

20 July 2020

Northern Beaches Council
725 Pittwater Road
DEE WHY NSW 2099
Attn: General Manager

Dear Sir / Madam

Re: Proposed Subdivision - 4 Cambridge Avenue, Narrabeena

With reference to the development application for the subdivision of the above property, please find enclosed copies of Plan No. Sheet-1 to Sheet-3 for your perusal:

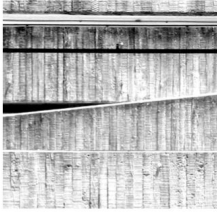
- Sheet-1 shows the proposed driveway plan for the right of way access to the proposed garage and turning areas.
- Sheet-2 shows the driveway long-sections, cross-section and driveway details of the right-of-way access.
- Sheet-3 shows the inter-allotment drainage system to be provided as part of the proposed subdivision of the site. The proposed drainage line discharges collected flows to the Council's drainage system adjacent to the southern boundary.

Should you require any further information please contact the undersigned.

Yours faithfully
TAYLOR CONSULTING

D M SCHAEFER - Director
B.E. Civil (Hons) M.I.E.Aust.





20 July 2020

Northern Beaches Council
725 Pittwater Rd
DEE WHY NSW 2099
Attn: General Manager

Dear Sir / Madam

Re: Stormwater Management Plan – 4A Cambridge Avenue, Narraweena

With reference to the Development Application for the above property, please find attached a copy of the site Stormwater Management Plan, Sheet-4 and Sheet-6, for your perusal.

The plan shows drainage from the newly-created lots connecting to the existing Council system located adjacent to the site.

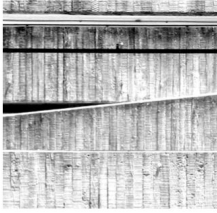
Note that the required on-site detention storage volume has been offset by 50% via the provision of 5,000 litres of rainwater storage.

Should you require any further information please contact the undersigned.

Yours faithfully
TAYLOR CONSULTING

D M SCHAEFER - Director
B.E. Civil – Hons. M.I.E. Aust. (20 years)





20 July 2020

Northern Beaches Council
725 Pittwater Rd
DEE WHY NSW 2099
Attn: General Manager

Dear Sir / Madam

Re: Stormwater Management Plan – 4B Cambridge Avenue, Narraweena

With reference to the Development Application for the above property, please find attached a copy of the site Stormwater Management Plan, Sheet-5 and Sheet-6, for your perusal.

The plan shows drainage from the newly-created lots connecting to the existing Council system located adjacent to the site.

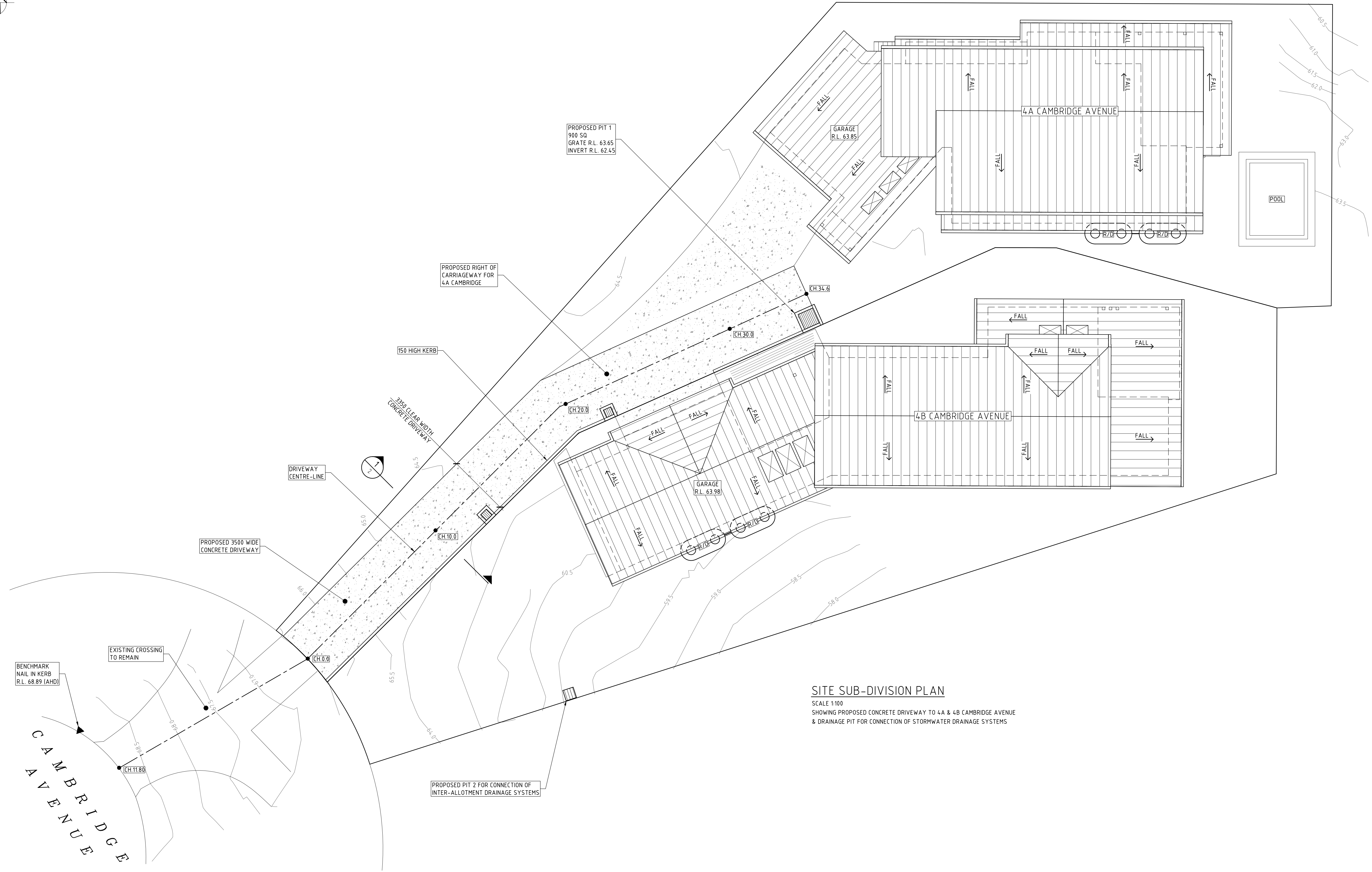
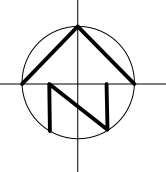
Note that the required on-site detention storage volume has been offset by 50% via the provision of 5,000 litres of rainwater storage.

Should you require any further information please contact the undersigned.

Yours faithfully
TAYLOR CONSULTING

D M SCHAEFER - Director
B.E. Civil – Hons. M.I.E. Aust. (20 years)



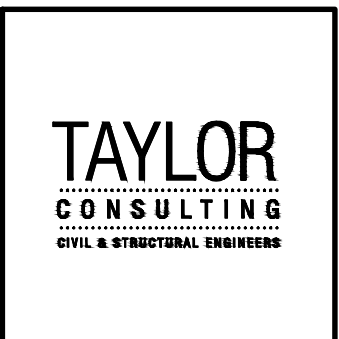


SITE SUB-DIVISION PLAN

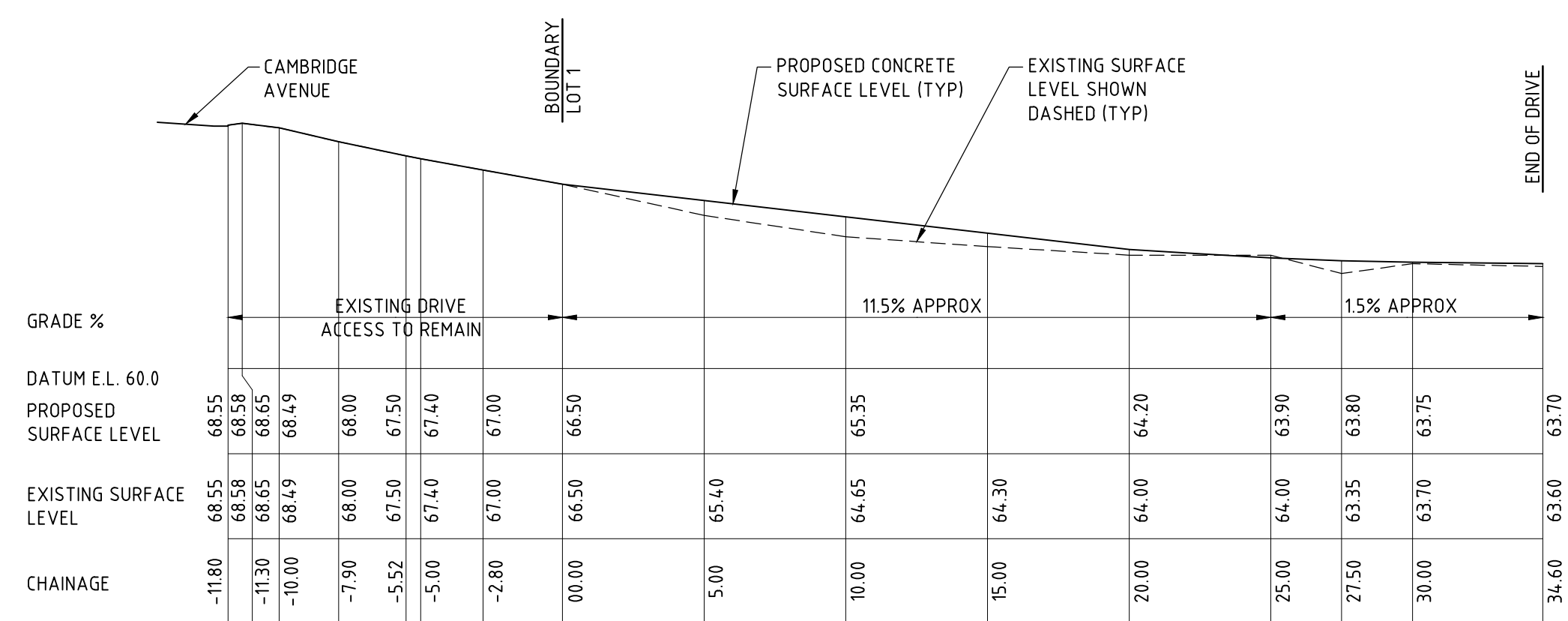
SCALE 1:100
SHOWING PROPOSED CONCRETE DRIVEWAY TO 4A & 4B CAMBRIDGE AVENUE
& DRAINAGE PIT FOR CONNECTION OF STORMWATER DRAINAGE SYSTEMS

ISSUE	DATE	REVISION

TITLE SUB-DIVISION DRIVEWAY PLAN 4 CAMBRIDGE AVENUE, NARRAWEENA			
DRAWN MDB	DATE 20 JULY 2020	CHECKED 	SCALE @ A1 1:100
BE Civil (Hons) MIE Aust.			



DATE: 20 JUL 2020
SHEET - 1



The diagram illustrates a cross-section of a concrete driveway. Key dimensions and features include:

- 3350 CLEAR DRIVEWAY WIDTH:** The total width of the clear driveway area.
- 150:** The width of the concrete curb on the right side.
- 3% (MIN) CROSS FALL:** The slope of the driveway surface, indicated by an arrow pointing towards the curb.
- 150:** The height of the concrete curb.
- RETAINING WALL AS NECESSARY (TO FUTURE STRUCTURAL DETAIL):** A note pointing to the vertical wall structure at the end of the driveway.

TYPICAL CONCRETE DRIVEWAY SECTION

Diagram illustrating the cross-section of a proposed concrete drive and 150 high kerb. The diagram shows the proposed concrete drive (typical) and the 150 high kerb (typical) on the right side. A boundary line is indicated on the right side. The existing surface level is shown as a dashed line. The proposed drive level is shown as a solid line. The diagram includes a table of levels and chainage.

CHAINAGE (m)	EXISTING SURFACE LEVEL	PROPOSED DRIVE LEVEL
-2.50	66.70	66.70
-1.75	66.55	66.55
0.00	66.50	66.50
1.00	66.50	66.45
1.75	66.50	66.60
2.50	66.20	66.50

DATUM 65.00

CHAINAGE (m)	EXISTING SURFACE LEVEL	PROPOSED DRIVE LEVEL	DATUM 63.00
-3.00	65.00	65.00	64.70
-2.50	64.70	65.35	64.70
-1.75	65.40	65.35	65.35
0.00	64.65	65.35	65.40
1.00	64.50	65.30	65.30
1.60	64.00	65.45	65.45
1.75	63.70	63.70	65.45
2.50	63.50	63.50	63.70

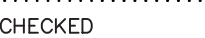
The diagram illustrates a cross-section of a road profile. The vertical axis represents elevation in meters, with a datum of 62.00. The horizontal axis represents chainage in meters. The profile shows the existing ground surface (dashed line) and the proposed road level (solid line). The road level is constant at 64.20 m from chainage 0.00 to 1.00 m, then drops to 64.30 m from chainage 1.00 m to 2.50 m. The existing surface level is 64.30 m at chainage -2.50 m, drops to 64.20 m at chainage -1.75 m, then rises to 63.94 m at chainage 1.00 m, and finally drops to 63.25 m at chainage 1.75 m. The boundary is marked at chainage 2.50 m.

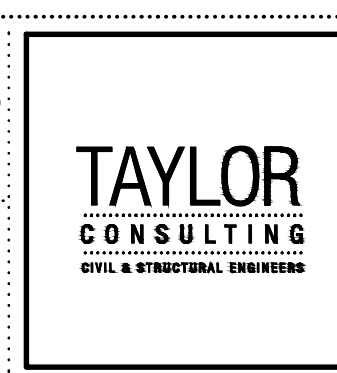
CHAINAGE (m)	EXISTING SURFACE LEVEL	PROPOSED DRIVE LEVEL
-2.50	64.30	
-1.75	64.20	64.25
0.00	64.00	64.20
1.00	63.94	64.15
1.60	63.25	64.30
1.75		64.30
2.50	63.20	

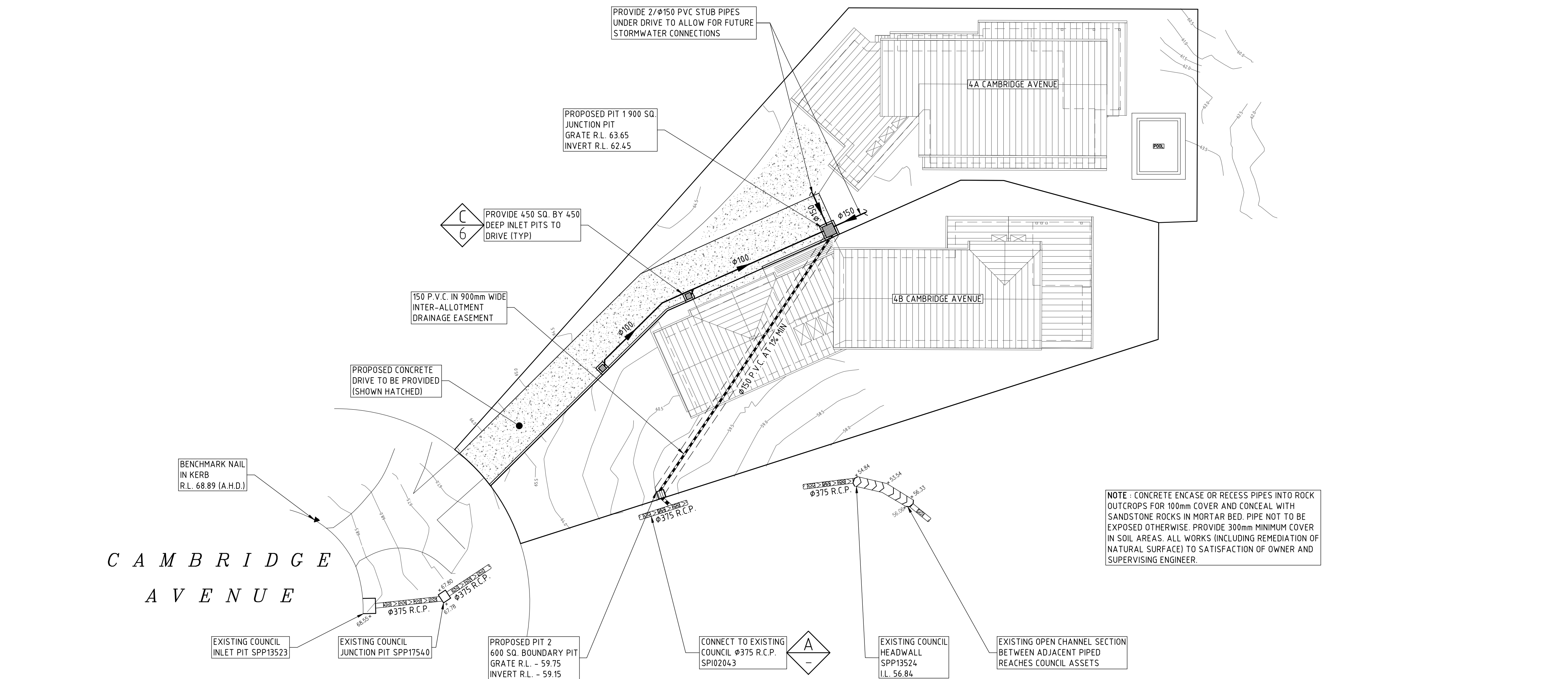
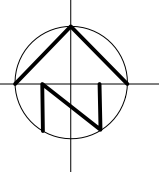
CHAINAGE (m)	PROPOSED DRIVE LEVEL	EXISTING SURFACE LEVEL	DATUM 62.00
-2.50	64.10	64.10	
-1.75	63.80	64.00	
0.00	63.75	63.70	
1.75	63.70	63.20	
2.50	63.20	63.10	

NOTE: FUTURE LOT 2 PARKING PLATFORM MATCHES TO THIS LEVEL

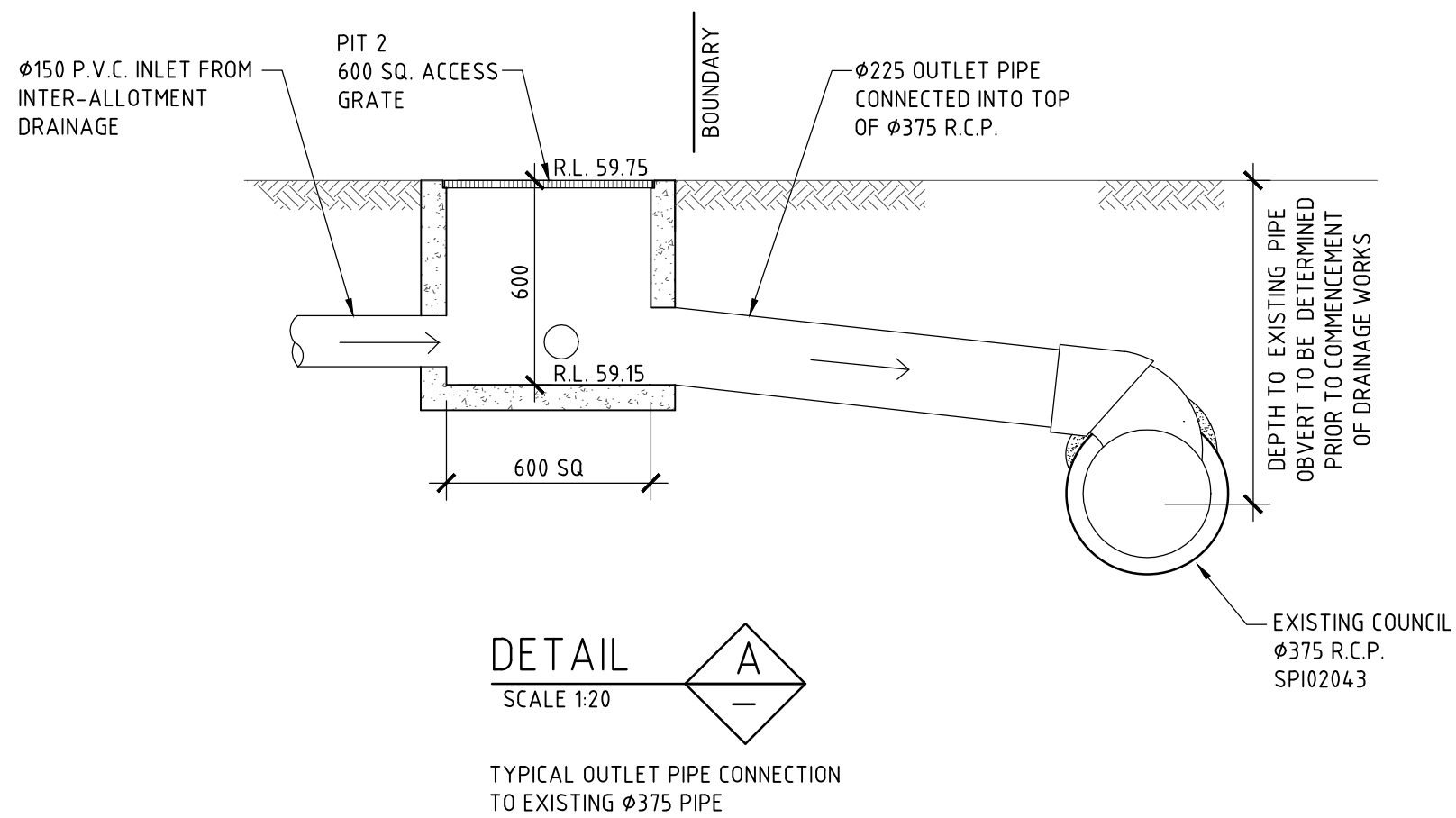
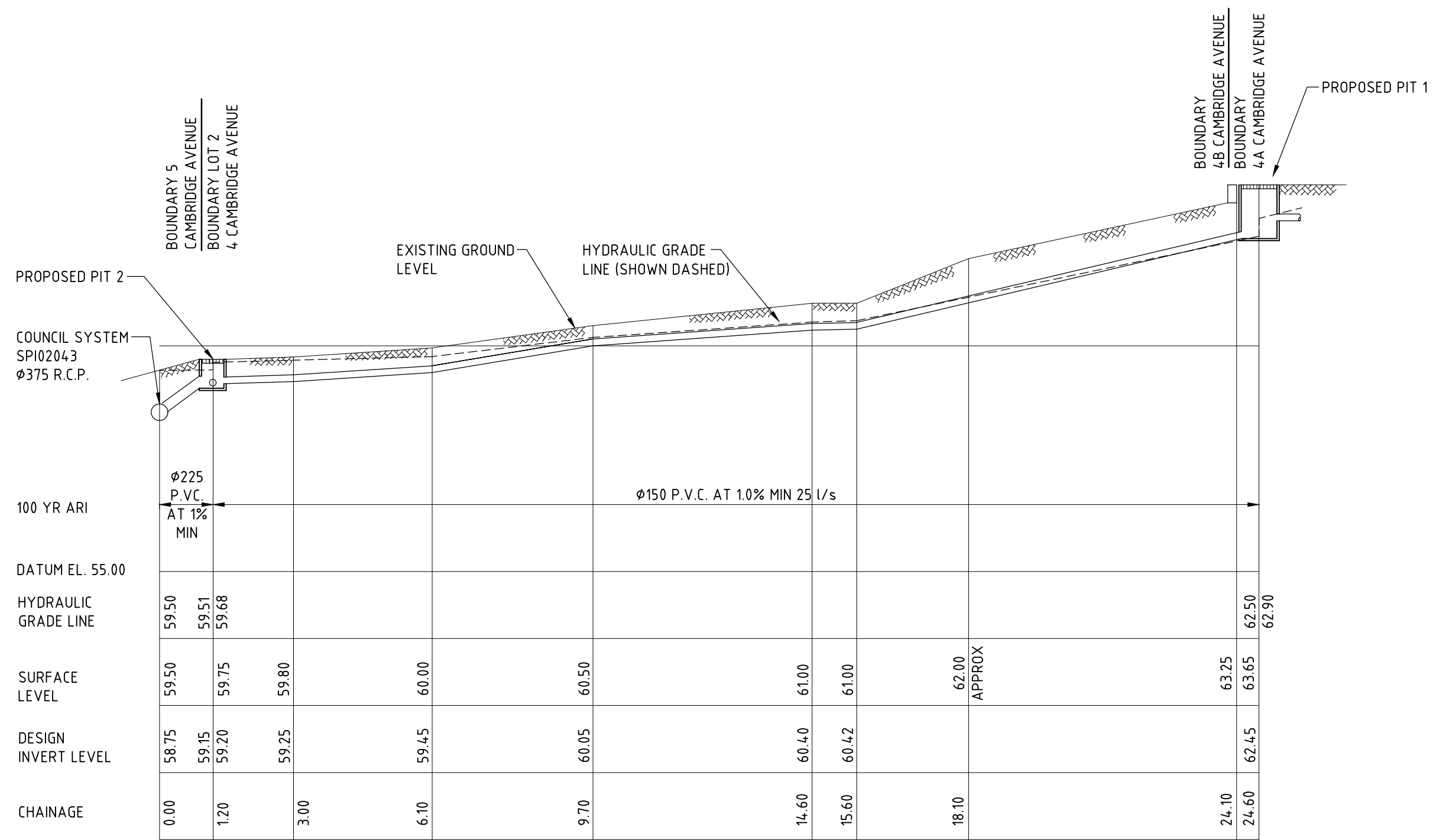
[illegible]

TITLE SUB-DIVISION DRIVEWAY LONG-SECTIONS & DETAILS 4 CAMBRIDGE AVENUE, NARRAWEENA			
DRAWN MDB	DATE 20 JULY 2020	CHECKED  BE Civil (Hons) MIE Aust.	SCALE @ A1 1:200 1:50 1:20





- DRAINAGE NOTES**
- + DENOTES EXISTING GROUND LEVEL
 - FALL STORMWATER PIPES AT 1% MIN. UNLESS OTHERWISE NOTED.
 - SUB-SOIL DRAINAGE TO BE CONNECTED TO THE SITE DRAINAGE SYSTEM AS NECESSARY.
 - SURFACE GRATES 300 SQ. UNLESS OTHERWISE NOTED.
 - ALL STORMWATER PIPES TO HAVE SOLVENT CEMENT WATERTIGHT JOINTS.
 - CHECK & LOCATE DEPTH OF EXISTING MAINS & SERVICES PRIOR TO CONSTRUCTION OF STORMWATER SYSTEM AS VARIATIONS IN POSITION OF MAINS COULD AFFECT DRAINAGE CONSTRUCTION DETAILS.
 - INSPECTIONS MUST BE UNDERTAKEN BY THIS OFFICE (BY PRIOR ARRANGEMENT WITH ENGINEER) DURING CONSTRUCTION TO ENABLE FULL CERTIFICATION UPON COMPLETION OF WORKS.
 - ALL CONSTRUCTION OF COUNCIL DRAINAGE WORKS TO COMPLY WITH COUNCIL STANDARD.
 - REMOVE REDUNDANT DRAINAGE PITS AND SEAL PIPES.
 - PIT BENCHING TO BE HALF THE OUTGOING PIPE DIAMETER. CONCRETE FOR BENCHING TO BE 20 MPa MASS CONCRETE.
 - APPROVED PRE-CAST PITS MAY BE USED.
 - ALL PIPES TO BE LAID ON COMPACTED FINE CRUSHED ROCK OR SAND BEDDING 75mm THICK & PIPES BACKFILLED WITH COMPACTED SAND TO 300mm ABOVE TOP OF PIPE, ELSE ATTACHED TO UNDERSIDE OF STRUCTURE AT 600mm c/c AS NECESSARY
 - PIPE ROUTES SHOWN ARE INDICATIVE ONLY AND SHOULD BE AS NECESSARY ACCORDING TO SITE CONDITIONS, TREE POSITIONS ETC. CONFIRM SIGNIFICANT CHANGES IN PIPES SYSTEM DETAILS WITH SUPERVISING ENGINEER PRIOR TO COMMENCEMENT OF DRAINAGE CONSTRUCTION WORKS.
 - CONTRACTOR SHALL ENSURE THAT SERVICES TO BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS WHERE REQUIRED. ONCE WORKS ARE COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL TEMPORARY SERVICES AND MAKE GOOD ALL DISTURBED AREAS.
 - STORMWATER SYSTEM REQUIRES SIGNIFICANT MAINTENANCE DUE TO POTENTIAL HIGH POLLUTANT LOAD. FILTERS AND POLLUTANT TRAPS SHOULD BE CHECKED AFTER LARGE STORM EVENTS AND CLEANED EVERY 6 MONTHS.
 - PLUMBING AND DRAINAGE WORKS TO COMPLY WITH AS-3500, THE NATIONAL DRAINAGE & PLUMBING CODE.
 - WHERE POSSIBLE DRAINAGE LINES SHALL BE LAID IN AREAS PREVIOUSLY DISTURBED BY OTHER SITE WORKS AND FOLLOW TOPOGRAPHICAL FEATURES TO REDUCE IMPACT AND AVOID TREE ROOTS.
 - THIS STORMWATER MANAGEMENT PLAN HAS BEEN PREPARED FOR D.A. SUBMISSION TO COUNCIL AND DOES NOT NECESSARILY CONTAIN ALL APPROPRIATE INFORMATION TO ENABLE FOR ISSUE TO PLUMBER/BUILDER FOR CONSTRUCTION. CONTACT TAYLOR CONSULTING FOR MORE INFORMATION.



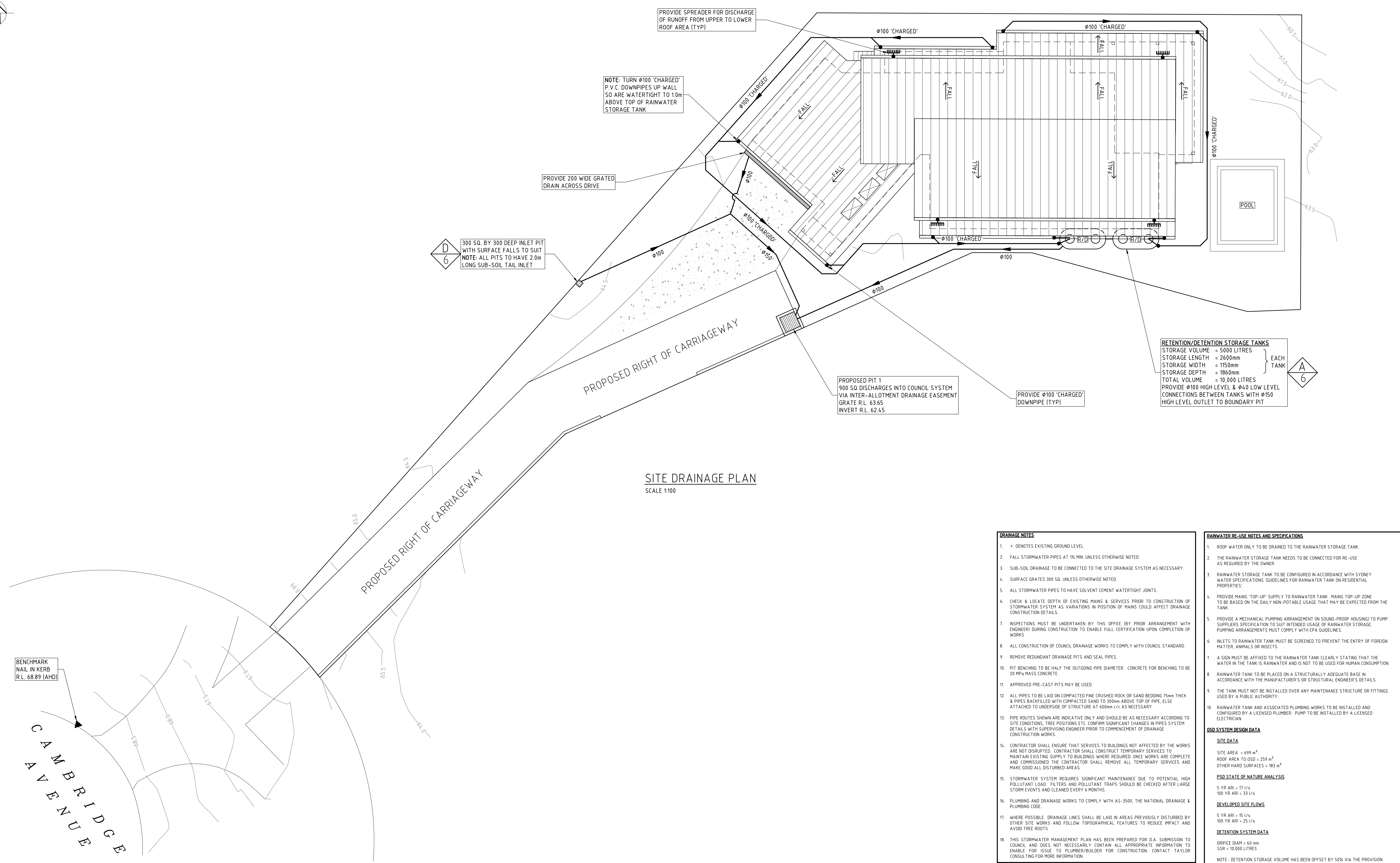
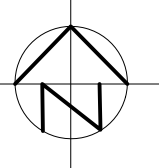
INTERALLOTMENT DRAINAGE LINE LONG-SECTION
SCALE 1:100 NATURAL

ISSUE	DATE	REVISION

TITLE INTER-ALLOTMENT DRAINAGE PLAN & LONG-SECTION 4 CAMBRIDGE AVENUE, NARRAWEENA			
DRAWN MDB	DATE 20 JULY 2020	CHECKED 	SCALE @ A1 1:200 1:100 1:20



DRAINAGE
SHEET - 3



SITE DRAINAGE PLAN
SCALE 1:100

- DRAINAGE NOTES**
- + DENOTES EXISTING GROUND LEVEL.
 - FALL STORMWATER PIPES AT 1% MIN. UNLESS OTHERWISE NOTED.
 - SUB-SOIL DRAINAGE TO BE CONNECTED TO THE SITE DRAINAGE SYSTEM AS NECESSARY.
 - SURFACE GRATES 300 SQ. UNLESS OTHERWISE NOTED.
 - ALL STORMWATER PIPES TO HAVE SOLVENT CEMENT WATERTIGHT JOINTS.
 - CHECK & LOCATE DEPTH OF EXISTING MAINS & SERVICES PRIOR TO CONSTRUCTION OF STORMWATER SYSTEM AS VARIATIONS IN POSITION OF MAINS COULD AFFECT DRAINAGE CONSTRUCTION DETAILS.
 - INSPECTIONS MUST BE UNDERTAKEN BY THIS OFFICE (BY PRIOR ARRANGEMENT WITH ENGINEER) DURING CONSTRUCTION TO ENABLE FULL CERTIFICATION UPON COMPLETION OF WORKS.
 - ALL CONSTRUCTION OF COUNCIL DRAINAGE WORKS TO COMPLY WITH COUNCIL STANDARD.
 - REMOVE REDUNDANT DRAINAGE PITS AND SEAL PIPES.
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 - THIS STORMWATER MANAGEMENT PLAN HAS BEEN PREPARED FOR D.A. SUBMISSION TO COUNCIL AND DOES NOT NECESSARILY CONTAIN ALL APPROPRIATE INFORMATION TO ENABLE FOR ISSUE TO PLUMBER/BUILDER FOR CONSTRUCTION. CONTACT TAYLOR CONSULTING FOR MORE INFORMATION.

- RAINWATER RE-USE NOTES AND SPECIFICATIONS**
- ROOF WATER ONLY TO BE DRAINED TO THE RAINWATER STORAGE TANK.
 - THE RAINWATER STORAGE TANK NEEDS TO BE CONNECTED FOR RE-USE AS REQUIRED BY THE OWNER.
 - RAINWATER STORAGE TANK TO BE CONFIGURED IN ACCORDANCE WITH SYDNEY WATER SPECIFICATIONS' GUIDELINES FOR RAINWATER TANK ON RESIDENTIAL PROPERTIES.
 - PROVIDE MAINS 'TOP-UP' SUPPLY TO RAINWATER TANK. MAINS 'TOP-UP' ZONE TO BE BASED ON THE DAILY NON-POTABLE USAGE THAT MAY BE EXPECTED FROM THE TANK.
 - PROVIDE A MECHANICAL PUMPING ARRANGEMENT (IN SOUND-PROOF HOUSING) TO PUMP SUPPLIERS SPECIFICATION TO SUIT INTENDED USAGE OF RAINWATER STORAGE. PUMPING ARRANGEMENTS MUST COMPLY WITH EPA GUIDELINES.
 - INLETS TO RAINWATER TANK MUST BE SCREENED TO PREVENT THE ENTRY OF FOREIGN MATTER, ANIMALS OR INSECTS.
 - A SIGN MUST BE AFFIXED TO THE RAINWATER TANK CLEARLY STATING THAT THE WATER IN THE TANK IS RAINWATER AND IS NOT TO BE USED FOR HUMAN CONSUMPTION.
 - RAINWATER TANK TO BE PLACED ON A STRUCTURALLY ADEQUATE BASE IN ACCORDANCE WITH THE MANUFACTURER'S OR STRUCTURAL ENGINEER'S DETAILS.
 - THE TANK MUST NOT BE INSTALLED OVER ANY MAINTENANCE STRUCTURE OR FITTINGS USED BY A PUBLIC AUTHORITY.
 - RAINWATER TANK AND ASSOCIATED PLUMBING WORKS TO BE INSTALLED AND CONFIGURED BY A LICENSED PLUMBER. PUMP TO BE INSTALLED BY A LICENSED ELECTRICIAN.
- OSD SYSTEM DESIGN DATA**
- SITE DATA**
- SITE AREA = 699 m²
ROOF AREA TO OSD = 259 m²
OTHER HARD SURFACES = 183 m²
- PSD STATE OF NATURE ANALYSIS**
- 5 YR ARI = 17 l/s
100 YR ARI = 33 l/s
- DEVELOPED SITE FLOWS**
- 5 YR ARI = 15 l/s
100 YR ARI = 25 l/s
- DETENTION SYSTEM DATA**
- ORIFICE DIAM = 60 mm
SSR = 10,000 LITRES
- NOTE: DETENTION STORAGE VOLUME HAS BEEN OFFSET BY 50% VIA THE PROVISION OF 5000 LITRES OF RAINWATER STORAGE.

STORMWATER SYSTEM DESIGN DATA

SITE DATA

SITE AREA = 699 m² (100%)
PROPOSED IMPERVIOUS AREA = 442 m² (63%)
PROPOSED LANDSCAPED AREA = 257 m² (37%)
EXISTING IMPERVIOUS AREA = 206 m² (36%)
EXISTING LANDSCAPED AREA = 371 m² (64%)

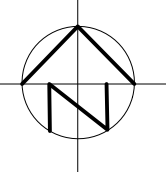
ISSUE DATE	REVISION

TITLE
STORMWATER MANAGEMENT PLAN
4A CAMBRIDGE AVENUE, NARRAWEENA

DRAWN: MDB
DATE: 20 JULY 2020
CHECKED: [Signature]
SCALE: @ A1
1:100
BY: BE Civil (Hons) MIE Aust.

TAYLOR
CONSULTING
CIVIL & STRUCTURAL ENGINEERS

SH-4
SHEET -4



BENCHMARK
NAIL IN KERB
R.L. 68.89 (AHD)

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SECURE DRAINAGE LINES TO
UNDERSIDE OF FLOOR STRUCTURE
AS NECESSARY FOR CONNECTION TO
DETENTION STORAGE TANK (TYP)

PROVIDE Ø100
DOWNPIPE (TYP)

300 SQ. BY 300 DEEP INLET PIT
WITH SURFACE FALLS TO SUIT
NOTE: ALL PITS TO HAVE 2.0m
LONG SUB-SOIL TAIL INLET

PROVIDE SPREADER FOR DISCHARGE
OF RUNOFF FROM UPPER TO LOWER
ROOF AREA (TYP)

PROPOSED RIGHT OF CARRIAGEWAY

PROPOSED RIGHT OF CARRIAGEWAY

RETENTION/DETENTION STORAGE TANKS
STORAGE VOLUME = 5000 LITRES
STORAGE LENGTH = 2600mm
STORAGE WIDTH = 1150mm
STORAGE DEPTH = 1860mm
TOTAL VOLUME = 10,000 LITRES
PROVIDE Ø100 HIGH LEVEL & Ø40 LOW LEVEL
CONNECTIONS BETWEEN TANKS WITH Ø150
HIGH LEVEL OUTLET TO BOUNDARY PIT

A
6

SITE DRAINAGE PLAN

SCALE 1:100

PROPOSED PIT 2
DISCHARGES INTO COUNCIL SYSTEM
IN NEIGHBOURING PROPERTY.
SEE SHEET-3 FOR DETAILS

DRAINAGE NOTES

- + DENOTES EXISTING GROUND LEVEL
- FALL STORMWATER PIPES AT 1% MIN. UNLESS OTHERWISE NOTED.
- SUB-SOIL DRAINAGE TO BE CONNECTED TO THE SITE DRAINAGE SYSTEM AS NECESSARY.
- SURFACE GRATES 300 SQ. UNLESS OTHERWISE NOTED
- ALL STORMWATER PIPES TO HAVE SOLVENT CEMENT WATERTIGHT JOINTS.
- CHECK & LOCATE DEPTH OF EXISTING MAINS & SERVICES PRIOR TO CONSTRUCTION OF STORMWATER SYSTEM AS VARIATIONS IN POSITION OF MAINS COULD AFFECT DRAINAGE CONSTRUCTION DETAILS.
- INSPECTIONS MUST BE UNDERTAKEN BY THIS OFFICE (BY PRIOR ARRANGEMENT WITH ENGINEER) DURING CONSTRUCTION TO ENABLE FULL CERTIFICATION UPON COMPLETION OF WORKS.
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- PLUMBING AND DRAINAGE WORKS TO COMPLY WITH AS-3500, THE NATIONAL DRAINAGE & PLUMBING CODE.
- WHERE POSSIBLE, DRAINAGE LINES SHALL BE LAID IN AREAS PREVIOUSLY DISTURBED BY OTHER SITE WORKS AND FOLLOW TOPOGRAPHICAL FEATURES TO REDUCE IMPACT AND AVOID TREE ROOTS
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RAINWATER RE-USE NOTES AND SPECIFICATIONS

- ROOF WATER ONLY TO BE DRAINED TO THE RAINWATER STORAGE TANK.
- THE RAINWATER STORAGE TANK NEEDS TO BE CONNECTED FOR RE-USE AS REQUIRED BY THE OWNER.
- RAINWATER STORAGE TANK TO BE CONFIGURED IN ACCORDANCE WITH SYDNEY WATER SPECIFICATIONS' GUIDELINES FOR RAINWATER TANK ON RESIDENTIAL PROPERTIES'.
- PROVIDE MAINS 'TOP-UP' SUPPLY TO RAINWATER TANK. MAINS TOP-UP ZONE TO BE BASED ON THE DAILY NON-POTABLE USAGE THAT MAY BE EXPECTED FROM THE TANK.
- PROVIDE A MECHANICAL PUMPING ARRANGEMENT (IN SOUND-PROOF HOUSING) TO PUMP SUPPLIERS SPECIFICATION TO SUIT INTENDED USAGE OF RAINWATER STORAGE. PUMPING ARRANGEMENTS MUST COMPLY WITH EPA GUIDELINES.
- INLETS TO RAINWATER TANK MUST BE SCREENED TO PREVENT THE ENTRY OF FOREIGN MATTER, ANIMALS OR INSECTS.
- A SIGN MUST BE AFFIXED TO THE RAINWATER TANK CLEARLY STATING THAT THE WATER IN THE TANK IS RAINWATER AND IS NOT TO BE USED FOR HUMAN CONSUMPTION.
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- THE TANK MUST NOT BE INSTALLED OVER ANY MAINTENANCE STRUCTURE OR FITTINGS USED BY A PUBLIC AUTHORITY.
- RAINWATER TANK AND ASSOCIATED PLUMBING WORKS TO BE INSTALLED AND CONFIGURED BY A LICENSED PLUMBER. PUMP TO BE INSTALLED BY A LICENSED ELECTRICIAN.

OSD SYSTEM DESIGN DATA

SITE DATA

SITE AREA = 711 m²
ROOF AREA TO OSD = 297 m²
OTHER HARD SURFACES = 4 m²

PSD STATE OF NATURE ANALYSIS

5 YR ARI = 15 l/s
100 YR ARI = 29 l/s

DEVELOPED SITE FLOWS

5 YR ARI = 14 l/s
100 YR ARI = 24 l/s

DETENTION SYSTEM DATA

ORIFICE DIAM = 60 mm
SSR = 10,000 LITRES

NOTE: DETENTION STORAGE VOLUME HAS BEEN OFFSET BY 50% VIA THE PROVISION OF 5000 LITRES OF RAINWATER STORAGE.

STORMWATER SYSTEM DESIGN DATA

SITE DATA

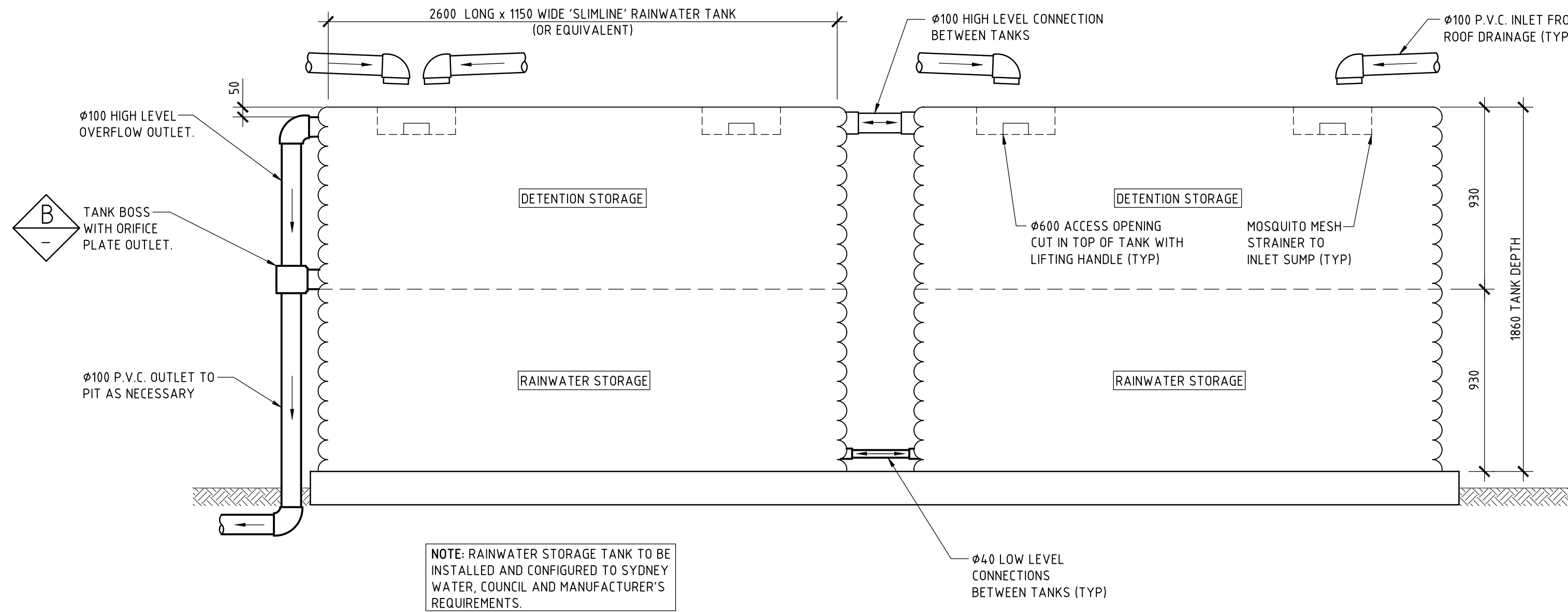
SITE AREA = 711 m² (100%)
PROPOSED IMPERVIOUS AREA = 301 m² (42%)
PROPOSED LANDSCAPED AREA = 410 m² (58%)
EXISTING IMPERVIOUS AREA = 67 m² (9%)
EXISTING LANDSCAPED AREA = 644 m² (91%)

ISSUE DATE	REVISION

TITLE STORMWATER MANAGEMENT PLAN 4B CAMBRIDGE AVENUE, NARRAWEENA			
DRAWN MDB	DATE 20 JULY 2020	CHECKED 	SCALE @ A1 1:100
BE Civil (Hons) MIE Aust.			

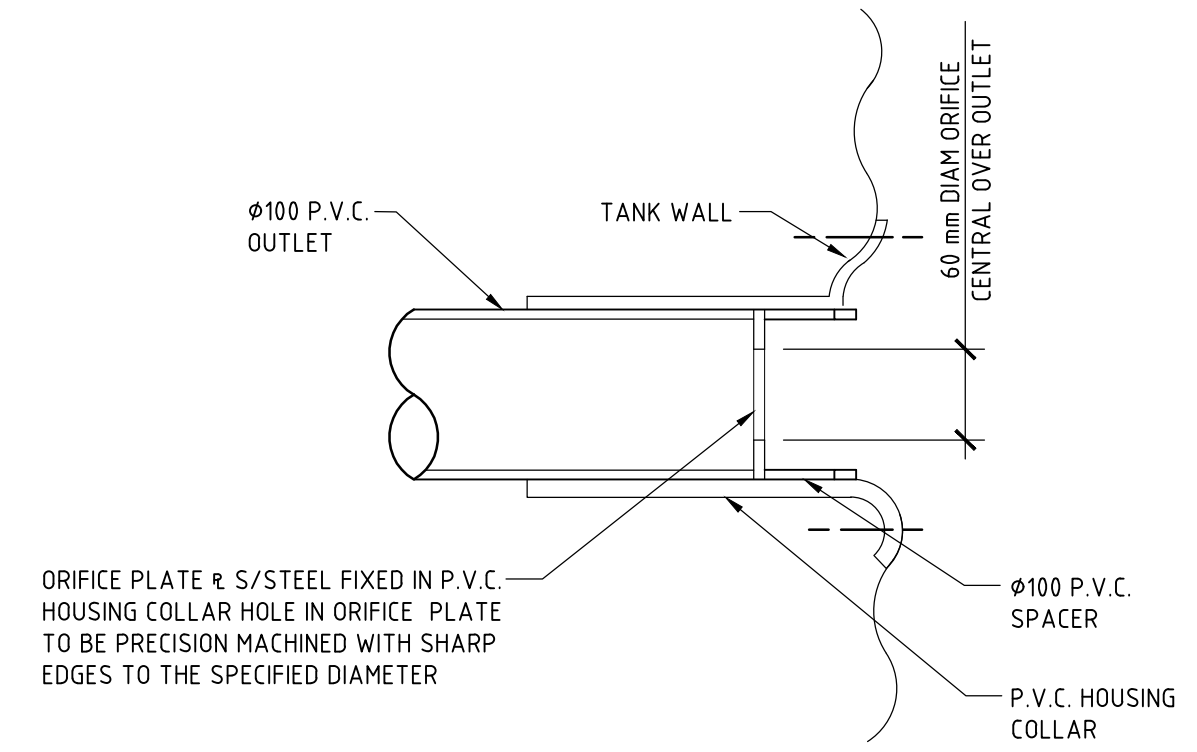
TAYLOR
CONSULTING
CIVIL & STRUCTURAL ENGINEERS

SH-5
SHEET -5



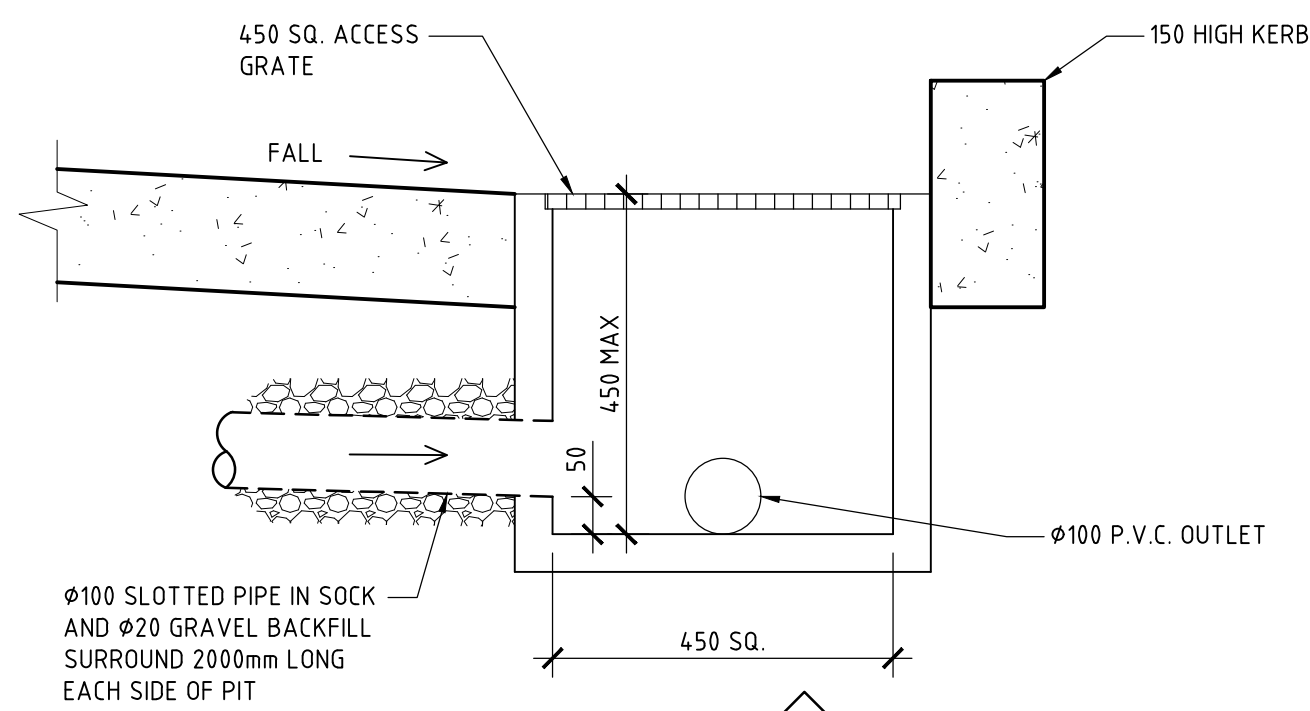
DETAIL A
SCALE 1:20

TYPICAL COMBINATION DETENTION/RETENTION CONFIGURATION SCHEMATIC



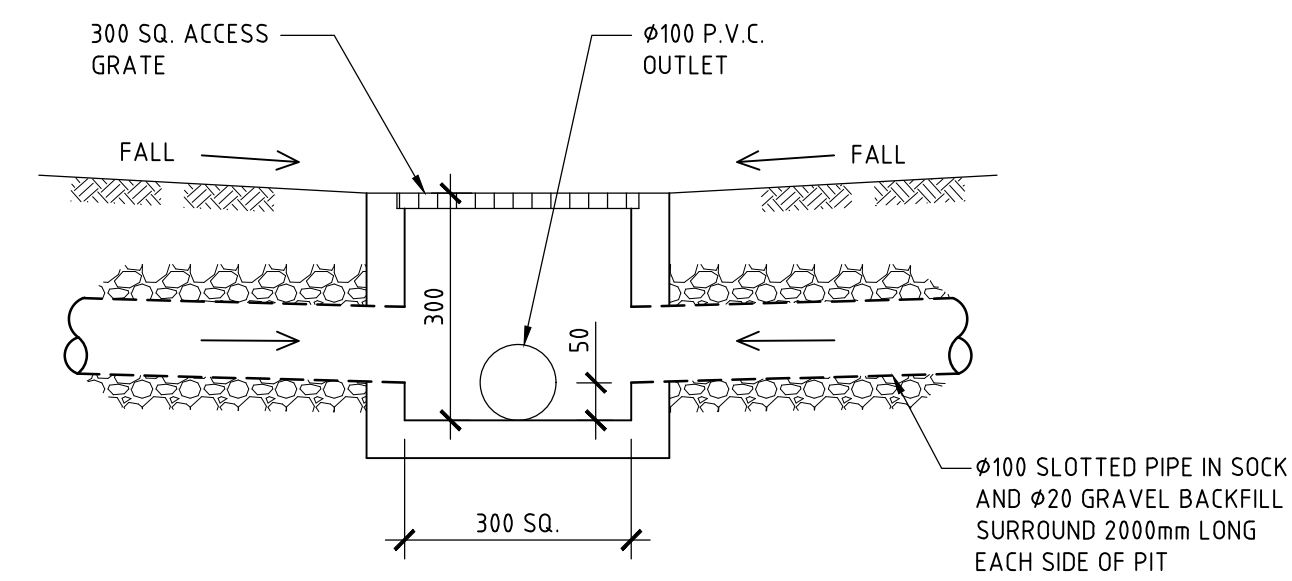
DETAIL B
SCALE 1:5

DETENTION STORAGE TANK OUTLET ORIFICE PLATE



DETAIL C
SCALE 1:10

TYPICAL SURFACE INLET PIT DETAIL



DETAIL D
SCALE 1:10

TYPICAL SURFACE INLET PIT DETAIL

ISSUE	DATE	REVISION

TITLE STORMWATER MANAGEMENT DETAILS 4A & 4B CAMBRIDGE AVENUE, NARRAWEENA				<p>TAYLOR CONSULTING CIVIL & STRUCTURAL ENGINEERS</p>	<p>DESIGNED BY SHEET -6</p>
DRAWN MDB	DATE 20 JULY 2020	CHECKED 	SCALE @ A1 1:20 1:10 1:5		
<p>BE Civil (Hons) MIE Aust.</p>					
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<p> </p>					