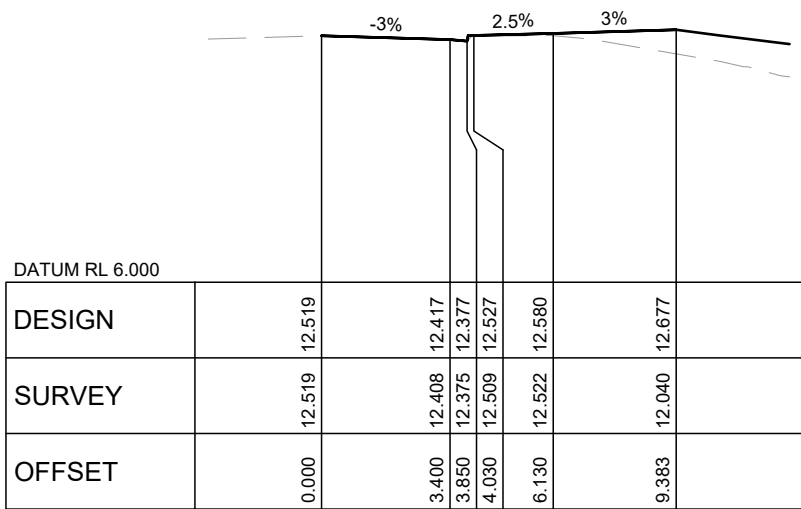
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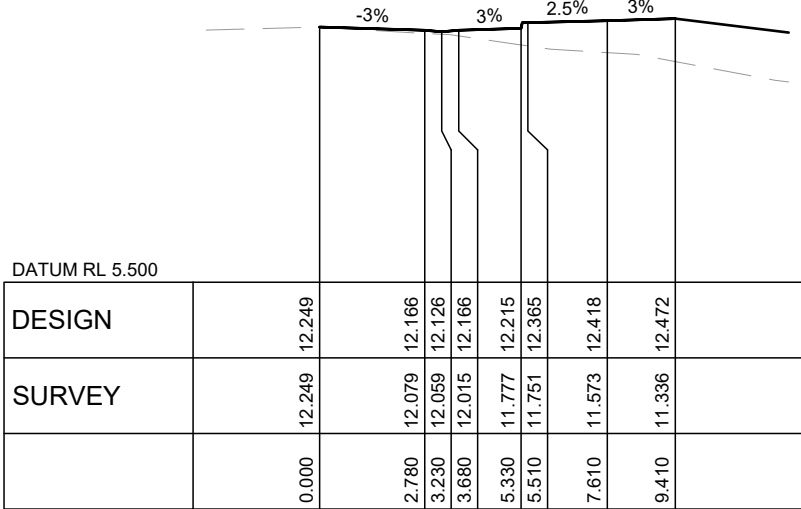
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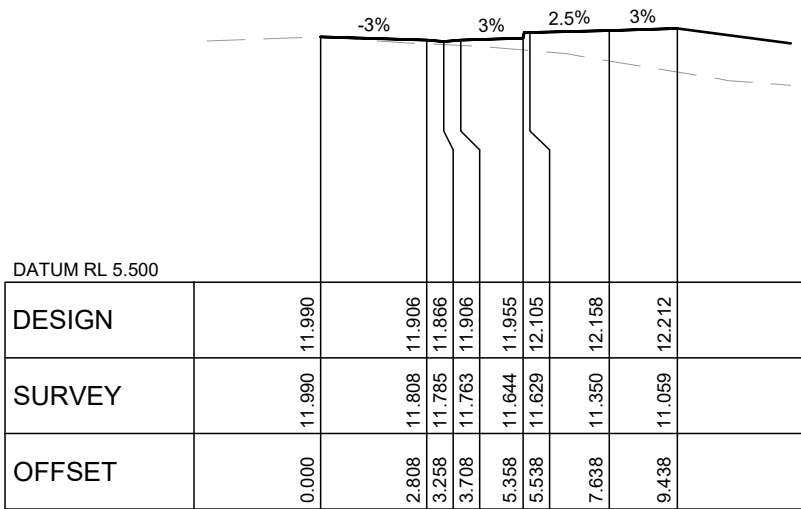
CH 60



CH 11.122



CH 30

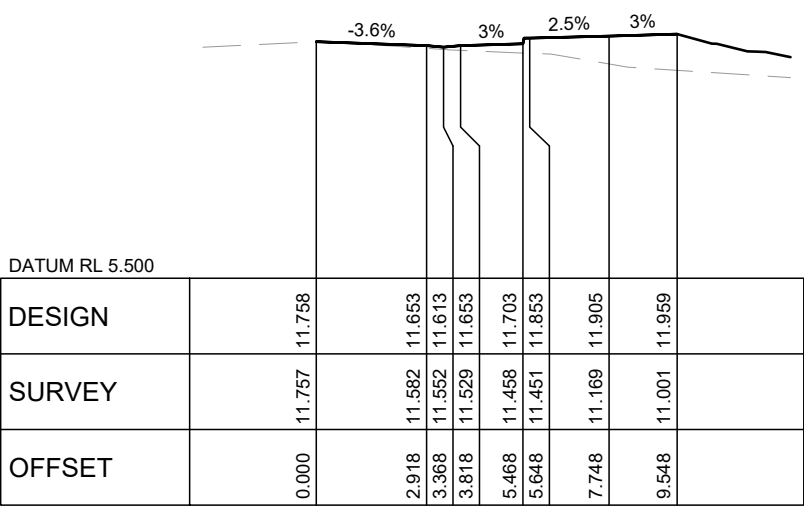


CH 50

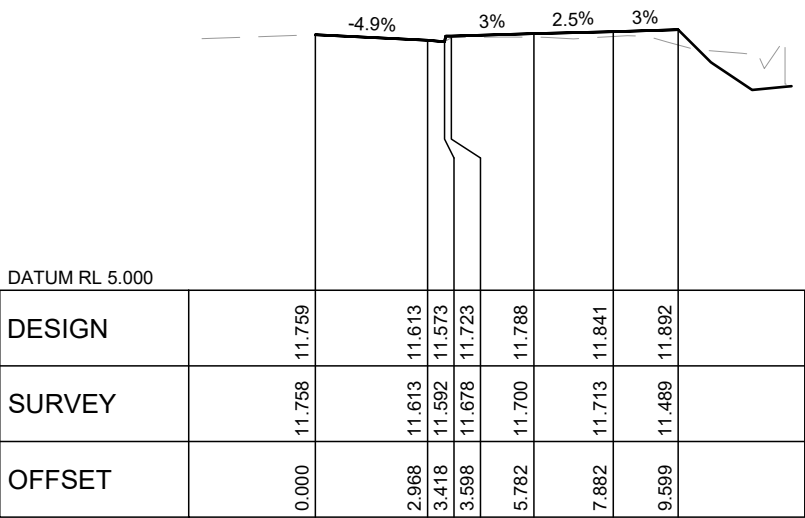
HORZ SCALE 1:200  
VERT SCALE 1:400

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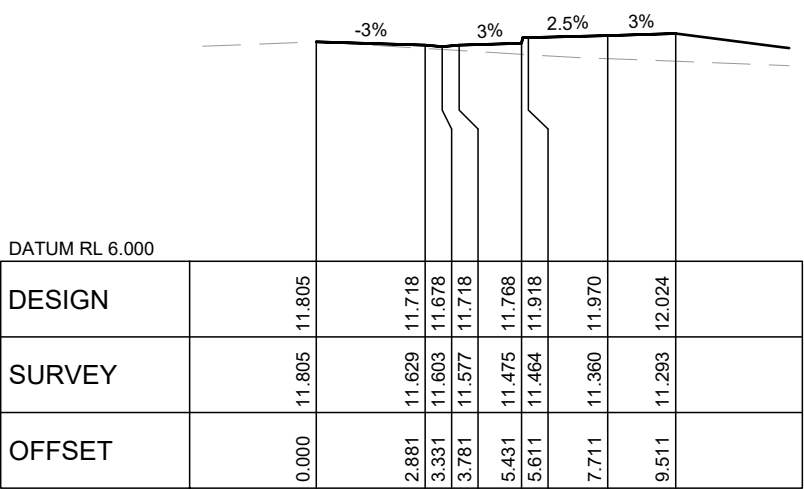
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				WARRIEWOOD DEVELOPERS PTY LTD				ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		ROAD CROSS SECTIONS (MC02) WARRIEWOOD ROAD SHEET 1 OF 2			
								PROPOSED RESIDENTIAL DEVELOPMENT		Drawn		Date	
								(No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD		LW		DEC 2023	
										Scale		A1	
										AS NOTED		Q.A. Check	
										-		Date	
										-			
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										BK		CC230177	
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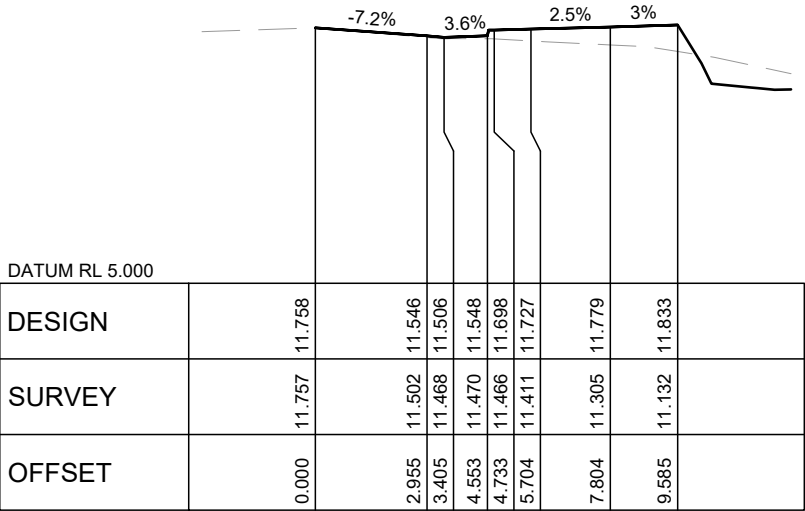
CH 80



CH 93.576



CH 70



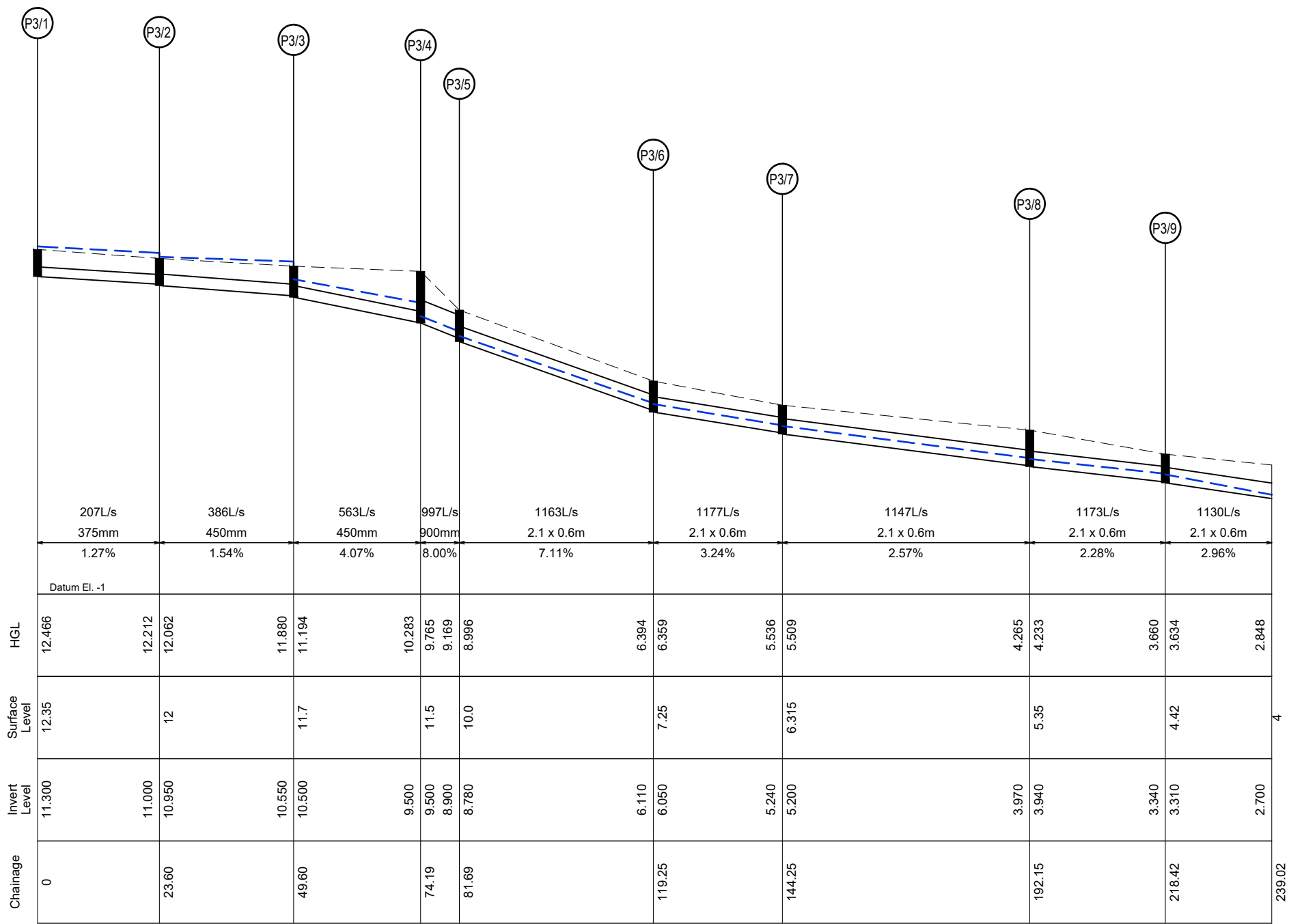
CH 90

HORZ SCALE 1:200  
VERT SCALE 1:400

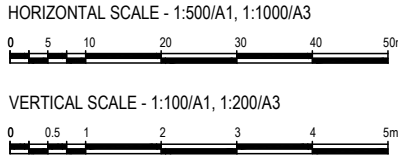
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				North		Client		Architect		ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		Project		Drawing Title	
						WARRIEWOOD DEVELOPERS PTY LTD				AcOR CONSULTANTS		PROPOSED RESIDENTIAL DEVELOPMENT		ROAD CROSS SECTIONS (MC02) WARRIEWOOD ROAD SHEET 2 OF 2	
A				ISSUED FOR APPROVAL		15.12.23		RH		BK		Drawn		Date	
Issue				Description		Date		Drawn		Approved		LW		DEC 2023	
0				10m at full size								Designed		Project No.	
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												Issue		A	



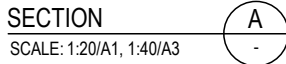
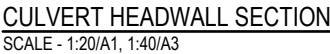


LONG SECTION (100YR ARI + CC)  
DRAINAGE LINE 3



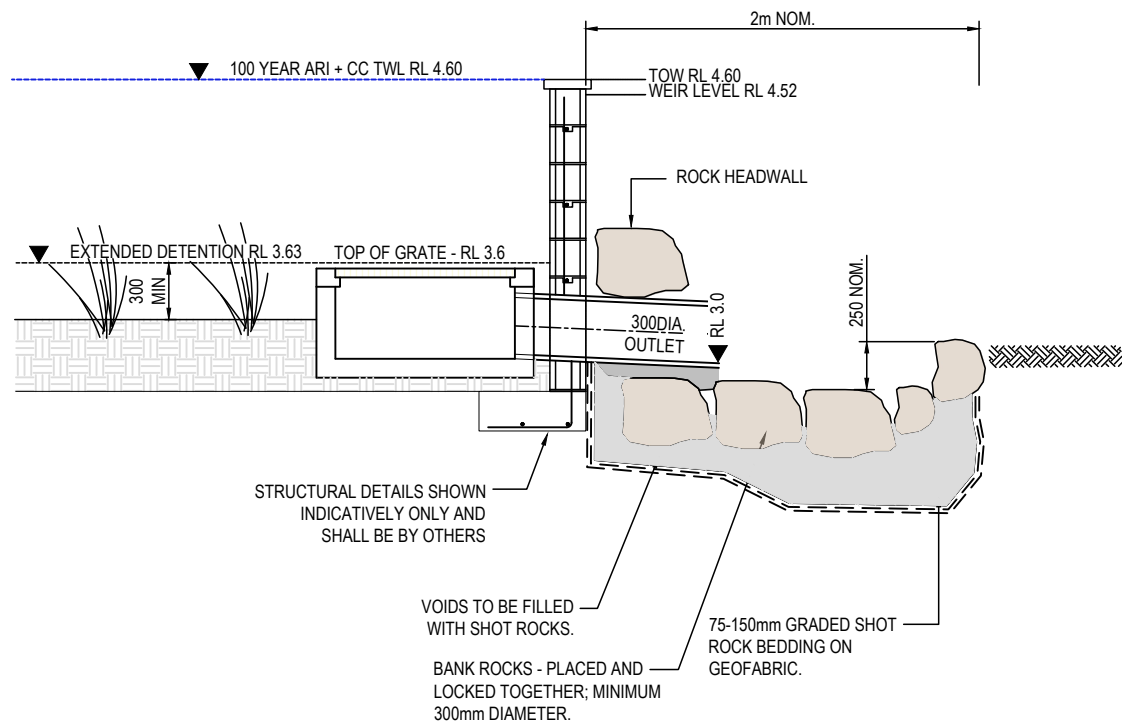
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										North		Client		Project		Drawing Title			
												WARRIEWOOD DEVELOPERS PTY LTD		ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		PROPOSED RESIDENTIAL DEVELOPMENT (No. 43 - 49) WARRIEWOOD ROAD WARRIEWOOD			

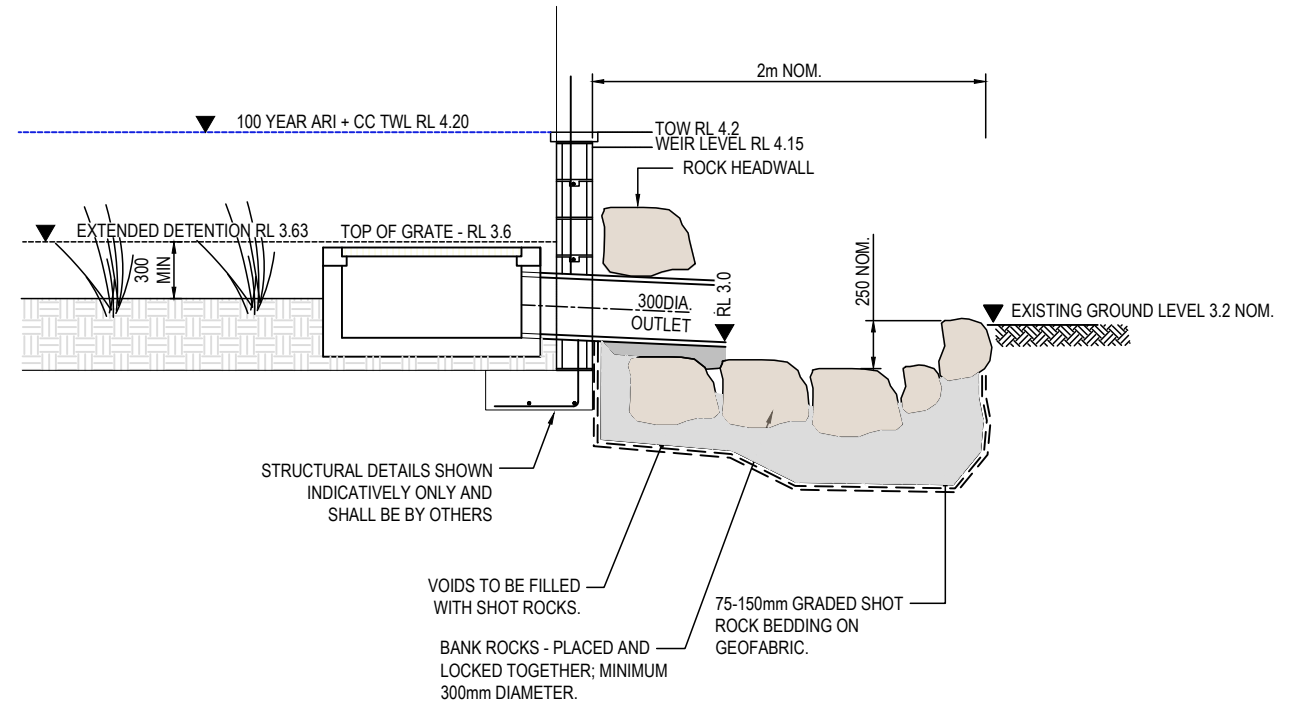


Drawing Title					
TYPICAL DETAIL SHEET					
OF 2					
Drawn	Date	Scale	A1	O.A. Check	Date
LW	DEC 2023	AS NOTED		-	-
Designed	Project No.	Dwg. No.		Issue	
BK	CC230177	C3.15		A	





**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		Client		Architect		Project		Drawing Title	
						WARRIEWOOD DEVELOPERS PTY LTD				ACOR Consultants (CC) Pty Ltd Platinum Building, Suite 2.01, 4 Ilya Avenue ERINA NSW 2250, Australia T +61 2 4324 3499		TYPICAL DETAIL SHEET 2 OF 2	
A				ISSUED FOR APPROVAL		15.12.23		RH		BK		Date	
Issue				Description		Date		Drawn		Approved		Scale	
0				1cm at full size								A1	
												Q.A. Check	
												Date	
												AS NOTED	
												-	
												Dwg. No.	
												C3.16	
												Issue	
												A	



ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS



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

Project No. **CC230177**  
Dwg. No. **C3.16**  
Issue **A**