Appendix C – ADDITIONAL INFORMATION

DEVELOPMENT APPLICATION CONCEPT STORMWATER MANAGEMENT PLAN

FOR

PROPOSED MULTI USE DEVELOPMENT

AT

482-488 THE ESPLANADE
WARNERS BAY

LAKE MACQUARIE CITY COUNCIL LOCAL GOVERNMENT AREA

LOCALITY PLAN

DRAWING LIST - DA SERIES	
DA.1.01	COVER SHEET AND LOCALITY PLAN
DA.2.01	CONCEPT SEDIMENT AND EROSION CONTROL PLAN
DA.2.02	CONCEPT SEDIMENT AND EROSION CONTROL DETAILS
DA.2.03	LMCC SEDIMENT AND EROSION CONTROL NOTES
DA.3.01	CONCEPT BASEMENT STORMWATER DRAINAGE PLAN
DA.3.02	CONCEPT STORMWATER MANAGEMENT PLAN
DA.3.03	CONCEPT STORMWATER MANAGEMENT DETAILS

SURVEY

1. SURVEY BY:
   CADMAN CONSULTANTS
2. ORIGIN OF COORDINATES:

SSM NO.	E	N	R.L.
PM49044	NOT SUPPLIED	NOT SUPPLIED	10.351

3. ALL WORKS TO BE SET OUT BY A REGISTERED SURVEYOR
4. ALL LEVELS SHOWN ARE TO AHD

DIAL 1100 BEFORE YOU DIG
www.1100.com.au

NOTE

ALL UTILITIES ARE TO BE ACCURATELY LOCATED BY CONTRACTOR BEFORE CONSTRUCTION.

RGH CONSULTING GROUP
Multi-discipline Engineering

Postal Address: PO Box 3197, Tuggerah NSW 2259

Central Coast Office:
Unit 1, 3 Teamster Close
Tuggerah, NSW 2259
Ph 02 4351 9022

Newcastle Office:
Unit 5, 166 Hannell Street,
Maryville, NSW 2293
Ph 02 4058 2137

NOT FOR CONSTRUCTION

DO NOT SCALE DRAWINGS. VERIFY ALL DIMENSIONS ON SITE.

A1

REVISION	DESCRIPTION	DATE
A	ISSUE FOR REVIEW	31/03/17
B	ISSUE FOR CC	11/04/17
C	REISSUE FOR CC	21/11/17

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SCALE

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SURVEY BY	CADMAN CONSULTANTS
REFERENCE	8395
DATED	15/02/2009
DATUM	AHD
CLIENT	BLOC PTY LTD
ADDRESS	482-488 THE ESPLANADE WARNERS BAY
PROJECT	PROPOSED MULTI USE DEVELOPMENT

DRAWING TITLE: COVER SHEET AND LOCALITY PLAN

ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830
signed date

		INIT.
SCALE	N.T.S.	
DRAWN	AF/JG	
DESIGNED	BW	
CHECKED	BW	
DATE	MARCH 2017	
JOB NUMBER	20160518	

SHEET: DA.1.01

REV: C

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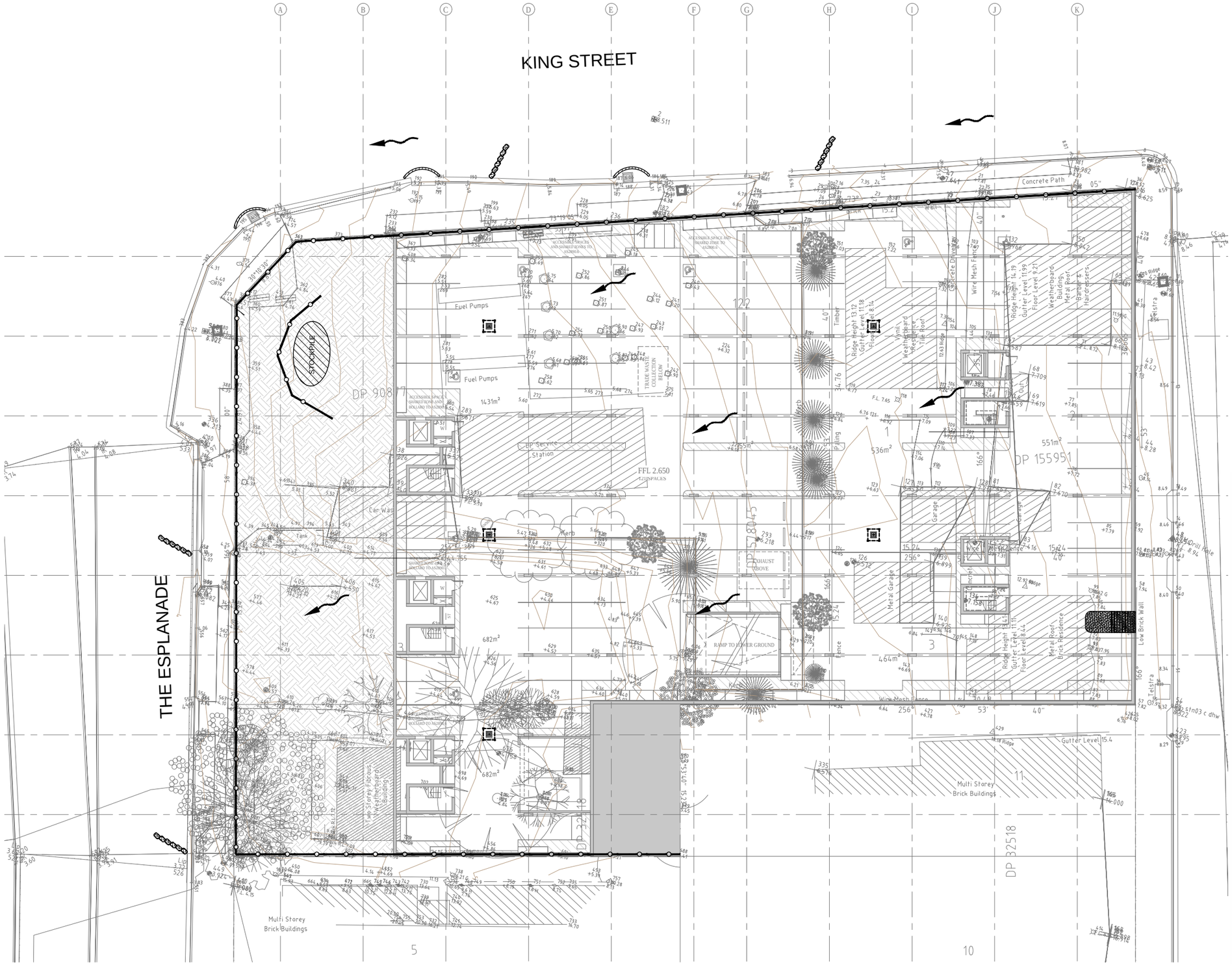

LEGEND

- SEDIMENT FENCE
- DENOTES TEMPORARY SURFACE INLET SEDIMENT TRAP
- STABILISED SITE ACCESS
- DIRECTION OF OVERLAND FLOW
- GUTTER SEDIMENT TRAP
- DENOTES MESH AND GRAVEL INLET FILTER FOR KERB INLET PITS
- STOCKPILE — TEMPORARY STOCKPILE

NOTE

EXACT LOCATION OF STABILISED SITE ACCESS AND TEMPORARY MATERIAL STOCKPILE TO BE DETERMINED AND CONFIRMED ON-SITE BY CONTRACTOR DURING CONSTRUCTION

NOTE

AS THE PROPOSED DEVELOPMENT INCLUDES THE CONSTRUCTION OF A BASEMENT, WHICH WILL BE EXCAVATED FIRST, RGH HAS NOT DESIGNED A SEDIMENT BASIN AS SOIL WILL BE CAPTURED WITHIN THE EXCAVATED AREA FOR PUMP-OUT AND APPROPRIATE REMOVAL FROM SITE

1 Site Data Sheet

SEDIMENT AND EROSION CONTROL PLAN

SCALE 1:200 @ A1

NOT FOR CONSTRUCTION

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A1

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VERSION: FOR REVIEW

SCALE: 4 2 0 4 8 12 16 20 — SCALE OF METRES (1:200 AT A1 SHEET BEFORE REDUCTION)

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CLIENT	BLOC PTY LTD
ADDRESS	482-488 THE ESPLANADE WARNERS BAY
PROJECT	PROPOSED MULTI USE DEVELOPMENT

DRAWING TITLE: CONCEPT SEDIMENT AND EROSION CONTROL PLAN

ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830
signed date

		INIT.
SCALE	1:200	
DRAWN	AFJG	
DESIGNED	BW	
CHECKED	BW	
DATE	MARCH 2017	
JOB NUMBER	20160518	

SHEET: DA.2.01
REV: C

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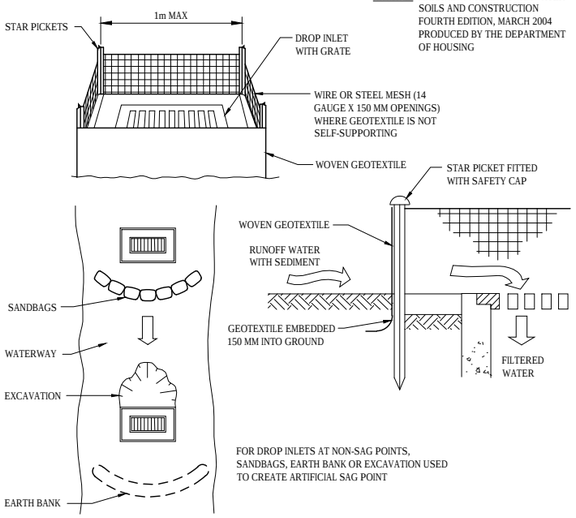
SOURCE: MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION FOURTH EDITION, MARCH 2004 PRODUCED BY THE DEPARTMENT OF HOUSING

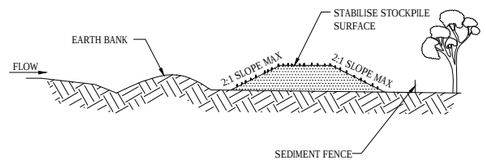


CONSTRUCTION NOTES:

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING
4. DO NOT COVER INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER SD 6-12

SOURCE: MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION FOURTH EDITION, MARCH 2004 PRODUCED BY THE DEPARTMENT OF HOUSING

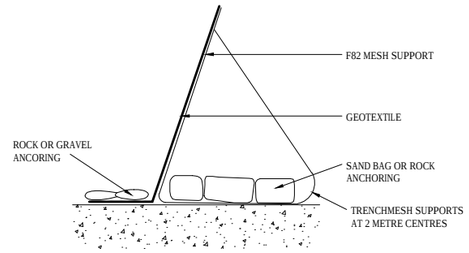


CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METERS IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCSE (STANDARD DRAWING 6-8) 1 TO 2 METRES DOWNSLOPE.

STOCKPILES SD 4-1

SOURCE: MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION FOURTH EDITION, MARCH 2004 PRODUCED BY THE DEPARTMENT OF HOUSING

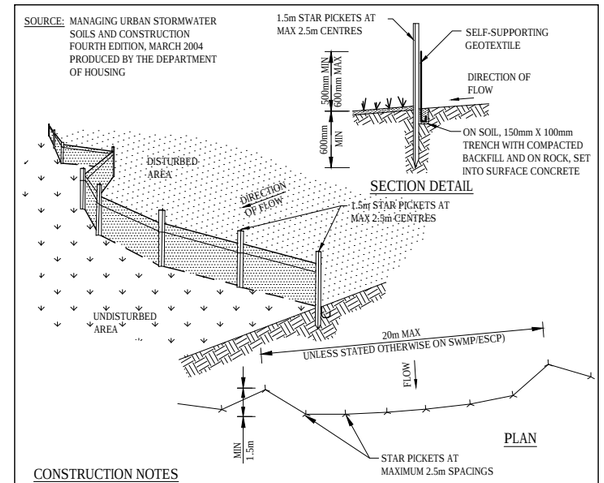


CONSTRUCTION NOTES:

1. INSTALL THIS TYPE OF SEDIMENT FENCE WHEN USE OF SUPPORT POSTS IS NOT DESIRABLE OR NOT POSSIBLE. SUCH CONDITIONS MIGHT APPLY, FOR EXAMPLE, WHERE APPROVAL IS GRANTED FROM THE APPROPRIATE AUTHORITIES TO PLACE THESE FENCES IN HIGHLY SENSITIVE ESTUARINE AREAS
2. USE BENT TRENCH MESH TO SUPPORT THE F82 WELDED MESH FACING AS SHOWN ON THE DRAWING ABOVE. ATTACH THE GEOTEXTILE TO THE WELDED MESH FACING USING UV RESISTANT CABLE TIES
3. STABILISE THE WHOLE STRUCTURE WITH SANDBAG OR ROCK ANCHORING OVER THE TRENCH MESH AND THE LEADING EDGE OF THE GEOTEXTILE. THE ANCHORING SHOULD BE SUFFICIENTLY LARGE TO ENSURE STABILITY OF THE STRUCTURE IN THE DESIGN STORM EVENT, USUALLY THE 10 YEAR EVENT.

ALTERNATIVE SEDIMENT FENCE SD 6-9

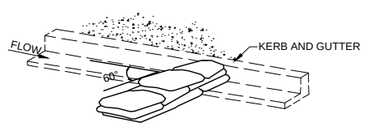
SOURCE: MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION FOURTH EDITION, MARCH 2004 PRODUCED BY THE DEPARTMENT OF HOUSING



CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALL THE 10 YEAR EVENT.
2. CUT A 150 MM DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUNDAT 2.5 METRE INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH, FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150 MM OVERLAP.
6. BACKFILL TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE

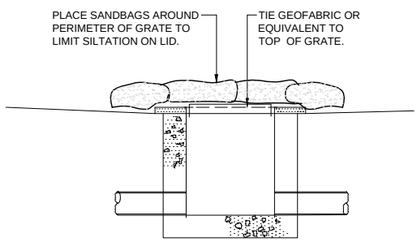
SEDIMENT FENCE SD 6-8



GRAVEL FILLED SAUSAGE TEMPORARY GUTTER GROSS POLLUTANT/SEDIMENT TRAP

COARSE GRAVEL ROLLED IN NETTING MATERIAL TOTALING 200mm HIGH & PLACED HARD AGAINST FACE OF KERB.
NTS

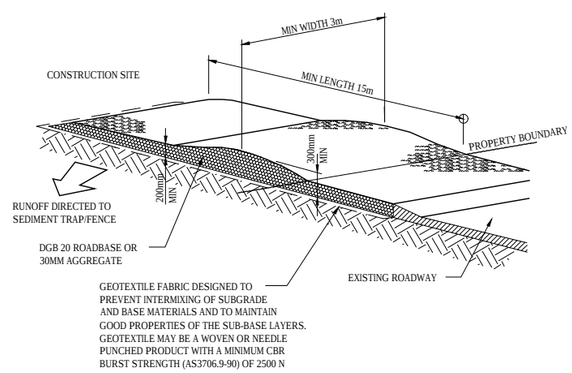
NOTE:
SEDIMENT BARRIERS TO BE USED ONLY WHERE ROAD WIDTHS PERMITS AND WHERE SAFETY TO PASSING TRAFFIC IS NOT AFFECTED



TEMPORARY SURFACE INLET SEDIMENT TRAP

WHEN USED AS A GROSS POLLUTANT TRAP STRUCTURE SHALL BE REGULARLY DESILTED.
NTS

SOURCE: MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION FOURTH EDITION, MARCH 2004 PRODUCED BY THE DEPARTMENT OF HOUSING

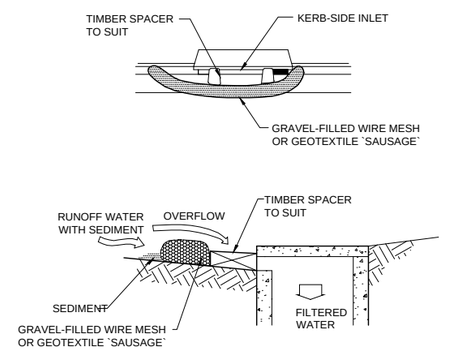


CONSTRUCTION NOTES:

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200MM THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30MM AGREGATE.\
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE

STABILISED SITE ACCESS SD 6-14

SOURCE: MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION FOURTH EDITION, MARCH 2004 PRODUCED BY THE DEPARTMENT OF HOUSING



NOTE: THIS PRACTICE ONLY TO BE USED WHERE SPECIFIED IN AN APPROVED SWMP/ESCP.

CONSTRUCTION NOTES:

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150MM HIGH X 400MM WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT - LADEN WATERS CANNOT PASS BETWEEN.

MESH AND GRAVEL INLET FILTER SD 6-11

NOT FOR CONSTRUCTION

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ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830
signed date

		INIT.
SCALE	N.T.S.	
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SEDIMENT & EROSION CONTROL NOTES (LMCC)

EROSION AND SEDIMENT CONTROL NOTES

THE FOLLOWING NOTES MAY NOT BE RELEVANT TO EACH DEVELOPMENT.

GENERAL

1. ESCP REFERS TO EROSION AND SEDIMENT CONTROL PLAN OR A SOIL AND WATER MANAGEMENT PLAN (SWMP).
2. ESC REFERS TO EROSION AND SEDIMENT CONTROL.
3. SEDIMENT, INCLUDES, BUT IS NOT LIMITED TO, CLAY, SILT, SAND, GRAVEL, SOIL, MUD, CEMENT, AND CERAMIC WASTE.
4. ANY REFERENCE TO THE BLUE BOOK REFERS TO MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION. LANDCOM, 2004.
5. ANY REFERENCE TO THE IECA WHITE BOOKS (2008) REFERS TO IECA 2008. BEST PRACTICE EROSION AND SEDIMENT CONTROL- BOOKS 1-6.INTERNATIONAL EROSION CONTROL ASSOCIATION (AUSTRALASIA). PICTON NSW.
6. ANY MATERIAL DEPOSITED IN ANY CONSERVATION AREA FROM WORKS ASSOCIATED WITH THE DEVELOPMENT SHALL BE REMOVED IMMEDIATELY BY MEASURES INVOLVING MINIMAL GROUND AND/OR VEGETATION DISTURBANCE AND NO MACHINERY, OR FOLLOWING DIRECTIONS BY COUNCIL AND/OR WITHIN A TIMEFRAME ADVISED BY COUNCIL.

THE ESCP

7. THE ESCP AND ITS ASSOCIATED ESC MEASURES SHALL BE CONSTANTLY MONITORED, REVIEWED, AND MODIFIED AS REQUIRED TO CORRECT DEFICIENCIES. COUNCIL HAS THE RIGHT TO DIRECT CHANGES IF, IN ITS OPINION, THE MEASURES THAT ARE PROPOSED OR HAVE BEEN INSTALLED ARE INADEQUATE TO PREVENT POLLUTION.
8. PRIOR TO ANY ACTIVITIES ONSITE, THE RESPONSIBLE PERSON(S) IS TO BE NOMINATED. THE RESPONSIBLE PERSON(S) SHALL BE RESPONSIBLE FOR THE ESC MEASURES ONSITE. THE NAME, ADDRESS AND 24 HOUR CONTACT DETAILS OF THE PERSON(S) SHALL BE PROVIDED TO COUNCIL IN WRITING. COUNCIL SHALL BE ADVISED WITHIN 48 HOURS OF ANY CHANGES TO THE RESPONSIBLE PERSON(S), OR THEIR CONTACT DETAILS, IN WRITING.
9. AT LEAST 14 DAYS BEFORE THE NATURAL SURFACE IS DISTURBED IN ANY NEW STAGE, THE CONTRACTOR SHALL SUBMIT TO THE CERTIFIER, A PLAN SHOWING ESC MEASURES FOR THAT STAGE. THE DEGREE OF DESIGN DETAIL SHALL BE BASED ON THE DISTURBED AREA.
10. AT ANY TIME DURING CONSTRUCTION, THE ESC MEASURES ONSITE SHALL BE APPROPRIATE FOR THE AREA OF DISTURBANCE AND ITS CHARACTERISTICS INCLUDING SOILS (IN ACCORDANCE WITH THOSE REQUIRED FOR THE SITE AS PER DCP).
11. THE IMPLEMENTATION OF THE ESCP SHALL BE SUPERVISED BY PERSONNEL WITH APPROPRIATE QUALIFICATIONS AND/OR EXPERIENCE IN ESC ON CONSTRUCTION SITES.
12. THE APPROVED ESCP SHALL BE AVAILABLE ON-SITE FOR INSPECTION BY COUNCIL OFFICERS WHILE WORK ACTIVITIES ARE OCCURRING.
13. THE APPROVED ESCP SHALL BE UP TO DATE AND SHOW A TIMELINE OF INSTALLATION, MAINTENANCE AND REMOVAL OF ESC MEASURES.
14. ALL ESC MEASURES SHALL BE APPROPRIATE FOR THE SEDIMENT TYPE(S) OF THE SOILS ONSITE, IN ACCORDANCE WITH THE BLUE BOOK, IECA WHITE BOOKS OR OTHER CURRENT RECOGNISED INDUSTRY STANDARD FOR ESC FOR AUSTRALIAN CONDITIONS.
15. ADEQUATE SITE DATA, INCLUDING SOIL DATA FROM A NATA APPROVED LABORATORY, SHALL BE OBTAINED TO ALLOW THE PREPARATION OF AN APPROPRIATE ESCP, AND ALLOW THE SELECTION, DESIGN AND SPECIFICATION OF REQUIRED ESC MEASURES.
16. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE APPROVED ESCP (AS AMENDED FROM TIME TO TIME) UNLESS CIRCUMSTANCES ARISE WHERE:
    a) COMPLIANCE WITH THE ESCP WOULD INCREASE THE POTENTIAL FOR ENVIRONMENTAL HARM; OR
    b) CIRCUMSTANCES CHANGE DURING CONSTRUCTION AND THOSE CIRCUMSTANCES COULD NOT HAVE BEEN FORESEEN; OR
    c) COUNCIL DETERMINES THAT UNACCEPTABLE OFF-SITE SEDIMENTATION IS OCCURRING AS A RESULT OF A LAND-DISTURBING ACTIVITY. IN EITHER CASE, THE PERSON(S) RESPONSIBLE MAY BE REQUIRED TO TAKE ADDITIONAL, OR ALTERNATIVE PROTECTIVE ACTION, AND/OR UNDERTAKE REASONABLE RESTORATION WORKS WITHIN THE TIMEFRAME SPECIFIED BY THE COUNCIL.
17. ADDITIONAL ESC MEASURES SHALL BE IMPLEMENTED, AND A REVISED ESCP SUBMITTED FOR APPROVAL TO THE CERTIFIER (WITHIN FIVE BUSINESS DAYS OF ANY SUCH AMENDMENTS) IN THE EVENT THAT:
    a) THERE IS A HIGH PROBABILITY THAT SERIOUS OR MATERIAL ENVIRONMENTAL HARM MAY OCCUR AS A RESULT OF SEDIMENT LEAVING THE SITE; OR
    b) THE IMPLEMENTED WORKS FAIL TO ACHIEVE COUNCIL'S WATER QUALITY OBJECTIVES SPECIFIED IN THESE CONDITIONS; OR
    c) SITE CONDITIONS SIGNIFICANTLY CHANGE; OR
    d) SITE INSPECTIONS INDICATE THAT THE IMPLEMENTED WORKS ARE FAILING TO ACHIEVE THE "OBJECTIVE" OF THE ESCP.
18. A COPY OF ANY AMENDED ESCP SHALL BE FORWARDED TO AN APPROPRIATE COUNCIL OFFICER, WITHIN FIVE BUSINESS DAYS OF ANY SUCH AMENDMENTS.

SITE ESTABLISHMENT INCLUDING CLEARING AND MULCHING

19. NO LAND CLEARING SHALL BE UNDERTAKEN UNLESS PRECEDED BY THE INSTALLATION OF ADEQUATE DRAINAGE AND SEDIMENT CONTROL MEASURES, UNLESS SUCH CLEARING IS REQUIRED FOR THE PURPOSE OF INSTALLING SUCH MEASURES, IN WHICH CASE, ONLY THE MINIMUM CLEARING REQUIRED TO INSTALL SUCH MEASURES SHALL OCCUR.
20. BULK TREE CLEARING AND GRUBBING OF THE SITE SHALL BE IMMEDIATELY FOLLOWED BY SPECIFIED TEMPORARY EROSION CONTROL MEASURES (E.G. TEMPORARY GRASSING OR MULCHING) PRIOR TO COMMENCEMENT OF EACH STAGE OF CONSTRUCTION WORKS.
21. TREES AND VEGETATION CLEARED FROM THE SITE SHALL BE MULCHED ONSITE WITHIN 7 DAYS OF CLEARING.
22. APPROPRIATE MEASURES SHALL BE UNDERTAKEN TO CONTROL ANY DUST ORIGINATING DUE TO THE MULCHING OF VEGETATION ONSITE.
23. ALL OFFICE FACILITIES AND OPERATIONAL ACTIVITIES SHALL BE LOCATED SUCH THAT ANY EFFLUENT, INCLUDING WASH-DOWN WATER, CAN BE TOTALLY CONTAINED AND TREATED WITHIN THE SITE.
24. ALL REASONABLE AND PRACTICABLE MEASURES SHALL BE TAKEN TO ENSURE STORMWATER RUNOFF FROM ACCESS ROADS AND STABILISED ENTRY/EXIT SYSTEMS, DRAINS TO AN APPROPRIATE SEDIMENT CONTROL DEVICE.
25. SITE EXIT POINTS SHALL BE APPROPRIATELY MANAGED TO MINIMISE THE RISK OF SEDIMENT BEING TRACKED ONTO SEALED, PUBLIC ROADWAYS.
26. STORMWATER RUNOFF FROM ACCESS ROADS AND STABILISED ENTRY/EXIT POINTS SHALL DRAIN TO AN APPROPRIATE SEDIMENT CONTROL DEVICE.
27. THE APPLICANT SHALL ENSURE AN ADEQUATE SUPPLY OF ESC, AND APPROPRIATE POLLUTION CLEAN-UP MATERIALS ARE AVAILABLE ON-SITE AT ALL TIMES.
28. ALL TEMPORARY EARTH BANKS, FLOW DIVERSION SYSTEMS, AND SEDIMENT BASIN EMBANKMENTS SHALL BE MACHINE-COMPACTED, SEEDED AND MULCHED WITHIN TEN (10) DAYS OF FORMATION FOR THE PURPOSE OF ESTABLISHING A VEGETATIVE COVER, OR LINED APPROPRIATELY.
29. SEDIMENT DEPOSITED OFF SITE AS A RESULT OF ON-SITE ACTIVITIES SHALL BE COLLECTED AND THE AREA CLEANED/REHABILITATED AS SOON AS REASONABLE AND PRACTICABLE.
30. CONCRETE WASTE AND CHEMICAL PRODUCTS, INCLUDING PETROLEUM AND OIL-BASED PRODUCTS, SHALL BE PREVENTED FROM ENTERING ANY INTERNAL OR EXTERNAL WATER BODY, OR ANY EXTERNAL DRAINAGE SYSTEM, EXCLUDING THOSE ON-SITE WATER BODIES SPECIFICALLY DESIGNED TO CONTAIN AND/OR TREAT SUCH MATERIAL. APPROPRIATE MEASURES SHALL BE INSTALLED TO TRAP THESE

LMCC NOTES CONTINUED

MATERIALS ONSITE.

31. BRICK, TILE OR MASONRY CUTTING SHALL BE CARRIED OUT ON A PERVIOUS SURFACE (E.G. GRASS OR OPEN SOIL) AND IN SUCH A MANNER THAT ANY RESULTING SEDIMENT-LADEN RUNOFF IS PREVENTED FROM DISCHARGING INTO A GUTTER, DRAIN OR WATER. APPROPRIATE MEASURES SHALL BE INSTALLED TO TRAP THESE MATERIALS ONSITE.
32. NEWLY SEALED HARD-STAND AREAS (E.G. ROADS, DRIVEWAYS AND CAR PARKS) SHALL BE SWEPT THOROUGHLY AS SOON AS PRACTICABLE AFTER SEALING/SURFACING TO MINIMISE THE RISK OF COMPONENTS OF THE SURFACING COMPOUND ENTERING STORMWATER DRAINS.
33. STOCKPILES OF ERODIBLE MATERIAL SHALL BE PROVIDED WITH AN APPROPRIATE PROTECTIVE COVER (SYNTHETIC OR ORGANIC) IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR MORE THAN 10 DAYS.
34. STOCKPILES, TEMPORARY OR PERMANENT, SHALL NOT BE LOCATED IN AREAS IDENTIFIED AS NO-GO ZONES (INCLUDING, BUT NOT LIMITED TO, RESTRICTED ACCESS AREAS, BUFFER ZONES, OR AREAS OF NON-DISTURBANCE) ON THE ESCP.
35. NO MORE THAN 150M OF A STORMWATER, SEWER LINE OR OTHER SERVICE TRENCH SHALL TO BE OPEN AT ANY ONE TIME.
36. SITE SPOIL SHALL BE LAWFULLY DISPOSED OF IN A MANNER THAT DOES NOT RESULT IN ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.
37. WHEREVER REASONABLE AND PRACTICABLE, STORMWATER RUNOFF ENTERING THE SITE FROM EXTERNAL AREAS, AND NON-SEDIMENT LADEN (CLEAN) STORMWATER RUNOFF ENTERING A WORK AREA OR AREA OF SOIL DISTURBANCE, SHALL BE DIVERTED AROUND OR THROUGH THAT AREA IN A MANNER THAT MINIMISES SOIL EROSION AND THE CONTAMINATION OF THAT WATER FOR ALL DISCHARGES UP TO THE SPECIFIED DESIGN STORM DISCHARGE.

SITE MANAGEMENT INCLUDING DUST

38. PRIORITY SHALL BE GIVEN TO THE PREVENTION, OR AT LEAST THE MINIMISATION, OF SOIL EROSION, RATHER THAN THE TRAPPING OF DISPLACED SEDIMENT. SUCH A CLAUSE SHALL NOT REDUCE THE RESPONSIBILITY TO APPLY AND MAINTAIN, AT ALL TIMES, ALL NECESSARY ESC MEASURES.
39. MEASURES USED TO CONTROL WIND EROSION SHALL BE APPROPRIATE FOR THE LOCATION AND PREVENT SOIL EROSION AT ALL TIMES, INCLUDING WORKING HOURS, OUT OF HOURS, WEEKENDS, PUBLIC HOLIDAYS, AND DURING ANY OTHER SHUTDOWN PERIODS.
40. THE APPLICATION OF LIQUID OR CHEMICAL-BASED DUST SUPPRESSION MEASURES SHALL ENSURE THAT SEDIMENT-LADEN RUNOFF RESULTING FROM SUCH MEASURES DOES NOT CREATE A TRAFFIC OR ENVIRONMENTAL HAZARD.
41. ALL CUT AND FILL EARTH BATTERS LESS THAN 3M IN ELEVATION SHALL BE TOPSOILED, AND GRASS SEEDED/HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF GRADING IN CONSULTATION WITH COUNCIL.
42. ONCE CUT/FILL OPERATIONS HAVE BEEN FINALISED IN A SECTION, ALL DISTURBED AREAS THAT ARE NOT BEING WORKED ON SHALL BE STABILISED IN ACCORDANCE WITH TIME LINES IN THE BLUE BOOK.
43. ALL REASONABLE AND PRACTICABLE MEASURES SHALL BE TAKEN TO PREVENT, OR AT LEAST MINIMISE, THE RELEASE OF SEDIMENT FROM THE SITE.
44. SUITABLE ALL-WEATHER MAINTENANCE ACCESS SHALL BE PROVIDED TO ALL SEDIMENT CONTROL DEVICES.
45. SEDIMENT CONTROL DEVICES, OTHER THAN SEDIMENT BASINS, SHALL BE DE-SILTED AND MADE FULLY OPERATIONAL AS SOON AS REASONABLE AND PRACTICABLE AFTER A SEDIMENT-PRODUCING EVENT, WHETHER NATURAL OR ARTIFICIAL, IF THE DEVICE'S SEDIMENT RETENTION CAPACITY FALLS BELOW 75% OF ITS DESIGN RETENTION CAPACITY.
46. ALL EROSION AND SEDIMENT CONTROL MEASURES, INCLUDING DRAINAGE CONTROL MEASURES, SHALL BE MAINTAINED IN PROPER WORKING ORDER AT ALL TIMES DURING THEIR OPERATIONAL LIVES.
47. WASHING/FLUSHING OF SEALED ROADWAYS SHALL ONLY OCCUR WHERE SWEEPING HAS FAILED TO REMOVE SUFFICIENT SEDIMENT AND THERE IS A COMPELLING NEED TO REMOVE THE REMAINING SEDIMENT (E.G. FOR SAFETY REASONS). IN SUCH CIRCUMSTANCES, ALL REASONABLE AND PRACTICABLE SEDIMENT CONTROL MEASURES SHALL BE USED TO PREVENT, OR AT LEAST MINIMISE, THE RELEASE OF SEDIMENT INTO RECEIVING WATERS. ONLY THOSE MEASURES THAT WILL NOT CAUSE SAFETY AND PROPERTY FLOODING ISSUES SHALL BE EMPLOYED. SEDIMENT REMOVED FROM ROADWAYS SHALL BE DISPOSED OF IN A LAWFUL MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.
48. SEDIMENT REMOVED FROM SEDIMENT TRAPS AND PLACES OF SEDIMENT DEPOSITION SHALL BE DISPOSED OF IN A LAWFUL MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.

SEDIMENT BASINS - INSTALLATION, MAINTENANCE AND REMOVAL INCLUDING SEDIMENT TRAPS

49. AS-CONSTRUCTED PLANS SHALL BE PREPARED FOR ALL CONSTRUCTED SEDIMENT BASINS AND ASSOCIATED EMERGENCY SPILLWAYS. SUCH PLANS SHALL VERIFY THE BASIN'S DIMENSIONS, LEVELS AND VOLUMES COMPLY WITH THE APPROVED DESIGN DRAWINGS. THESE PLANS MAY BE REQUESTED BY THE CERTIFIER OR COUNCIL.
50. SEDIMENT BASINS SHALL BE CONSTRUCTED AND FULLY OPERATIONAL PRIOR TO ANY OTHER SOIL DISTURBANCE IN THEIR CATCHMENT.
51. INSTALL AN INTERNAL GATED VALVE, OR SIMILAR, IN ANY OUTLET PIPE ONCE PIPES INSTALLED, OR INSTALL A SACRIFICIAL PIPE FROM BASIN THROUGH WALL TO EXTERNAL OUTLET POINT. THE VALVE SHALL BE CONNECTED TO A RISER MADE FROM SLOTTED PIPE IN THE BASIN. THE VALVE MAY BE OPENED ONCE CAPTURED WATER MEETS WATER QUALITY REQUIREMENTS. THE FINAL SETUP FOR TEMPORARY INTERNAL OUTLET STRUCTURES TO BE CONFIRMED PRIOR TO CONSTRUCTION WITH COUNCIL. THIS SETUP WILL ENABLE DISCHARGE OF TREATED WATER FROM SITE WITHOUT NEED FOR PUMPING.
52. A SEDIMENT STORAGE LEVEL MARKER POST SHALL BE WITH A CROSS MEMBER SET JUST BELOW THE TOP OF THE SEDIMENT STORAGE ZONE (AS SPECIFIED ON THE APPROVED ESCP). AT LEAST A 75MM WIDE POST SHALL BE FIRMLY SET INTO THE BASIN FLOOR.
53. THE SITE MANAGER SHALL OBTAIN THE RELEVANT APPROVALS FROM THE RELEVANT ORGANISATIONS TO DISCHARGE TREATED WATER FROM ANY EXISTING BASINS. ORGANISATIONS MAY INCLUDE, BUT NOT BE LIMITED TO, HUNTER WATER, AND COUNCIL.
54. WHERE MORE THAN ONE STAGE IS TO BE DEVELOPED AT ONE TIME, OR BEFORE THE PRECEDING STAGE IS COMPLETE, THE SEDIMENT BASIN(S) FOR THESE STAGES SHALL HAVE SUFFICIENT CAPACITY TO CATER FOR ALL AREA DIRECTED TO THE BASIN(S).
55. PRIOR TO ANY FORECAST WEATHER EVENT LIKELY TO RESULT IN RUNOFF, ANY BASINS/TRAPS SHALL BE DEWATERED TO PROVIDE SUFFICIENT CAPACITY TO CAPTURE SEDIMENT LADEN WATER FROM THE SITE.

LMCC NOTES CONTINUED

56. SUFFICIENT QUANTITIES OF CHEMICALS/AGENTS TO TREAT CAPTURED WATER SHALL BE PLACED SUCH THAT WATER ENTERING THE BASIN MIXES WITH THE CHEMICAL/AGENTS AND IS CARRIED INTO THE BASIN TO SPEED UP CLARIFICATION.
57. ANY BASIN SHALL BE DEWATERED WITHIN THE X-DAY RAINFALL DEPTH USED TO CALCULATE THE CAPACITY OF THE BASIN, AFTER A RAINFALL EVENT.
58. SUFFICIENT QUANTITIES OF CHEMICALS/AGENTS TO TREAT TURBID WATER SHALL BE SECURELY STORED ON-SITE TO PROVIDE FOR AT LEAST THREE COMPLETE TREATMENTS OF ALL BASINS REQUIRING CHEMICALLY TREATMENT ONSITE.
59. PRIOR TO THE CONTROLLED DISCHARGE (E.G. DE-WATERING ACTIVITIES) FROM EXCAVATIONS AND/OR SEDIMENT BASINS, THE FOLLOWING WATER QUALITY OBJECTIVES SHALL BE ACHIEVED:
    a) TOTAL SUSPENDED SOLIDS (TSS) TO A MAXIMUM 50MG/L;
    b) WATER PH BETWEEN 6.5 AND 8.5, UNLESS OTHERWISE REQUIRED BY THE COUNCIL;
    c) TURBIDITY (MEASURED IN NTUS) TO A MAXIMUM OF 60 NTU); AND
    d) EC LEVELS NO GREATER THAN BACKGROUND LEVELS.
60. THE DEVELOPMENT APPROVAL MAY REQUIRE TESTING OF ADDITIONAL WATER QUALITY ELEMENTS PRIOR TO DISCHARGE. E.G. HEAVY METALS.
61. A SAMPLE OF THE RELEASED TREATED WATER SHALL BE KEPT ONSITE IN A CLEAR CONTAINER WITH THE SAMPLE DATE RECORDED ON IT.
62. WATER QUALITY SAMPLES SHALL BE TAKEN AT A DEPTH NO LESS THAN 200MM BELOW THE WATER SURFACE OF THE BASIN.
63. NO ALUMINIUM BASED PRODUCTS MAY BE USED TREAT CAPTURED WATER ONSITE WITHOUT THE PRIOR WRITTEN PERMISSION FROM AN APPROPRIATE COUNCIL OFFICER. THE APPLICANT SHALL HAVE A DEMONSTRATED ABILITY TO USE SUCH PRODUCTS CORRECTLY AND WITHOUT ENVIRONMENTAL HARM PRIOR TO ANY APPROVAL.
64. THE CHEMICAL/AGENT USED IN TYPE D AND TYPE F BASINS TO TREAT CAPTURED WATER CAPTURED IN THE BASIN SHALL BE APPLIED IN CONCENTRATIONS SUFFICIENT TO ACHIEVE COUNCIL'S WATER QUALITY OBJECTIVES WITHIN THE X-DAY RAINFALL DEPTH USED TO CALCULATE THE CAPACITY OF THE BASIN, AFTER A RAINFALL EVENT.
65. ALL MANUFACTURERS' INSTRUCTIONS SHALL BE FOLLOWED FOR ANY CHEMICALS/AGENTS USED ONSITE, EXCEPT WHERE APPROVED BY THE RESPONSIBLE PERSON OR AN APPROPRIATE COUNCIL OFFICER.
66. THE APPLICANT SHALL ENSURE THAT ON EACH OCCASION A TYPE F OR TYPE D BASIN WAS NOT DE-WATERED PRIOR TO BEING SURCHARGED BY A FOLLOWING RAINFALL EVENT, A REPORT IS PRESENTED TO AN APPROPRIATE COUNCIL OFFICER WITHIN 5 DAYS IDENTIFYING THE CIRCUMSTANCES AND PROPOSED AMENDMENTS, IF ANY, TO THE BASIN'S OPERATING PROCEDURES.
67. SETTLED SEDIMENT SHALL BE REMOVED AS SOON AS REASONABLE AND PRACTICABLE FROM ANY SEDIMENT BASIN IF:
    a) IT IS ANTICIPATED THAT THE NEXT STORM EVENT IS LIKELY TO CAUSE SEDIMENT TO SETTLE ABOVE THE BASIN'S SEDIMENT STORAGE ZONE; OR
    b) THE ELEVATION OF SETTLED SEDIMENT IS ABOVE THE TOP OF THE BASIN'S SEDIMENT STORAGE ZONE; OR
    c) THE ELEVATION OF SETTLED SEDIMENT IS ABOVE THE BASINS SEDIMENT MARKER LINE.
68. SCOUR PROTECTION MEASURES PLACED ON SEDIMENT BASIN EMERGENCY SPILLWAYS SHALL APPROPRIATELY PROTECT THE SPILLWAY CHUTE AND ITS SIDE BATTERS FROM SCOUR, AND SHALL EXTEND A MINIMUM OF 3M BEYOND THE DOWNSTREAM TOE OF THE BASIN'S EMBANKMENT.
69. SUITABLE ALL-WEATHER MAINTENANCE ACCESS SHALL BE PROVIDED TO ALL SEDIMENT CONTROL DEVICES.
70. MATERIALS, WHETHER LIQUID OR SOLID, REMOVED FROM ANY ESC MEASURES DURING MAINTENANCE OR DECOMMISSIONING, SHALL BE DISPOSED OF IN A MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.
71. ALL SEDIMENT BASINS SHALL REMAIN FULLY OPERATIONAL AT ALL TIMES UNTIL THE BASIN'S DESIGN CATCHMENT ACHIEVES 70% GROUND COVER OR SURFACE STABILISATION ACCEPTABLE TO COUNCIL.
72. THE ESC MEASURES INSTALLED DURING THE DECOMMISSIONING AND REHABILITATION OF A SEDIMENT BASIN SHALL COMPLY WITH SAME STANDARDS SPECIFIED FOR THE NORMAL CONSTRUCTION WORKS.
73. A SEDIMENT BASIN SHALL NOT BE DECOMMISSIONED UNTIL ALL UP-SLOPE SITE STABILISATION MEASURES HAVE BEEN IMPLEMENTED AND ARE APPROPRIATELY WORKING TO CONTROL SOIL EROSION AND SEDIMENT RUNOFF..
74. IMMEDIATELY PRIOR TO THE CONSTRUCTION OF THE PERMANENT STORMWATER TREATMENT DEVICE, APPROPRIATE FLOW BYPASS CONDITIONS SHALL BE ESTABLISHED TO PREVENT SEDIMENT-LADEN WATER ENTERING THE DEVICE.

REVEGETATION/STABILISATION

75. TEMPORARY STABILISATION MAY BE ATTAINED USING VEGETATION, NON REWETTABLE SOIL POLYMERS, OR PNEUMATICALLY APPLIED EROSION CONTROLS.
76. ALL CUT AND FILL EARTH BATTERS LESS THAN 3M IN ELEVATION SHALL BE TOPSOILED, AND GRASS SEEDED/HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF GRADING IN CONSULTATION WITH COUNCIL.
77. ONCE CUT/FILL OPERATIONS HAVE BEEN FINALISED IN A SECTION, ALL DISTURBED AREAS THAT ARE NOT BEING WORKED ON SHALL BE STABILISED IN ACCORDANCE WITH TIME LINES IN THE BLUE BOOK.
78. THE LMCC SEED MIX SHALL BE USED UNLESS STATED ON THE ESCP/SWMP.
79. THE PH LEVEL OF TOPSOIL SHALL BE APPROPRIATE TO ENABLE ESTABLISHMENT AND GROWTH OF SPECIFIED VEGETATION PRIOR TO INITIATING THE ESTABLISHMENT OF VEGETATION.
80. NON REWETTABLE BINDER SHALL BE USED IN ALL HYDROMULCH / HYDROSEED / POLYMER MIXES ON SLOPES OR WORKS ADJACENT TO A WATER COURSE.
81. SOIL AMELIORANTS SHALL BE ADDED TO THE SOIL IN ACCORDANCE WITH AN APPROVED LANDSCAPE PLAN, VEGETATION MANAGEMENT PLAN, AND/OR SOIL ANALYSIS.
82. SURFACE SOIL DENSITY, COMPACTION AND SURFACE ROUGHNESS SHALL BE ADJUSTED PRIOR TO SEEDING/PLANTING IN ACCORDANCE WITH AN APPROVED LANDSCAPE PLAN, VEGETATION MANAGEMENT PLAN, AND/OR SOIL ANALYSIS.
83. PROCEDURES FOR INITIATING A SITE SHUTDOWN, WHETHER PROGRAMMED OR UN-PROGRAMMED, SHALL INCORPORATE REVEGETATION OF ALL SOIL DISTURBANCES UNLESS OTHERWISE APPROVED BY COUNCIL. THE STABILISATION WORKS SHALL NOT RELY UPON THE LONGEVITY OF NON-VEGETATED EROSION CONTROL BLANKETS, OR TEMPORARY SOIL BINDERS.

LMCC NOTES CONTINUED

SITE MONITORING AND MAINTENANCE

84. THE APPLICANT SHALL ENSURE THAT APPROPRIATE PROCEDURES AND SUITABLY QUALIFIED PERSONNEL ARE ENGAGED TO PLAN AND CONDUCT SITE INSPECTIONS AND WATER QUALITY MONITORING THROUGHOUT THE CONSTRUCTION AND MAINTENANCE PHASE.
85. ALL ESC MEASURES SHALL BE INSPECTED AND ANY MAINTENANCE UNDERTAKEN IMMEDIATELY:
    a) AT LEAST DAILY (WHEN WORK IS OCCURRING ON-SITE); AND
    b) AT LEAST WEEKLY (WHEN WORK IS NOT OCCURRING ON-SITE); AND
    c) WITHIN 24HRS OF EXPECTED RAINFALL; AND
    d) WITHIN 18HRS OF A RAINFALL EVENT THAT CAUSES RUNOFF ON THE SITE.
86. WRITTEN RECORDS SHALL BE KEPT ONSITE OF ESC MONITORING AND MAINTENANCE ACTIVITIES CONDUCTED DURING THE CONSTRUCTION AND MAINTENANCE PERIODS, AND BE AVAILABLE TO COUNCIL OFFICERS ON REQUEST.
87. ALL ENVIRONMENTALLY RELEVANT INCIDENTS SHALL BE RECORDED IN A FIELD LOG THAT SHALL REMAIN ACCESSIBLE TO ALL RELEVANT REGULATORY AUTHORITIES.
88. ALL WATER QUALITY DATA, INCLUDING DATES OF RAINFALL, DATES OF TESTING, TESTING RESULTS AND DATES OF WATER RELEASE, SHALL BE KEPT IN AN ON-SITE REGISTER. THE REGISTER IS TO BE MAINTAINED UP TO DATE FOR THE DURATION OF THE APPROVED WORKS AND BE AVAILABLE ON-SITE FOR INSPECTION BY [INSERT NAME OF REGULATORY AUTHORITY] ON REQUEST.
89. AT NOMINATED INSTREAM WATER MONITORING SITES, A MINIMUM OF 3 WATER SAMPLES SHALL BE TAKEN AND ANALYSED, AND THE AVERAGE RESULT USED TO DETERMINE QUALITY.

INSTREAM WORKS

90. ALL INSTREAM WORKS (INCLUDING IN OR ADJACENT TO WATERCOURSES NATURAL OR MANMADE, FLOWING OR NOT) SHALL BE CARRIED OUT IN ACCORDANCE WITH THE IECA WHITE BOOKS.

NOTE

THESE SEDIMENT AND EROSION CONTROL NOTES HAVE BEEN PROVIDED ON THESE DRAWINGS AT THE REQUEST OF LAKE MACQUARIE CITY COUNCIL (LMCC). ANY QUESTIONS REGARDING THESE NOTES AND THEIR APPLICATION DURING CONSTRUCTION SHOULD BE DIRECTED TO THE LMCC SEDIMENT AND EROSION CONTROL OFFICER

NOT FOR CONSTRUCTION

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A1

REVISION	DESCRIPTION	DATE
A	REISSSUE FOR CC	21/11/17

VERSION

FOR REVIEW

SCALE

RGH CONSULTING GROUP
Multi-discipline Engineering

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SURVEY BY	CADMAN CONSULTANTS
REFERENCE	8395
DATED	15/02/2009
DATUM	AHD

CLIENT: BLOC PTY LTD

ADDRESS: 482-488 THE ESPLANADE WARNERS BAY

PROJECT: PROPOSED MULTI USE DEVELOPMENT

DRAWING TITLE: CONCEPT SEDIMENT AND EROSION CONTROL DETAILS

ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830
signed date

		INIT.
SCALE	N.T.S.	
DRAWN	AF/JG	
DESIGNED	BW	
CHECKED	BW	
DATE	MARCH 2017	
JOB NUMBER	20160518	

SHEET DA.2.03

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LEGEND

- 3,000L PRE-PACKAGED BASEMENT PUMP OUT TANK
- GRATED SURFACE INLET PIT
- PROPOSED STORMWATER PIPE
- SWRM — STORMWATER RISING MAIN FROM BASEMENT PUMP OUT TANK
- E — GRATED SURFACE INLET (FLOOR GRATE)
- B-SWP4 — BASEMENT STORMWATER PIT LABEL. REFER TO STORMWATER PIT SCHEDULE FOR LEVELS
- CP — PUMP OUT TANK ELECTRICAL CONTROL PANEL
- DIRECTION OF OVERLAND FLOW
- EXISTING KERB INLET PIT

STORMWATER PIT SCHEDULE

PIT No.	SURFACE LEVEL	INVERT LEVEL	NOMINAL PIT SIZE
B-SWP1	SL 2.57	IL 1.67	600sq GRATED PIT
B-SWP2	SL 2.57	IL 1.96	600sq GRATED PIT
B-SWP3	SL 2.57	IL 1.96	600sq GRATED PIT
B-SWP4	SL 2.57	IL 1.47	600sq GRATED PIT
B-SWP5	SL 2.57	IL 1.96	600sq GRATED PIT

NOTE - LEVELS

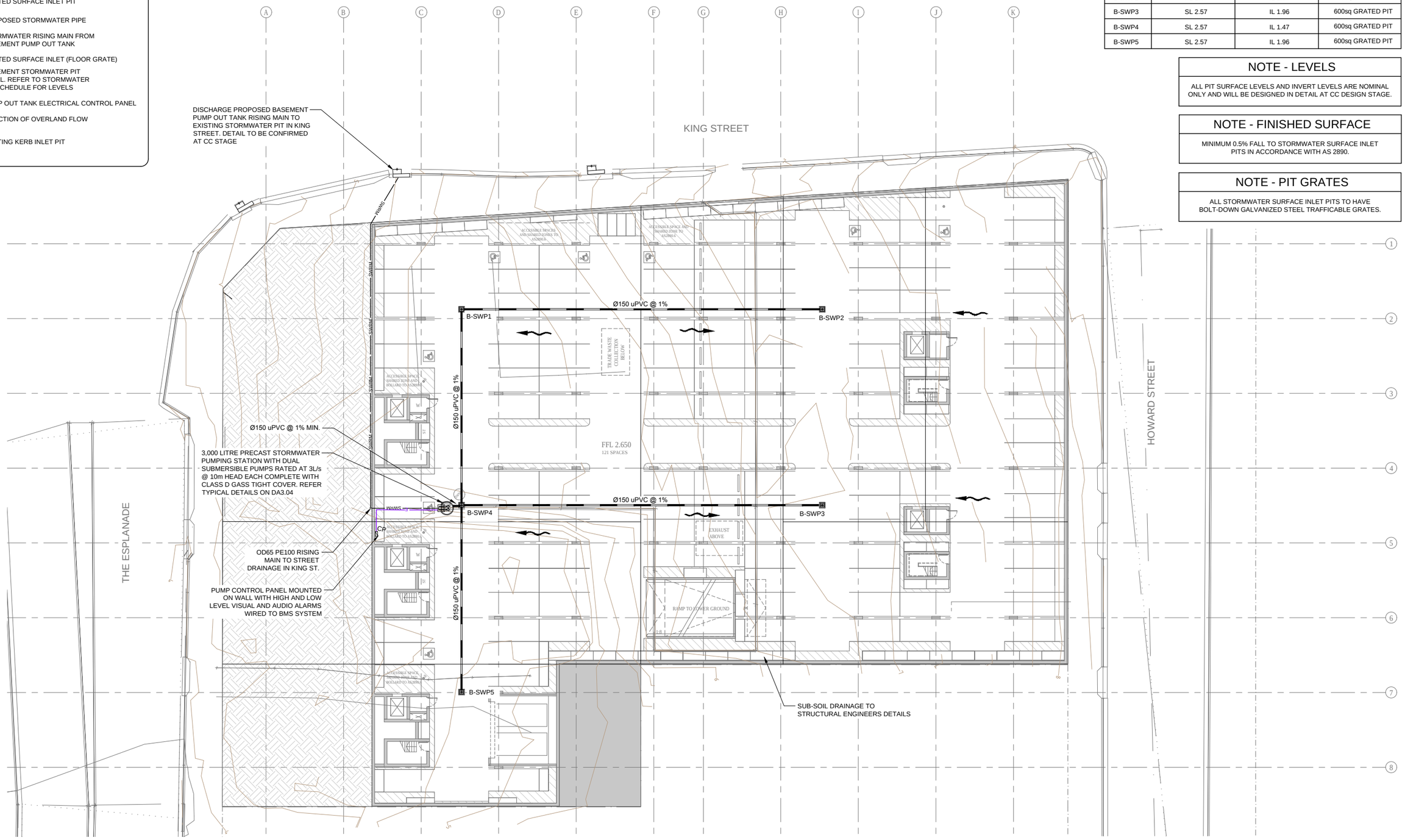
ALL PIT SURFACE LEVELS AND INVERT LEVELS ARE NOMINAL ONLY AND WILL BE DESIGNED IN DETAIL AT CC DESIGN STAGE.

NOTE - FINISHED SURFACE

MINIMUM 0.5% FALL TO STORMWATER SURFACE INLET PITS IN ACCORDANCE WITH AS 2890.

NOTE - PIT GRATES

ALL STORMWATER SURFACE INLET PITS TO HAVE BOLT-DOWN GALVANIZED STEEL TRAFFICABLE GRATES.



BASEMENT PUMPOUT PLAN

SCALE 1:200 @ A1

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A1

REVISION	DESCRIPTION	DATE
A	ISSUE FOR REVIEW	31/03/17
B	ISSUE FOR CC	11/04/17
C	REISSUE FOR CC	21/11/17

VERSION: FOR REVIEW

SCALE: 4 2 0 4 8 12 16 20 — SCALE OF METRES (1:200 AT A1 SHEET BEFORE REDUCTION)

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SURVEY BY	CADMAN CONSULTANTS
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DATUM	AHD
CLIENT	BLOC PTY LTD
ADDRESS	482-488 THE ESPLANADE WARNERS BAY
PROJECT	PROPOSED MULTI USE DEVELOPMENT

DRAWING TITLE: CONCEPT BASEMENT STORMWATER DRAINAGE PLAN

ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830
signed date

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DESIGNED	BW	
CHECKED	BW	
DATE	MARCH 2017	
JOB NUMBER	20160518	

SHEET: DA.3.01

REV: C

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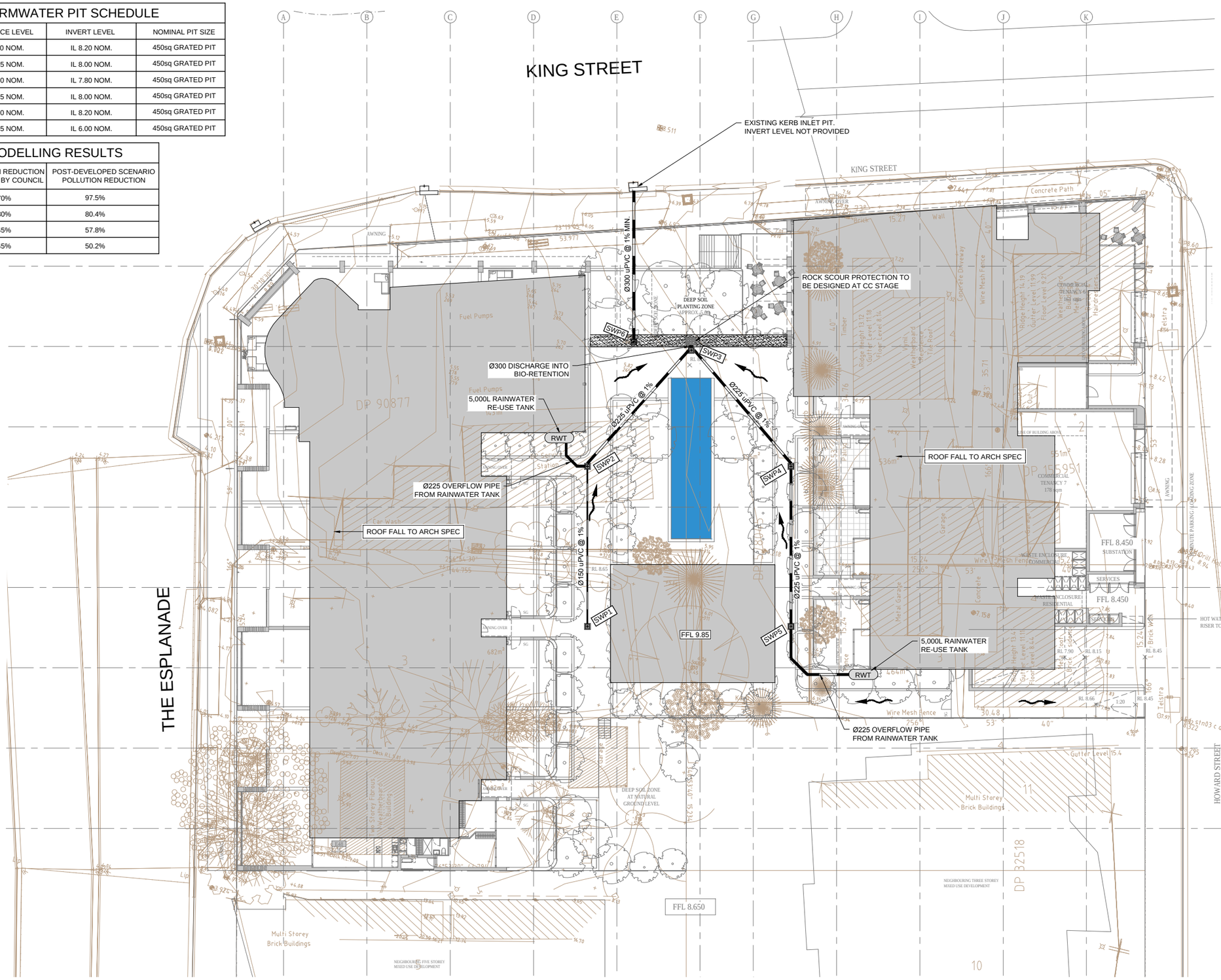
STORMWATER PIT SCHEDULE

PIT No.	SURFACE LEVEL	INVERT LEVEL	NOMINAL PIT SIZE
SWP1	SL 8.70 NOM.	IL 8.20 NOM.	450sq GRATED PIT
SWP2	SL 8.65 NOM.	IL 8.00 NOM.	450sq GRATED PIT
SWP3	SL 8.60 NOM.	IL 7.80 NOM.	450sq GRATED PIT
SWP4	SL 8.65 NOM.	IL 8.00 NOM.	450sq GRATED PIT
SWP5	SL 8.70 NOM.	IL 8.20 NOM.	450sq GRATED PIT
SWP6	SL 7.65 NOM.	IL 6.00 NOM.	450sq GRATED PIT

MUSIC MODELLING RESULTS

	POLLUTION REDUCTION REQUIRED BY COUNCIL	POST-DEVELOPED SCENARIO POLLUTION REDUCTION
GP	70%	97.5%
TSS	80%	80.4%
TP	45%	57.8%
TN	45%	50.2%



LEGEND

- GRATED SURFACE INLET PIT
- EXISTING KERB INLET PIT
- FINISHED SURFACE SPOT LEVEL (RL 8.68)
- PROPOSED STORMWATER PIPE AND DIAMETER (Ø300)
- PROPOSED RAINWATER TANK (RWT)
- DIRECTION OF OVERLAND FLOW
- PROPOSED BIO-RETENTION FILTER (MIN 25m²)
- PROPOSED ROOF AREA
- PROPOSED POOL

NOTE

EACH PROPOSED SURFACE INLET PIT IS TO CONTAIN A PROPRIETARY ECOSOL LITTER BASKET

NOTE

ALL ROOFWATER TO RAINWATER RE-USE TANKS.
DETAILS AND DETAILED DESIGN TO BE UNDERTAKEN BY HYDRAULIC DESIGNER AT CC STAGE

UPPER GROUND FLOOR PLAN

SCALE 1:200 @ A1

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A1

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SURVEY BY	CADMAN CONSULTANTS
REFERENCE	8395
DATED	15/02/2009
DATUM	AHD

CLIENT	BLOC PTY LTD
ADDRESS	482-488 THE ESPLANADE WARNERS BAY
PROJECT	PROPOSED MULTI USE DEVELOPMENT

DRAWING TITLE: CONCEPT STORMWATER MANAGEMENT PLAN

ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830
signed date

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DESIGNED	BW	
CHECKED	BW	
DATE	MARCH 2017	
JOB NUMBER	20160518	

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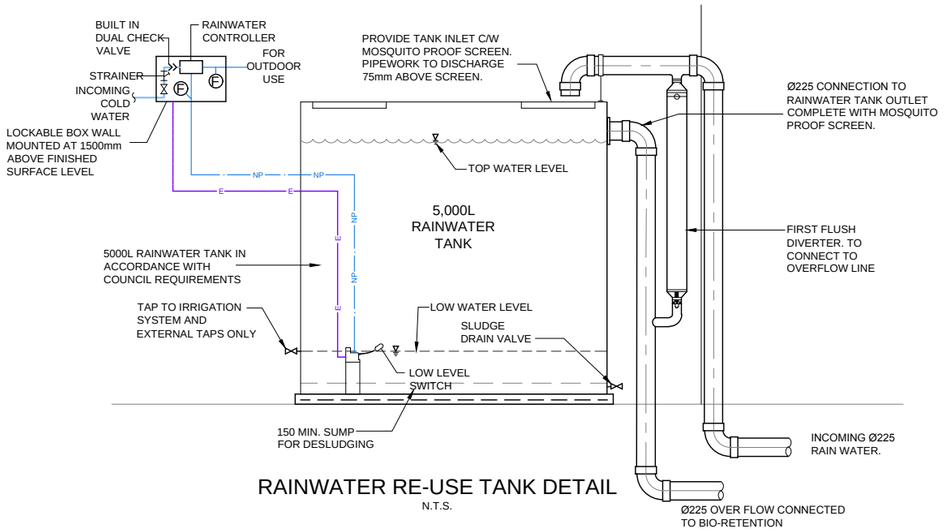

RAINWATER RE-USE TANK DETAIL

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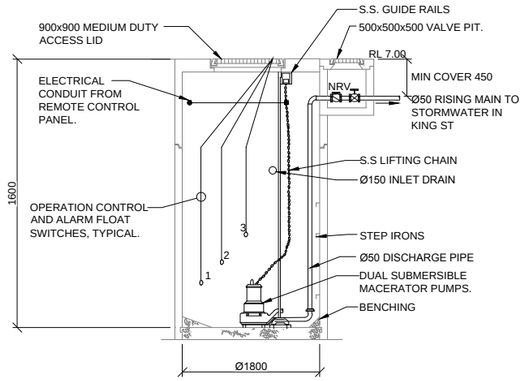


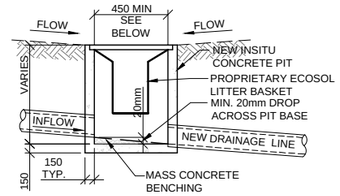
TYPICAL SUBMERSIBLE PUMP CHAMBER & VALVE PIT DETAIL.

NOT TO SCALE

PITS: EQUAL TO C.I & D. PRESCAST HOLDING TANK MODEL SPW-3 OR FIBRE GLASS PACKAGE UNIT SIMILAR TO THOSE MANUFACTURED BY HUNTER PUMPS.

PUMPS: EQUAL TO DUAL MACERATOR TYPE RATED AT 3.0l/s @ 10m HEAD.

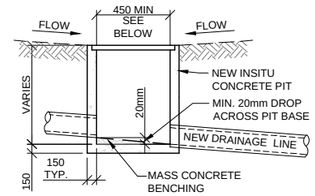
CONTROL PANEL: TO BE LOCATED ADJACENT WET WELL INSIDE BASEMENT. PROVIDE EXTERNAL ALARM LIGHT & BELL.



TYPICAL GRATED SURFACE INLET PIT WITH 'ECOSOL LITTER BASKET' DETAIL

N.T.S.

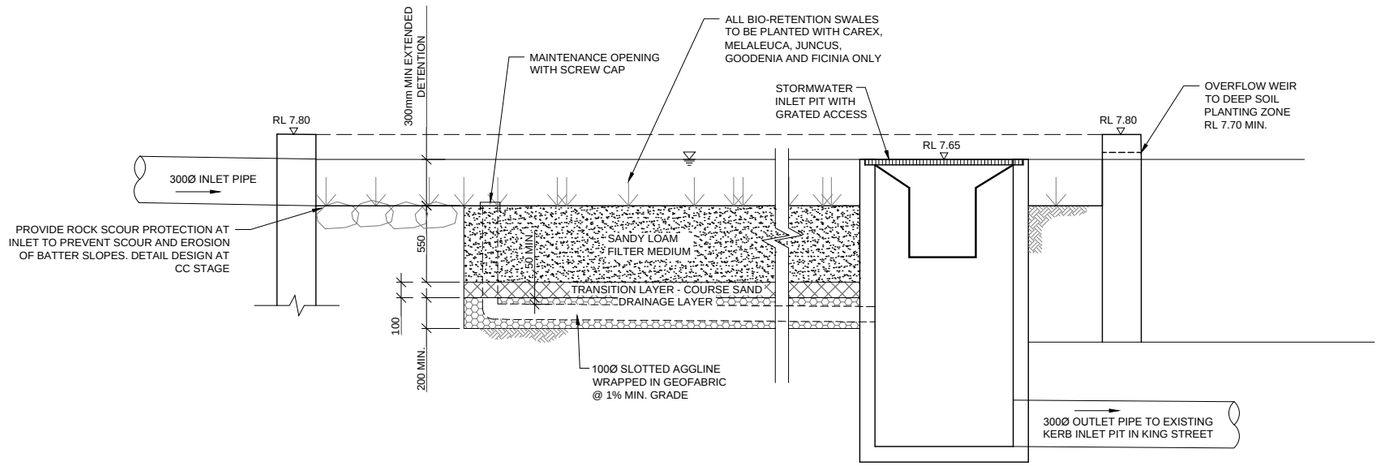
450 X 450 PLAN INTERNAL PIT DIMENSIONS FOR PITS LESS THAN 600 DEEP
600 X 600 PLAN INTERNAL PIT DIMENSIONS FOR PITS LESS THAN 900 DEEP
600 X 900 PLAN INTERNAL PIT DIMENSIONS FOR PITS 900 TO 1200 DEEP
900 X 900 PLAN INTERNAL PIT DIMENSIONS FOR PITS GREATER THAN 1200 DEEP



TYPICAL GRATED SURFACE INLET PIT DETAIL

N.T.S.

450 X 450 PLAN INTERNAL PIT DIMENSIONS FOR PITS LESS THAN 600 DEEP
600 X 600 PLAN INTERNAL PIT DIMENSIONS FOR PITS LESS THAN 900 DEEP
600 X 900 PLAN INTERNAL PIT DIMENSIONS FOR PITS 900 TO 1200 DEEP
900 X 900 PLAN INTERNAL PIT DIMENSIONS FOR PITS GREATER THAN 1200 DEEP



TYPICAL SECTION THROUGH BIO-RETENTION FILTER

SCALE N.T.S.

BIO-RETENTION FILTER MATERIAL SCHEDULE

LAYER	SOIL TYPE	PARTICLE SIZE (mm)	SATURATED HYDRAULIC CONDUCTIVITY (mm/hr)
FILTER MEDIA	SANDY LOAM	0.5	180
TRANSITION LAYER	COARSE SAND	1	3600
DRAINAGE LAYER	GRAVEL	2	36000

BIO-RETENION FILTER NOTES

1. FILTERS, SWALES AND BASINS TO BE CONSTRUCTED IN LOCATIONS AS LOCATED UPON THE DRAWINGS AND IN ACCORDANCE WITH THE DETAILS WITHIN THE DRAWING SET.
2. FILTER MEDIA AS SPECIFIED IS TO BE IN ACCORDANCE WITH THE FOLLOWING TABLE:

FILTER MEDIA TYPE	MEDIAN PARTICLE SIZE (mm)	MAX SATURATED HYDRAULIC CONDUCTIVITY (mm/hr)
GRAVEL	2	36000
COARSE SAND	1	3600
SAND	0.7	360
SANDY LOAM	0.45	180

3. CONTRACTOR IS TO PROVIDE RELEVANT TESTING CERTIFICATION FROM THE MEDIA SUPPLIER SHOWING CONFORMANCE WITH THE ABOVE TABLE WITH RESPECT TO PARTICLE SIZE.
4. SUBSOIL DRAINS ARE TO BE INSTALLED UPON A 100mm LAYER OF THE FILTER MEDIA, WITHIN 300mm OF THE FILTER PIT EXCAVATION PERIMETER, AND AT A MAXIMUM 5 METRE GRID THROUGHOUT THE FILTER AREA.
5. FILTERS OF LESS THAN OR EQUAL TO 2m WIDTH, I.E. FILTER TRENCHES MAY HAVE A SINGLE SUBSOIL DRAIN LOCATED CENTRALLY TO THE FILTER TRENCH AND IS TO EXTEND FOR THE FULL EXTENT OF THE FILTER TRENCH.
6. OUTLET LINES FROM FILTER AREAS ARE TO BE CONNECTED IMMEDIATELY TO FITTINGS TO SUIT THE OUTLET LINE DIAMETER AND PIPE MATERIAL. THE OUTLET LINE IS TO FALL AT A MINIMUM OF 1% GRADIENT TO POINT OF OUTLET AS SHOWN ON THE DRAWINGS.
7. THE CERTIFYING ENGINEER IS TO INSPECT AND VERIFY THE FILTER EXCAVATION PIT DIMENSIONS AND CONFIRM ADEQUACY PRIOR TO PLACEMENT OF FILTER MEDIA.
8. PLANTINGS UPON FILTER AREAS ARE TO BE AS SPECIFIED ON THE DRAWINGS AND SHOULD BE OF A GRASS OR SHRUB OF TYPE CAREX, JUNCUS, GOODENIA OR FICINIA UNLESS NOTED OTHERWISE, AND AT A DENSITY AS SPECIFIED ON THE DRAWINGS OR IF NOT NOTED AS SPECIFIED BY A QUALIFIED LANDSCAPE/ HORTICULTURE CONSULTANT.

NOT FOR CONSTRUCTION

DO NOT SCALE DRAWINGS. VERIFY ALL DIMENSIONS ON SITE.

A1

REVISION	DESCRIPTION	DATE
A	ISSUE FOR REVIEW	31/03/17
B	ISSUE FOR CC	11/04/17
C	REISSUE FOR CC	21/11/17

VERSION: FOR REVIEW

SCALE

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Multi-discipline Engineering
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SURVEY BY	CADMAN CONSULTANTS
REFERENCE	8395
DATED	15/02/2009
DATUM	AHD

CLIENT	BLOC PTY LTD
ADDRESS	482-488 THE ESPLANADE WARNERS BAY
PROJECT	PROPOSED MULTI USE DEVELOPMENT

DRAWING TITLE: CONCEPT STORMWATER MANAGEMENT DETAILS

ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830
signed date

		INIT.
SCALE	N.T.S.	
DRAWN	AFJG	
DESIGNED	BW	
CHECKED	BW	
DATE	MARCH 2017	
JOB NUMBER	20160518	

SHEET: DA.3.03
REV: C

11/21/17 H:\synergy\Projects\2016\20160518 482-488 The Esplanade, Warners Bay\DESIGN\DRAWINGS\CURRENT DRG\DA CVI\20160518_DA-3.03_A.dwg

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STORMWATER MANAGEMENT PLAN REPORT

Associated with the Proposed Multi-Storey Mixed-Use Development

At Lots 1 DP 90877, 122 DP 578045, 1-3 DP155951 and 3-4 DP 32518 482-488 The Esplanade Warners Bay

For Bloc Pty Ltd
Ref. 20160518_R01 Rev B
November 2017

Lake Macquarie City Council
Local Government Area

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6. CONCLUSIONS AND RECOMMENDATIONS 10
7. REFERENCES 11
APPENDIX A - DETAILED SITE SURVEY
APPENDIX B - MUSIC MODELLING RESULTS
APPENDIX C - SEDIMENT AND EROSION CONTROL CALCULATIONS

Revision Title		Prepared	Reviewed	Date
A	Issued for DA	N.L.	B.W.	11/04/17
B	Re-Issued for DA – Revised Layout	N.L.	T.G.	21/11/17

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EXECUTIVE SUMMARY

RGH Consulting Group Pty Ltd (RGH) has been engaged by Bloc Pty Ltd (the Client) to undertake conceptual stormwater and civil engineering design for Development Application (DA) and a Stormwater Management Plan (SMP) Report associated with the proposed multi-storey mixed-use development at Lots 1 DP 90877, 122 DP 578045, 1-3 DP155951 and 3-4 DP 32518, 482-488 The Esplanade, Warners Bay (the Subject Site). The site lies within the Lake Macquarie City Council (Council) Local Government Area (LGA). RGH has prepared DA Engineering Drawings (RGH Drawing Set) which should be referenced during review of this SMP Report.

Council's stormwater management guidelines require that the proposed development manage stormwater qualitatively prior to discharge into receiving waters or drainage infrastructure. Council has advised RGH that quantitative stormwater management is not required for this particular development due to its proximity to Lake Macquarie. The stormwater management requirements satisfied by this SMP were sourced from Council's Development Control Plan (DCP) or Engineering Design Guidelines, Council's Water Cycle Management (WCM) Guidelines, Council's Stormwater Quality Improvement Devices Guidelines and Council's Handbook on Drainage Design.

After construction, the development is expected to generate an increase in the amount of pollutants being transported by stormwater that will leave the development. Council specifies within its WCM Guidelines that pollutant reduction targets must be satisfied prior to approval of the development.

The qualitative models prepared involved the inclusion of rainwater tanks and a bio-retention filter area to treat the stormwater runoff prior to discharge from the site. The rainwater tanks proposed by RGH and shown within the RGH Drawing Set provide some pollutant reduction due to their storage, retention and re-use properties. The modelling conducted using the MUSIC stormwater quality modelling programme tested the performance of the 'treatment train' with respect to achieving the targets provided by Council.

During construction, implementation of water quality control as defined in the NSW Department of Housing Publication "*Soils and Construction*" (The Blue Book) is to be adopted to maximise the capture of sediments and minimise erosion of disturbed soils during the construction phase. Calculation involves the methods as outlined within the Blue Book and this SMP Report will require the final detailed design drawings to adopt the Blue Books standard management measures in this regard.

Stormwater quality was managed in accordance with Council's WCM Guidelines, with the requirements for medium-high density residential developments addressed and modelled within the MUSIC stormwater quality programme to determine the reduction percentages provided through treatment of stormwater runoff.

A 5 kilolitre (kL) rainwater tank is proposed for each roof area and was modelled within the MUSIC programme. Two bio-retention areas are incorporated into the landscaped area of the development to effectively and efficiently manage the removal of nitrates and phosphates for complete stormwater treatment. **Error! Reference source not found.** below

shows a screen shot of the results of the stormwater quality modelling. The summary output report from MUSIC can be found at Appendix B.

The stormwater drainage system will need to be maintained at regular intervals depending on the type of catchment usage. It is recommended that monitoring and recording of the performance of a stormwater system be undertaken regularly over a period of one year until such time as typical maintenance periods can be established. Initially, it is recommended that inspections of all new stormwater systems at quarterly intervals and after large rainfall events be conducted until a suitable baseline can be estimated. Suitable intervals for maintenance work to be undertaken can then be programmed.

Therefore, it is the recommendation of RGH Consulting Group Pty Ltd that the Stormwater Management Plan and strategy contained within this report be approved and adopted by Council for the proposed development.

1. INTRODUCTION

RGH Consulting Group Pty Ltd (RGH) has been engaged by Bloc Pty Ltd (the Client) to undertake conceptual Development Application (DA) stormwater and civil engineering design for the proposed Multi-Storey Residential Building development at Lots 1 DP 90877, 122 DP 578045, 1-3 DP155951 and 3-4 DP 32518, known as 482-488 The Esplanade, Warners Bay (the Subject Site). A qualified engineer from RGH attended the site to gain an understanding of the constraints which may affect the final layout or design of the development. RGH has prepared DA engineering design drawings (RGH Drawing Set) which should be reviewed in conjunction with this Stormwater Management Plan (SMP) Report.

The Subject Site is located within the Lake Macquarie City Council (Council) Local Government Area (LGA) and in order to gain approval for the development, Council's stormwater management targets for new development must be satisfied or addressed. Specifically in regards to stormwater management, Council requires that the proposed development manage stormwater qualitatively prior to discharge into receiving waters or drainage infrastructure.

Council has advised RGH that quantitative stormwater management, in the form of On-Site Detention, is not required for this particular development due to its proximity to Lake Macquarie. The stormwater management requirements satisfied by this SMP were sourced from Council's Development Control Plan (DCP) or Engineering Design Guidelines, Council's Water Cycle Management (WCM) Guidelines, Council's Stormwater Quality Improvement Devices Guidelines and Council's Handbook on Drainage Design.

After construction, the development is expected to generate an increase in the amount of pollutants being transported by stormwater that will leave the development. Council specifies within its WCM Guidelines that pollutant reduction targets must be satisfied prior to approval of the development. The qualitative models prepared involved the inclusion of rainwater tanks and bio-retention filter areas to treat the stormwater runoff prior to discharge from the site. The rainwater tanks proposed by RGH, and shown within the RGH Drawing Set, provide some pollutant reduction due to their storage, retention and re-use properties. The modelling conducted using the MUSIC stormwater quality modelling programme tested the performance of the 'treatment train' with respect to achieving the targets provided by Council.

During construction, implementation of water quality control as defined in the NSW Department of Housing Publication "*Soils and Construction*" (The Blue Book) is to be adopted to maximise the capture of sediments and minimise erosion of disturbed soils during the construction phase. Calculation involves the methods as outlined within the Blue Book and this SMP Report will require the final detailed design drawings to adopt the Blue Books standard management measures in this regard.

This report summarises the modelling techniques employed and the results of the modelling.

2. SITE AND CATCHMENT DESCRIPTION

The Subject Site is located along the southern alignment of the King Street carriageway, the western alignment of the Howard Street carriageway and the northern alignment of The Esplanade carriageway. It is approximately 80m east of Lake Macquarie as can be seen in Figure 1 below. The site catchment has a westerly aspect and the typical slope gradients are between 3-5%. The total site area is approximately 5.1 hectares (ha) and currently contains a petrol station, residential and commercial structures.

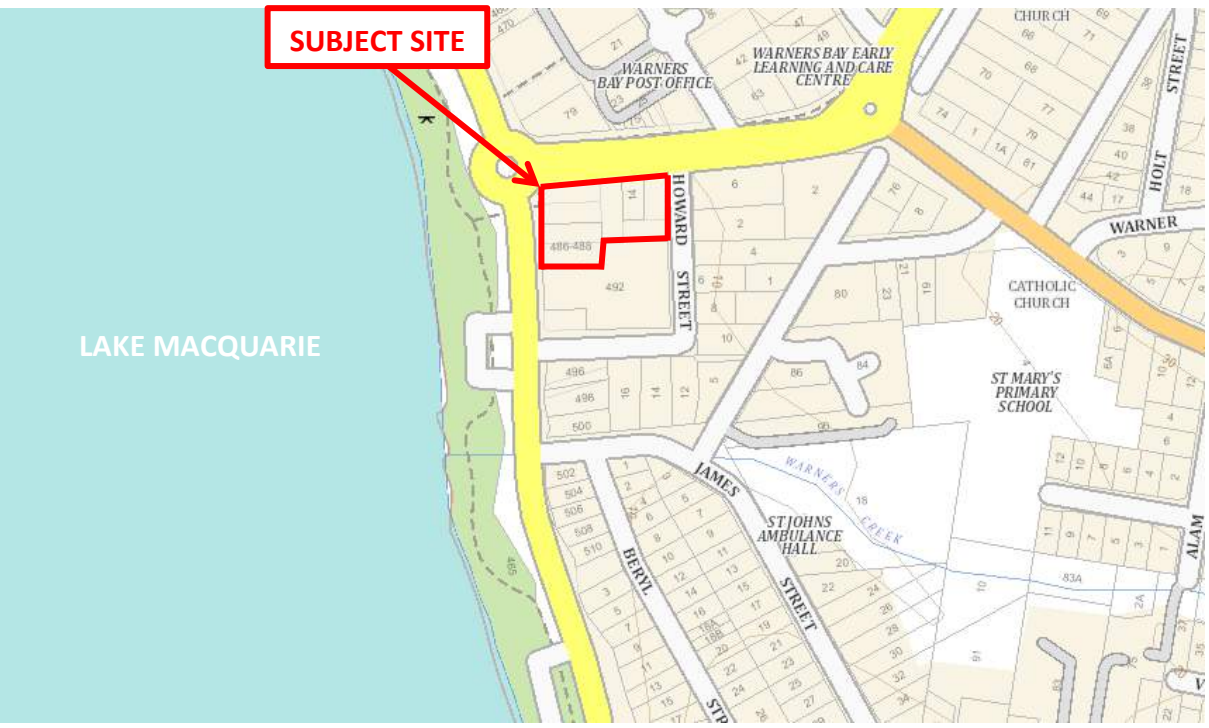

Figure 1 - Locality Map of the Subject Site

3. STORMWATER MANAGEMENT PLAN

The RGH Drawing Set shows the entirety of the proposed development, the proposed stormwater infrastructure and indicates the locations of the proposed bio-retention basin and outlet configuration.

3.1. Catchment Hydrology and Hydraulic Design

Council currently requires that site stormwater system be modelled using the Rational Method, in accordance with the Engineers Australia Publication "*Australian Rainfall and Runoff*" (ARR). Generally proposed development sub-catchment areas were idealised and catchment flow path lengths were adopted from the proposed site layout. Piped systems were sized to cater for the design storm being the 1 in 20 year critical Average Recurrence Interval (ARI) storm as per AS3500.1 'Plumbing and Drainage', and it is assumed that 1 in 100 year flows will be directed to the road reserve as part of more detailed construction issue revisions. The upstream catchment is managed by Council's drainage system within the King Street and Howards Street road carriageways.

3.2. Stormwater Quality Management

Stormwater quality will be managed in accordance with Council's WCM Guidelines, with the requirements for mixed-use developments addressed and modelled within the MUSIC stormwater quality programme to determine the reduction percentages provided through treatment of stormwater runoff.

A 5 kilolitre (kL) rainwater tank is proposed for each roof area and was modelled within the MUSIC programme. Two bio-retention areas are incorporated into the landscaped area of the development to effectively and efficiently manage the removal of nitrates and phosphates for complete stormwater treatment. Stormwater from the driveway, basement carpark and roof areas are captured and filtered through the bio-retention filter mediums as shown on the RGH Drawing Set. **Error! Reference source not found.** below shows a screen shot of the results of the stormwater quality modelling. The summary output report from MUSIC can be found at Appendix B.

The MUSIC programme combines litter and coarse sediment and outputs these pollutants as Gross Pollutants (GP). The rainwater re-use tanks provided are installed with first-flush diverters, which capture the initial stormwater flow from the roof areas, expected to contain the majority of pollutant runoff. Additionally, proprietary Ecosol Litter Baskets are proposed to be installed on each stormwater pit within the bio-retention areas and the small landscaped area on the southern boundary to further treat stormwater and manage GPs and Suspended Solids (SS).

It was determined that a total of 25m^2 of bio-retention filter area will be required to achieve the nutrient removal, particularly nitrates and phosphates, which are removed through the provision of nutrient removal vegetation as specified within the RGH Drawing Set. By constructing the bio-retention areas, as can be seen from the results presented within **Error! Reference source not found.** below, the pollutant removal targets can be achieved to satisfy Council's pollutant reduction targets.

The bio-retention basins designed consist of a 550mm deep filters with underdrain pipes consisting of 100mm diameter corrugated and perforated uPVC subsoil drain and geo-fabric

sock (ag-line), laid 100mm below the filter base, and discharging to an outlet at a minimum 1% grade due to the constraints of the Subject Site. Suitable high nutrient demand plant types have been specified on the RGH Drawing Set to satisfactorily remove nutrients and pollutants to an acceptable level. The sandy loam filter medium specified on the RGH Drawing Set has typical data supplied by the MUSIC programme and will need to achieve a saturated hydraulic conductivity of 180mm per hour (mm/hr).

	Sources	Residual Load	% Reduction
Flow (ML/yr)	3.61	3.31	8.4
Total Suspended Solids (kg/yr)	316	62	80.4
Total Phosphorus (kg/yr)	0.748	0.316	57.8
Total Nitrogen (kg/yr)	7.83	3.9	50.2
Gross Pollutants (kg/yr)	101	2.54	97.5

Figure 2 - MUSIC Model Schematic and Polltant Reduction Results

A portion of the landscaped area within the development area is unable to be captured and conveyed to the bio-retention basin for treatment and therefore, RGH has modelled the specific area as 'Uncaptured Landscaping', discharging it to the street and providing a treatment train which makes up for the shortfall of stormwater treatment for the uncaptured flows. The small amount of stormwater that will enter the basement car park will be pumped to the street drainage system via a basement pump out system.

4. SEDIMENT AND EROSION CONTROL

Sediment and erosion control design was undertaken in accordance with the NSW Department of Housing Publication "Soils and Construction", more commonly referred to as the "Blue Book". Typically, staged release of land will disturb much less area than the total basin catchment, and sediment and erosion control design and plans will need to be undertaken for each individual stage construction drawing set.

The Blue Book's RUSLE method was adopted to undertake detailed calculations for the sediment and erosion control design. Group C/D Warners Bay formation was adopted based upon the site characteristics and locality and RUSLE K factors of 0.037, 0.059 and 0.027 were implemented in calculation. Other factors calculated or adopted were the soil erosivity factor (R) of 3714, Erosion Control Practice (P) of 1.3 and a Ground Cover (C) factor of 1.0. The 5 day rainfall depth was adopted and the 75th percentile adopted as the site is not expected to be disturbed longer than 6 months. The 75th percentile 5 day rainfall depth adopted was 24.4mm as per the Blue Book for a site located within the Lake Macquarie region.

Under the Blue Book guidelines, if an area of up to 2,500m^2 of disturbance is proposed, sediment basin calculations are not required to be undertaken. Furthermore, if an area of greater than 2,500m^2 of disturbance can be shown to expect an annual soil loss of less than 150m^3, under the RUSLE method, a sediment basin is also deemed unnecessary. The RUSLE calculations performed for the Subject Site resulted in a worst case soil loss of 156m^3 per hectare per year (m^3/ha/yr). This is to be multiplied by the maximum area of disturbance, which for the Subject Site catchment is approximately 5.10ha.

Therefore, a minimum pond volume of 135m^3 is required in accordance with the Blue Book's RUSLE method of sediment retention volume calculation. The proposed multi-storey mixed-use development includes a basement which will be excavated first. RGH expects no sediment basin to be required, as sediment and erosion runoff will pond within the excavated basement area during storm events and can be treated and pumped out when required.

Therefore, provided the appropriate sediment and erosion control methods as detailed within the RGH Drawing Set are implemented on-site during construction, it is considered that the above sediment and erosion control strategy will adequately capture siltation and control sedimentation carried by stormwater to acceptable standards during the construction period.

5. STORMWATER SYSTEM MAINTENANCE

The stormwater drainage system will need to be maintained at regular intervals depending on the type of catchment usage. It is recommended that monitoring and recording of the performance of a stormwater system be undertaken regularly over a period of one year until such time as typical maintenance periods can be established. Initially, it is recommended that inspections of all new stormwater systems at quarterly intervals and after large rainfall events be conducted until a suitable baseline can be estimated. Suitable intervals for maintenance work to be undertaken can then be programmed.

Performance of the bio-retention basins will also need to be considered. The MUSIC programme user guide suggests that bio-retention filters should adequately serve a development for 25 years. Replacement of sub-soil drainage lines and sand filter media should be undertaken if the basin stores water longer than 1 week after rainfall. It should be noted that during wet periods, the basin may hold water for extended periods until the filter empties the basin. Outlet lines from the bio-retention filter can be flushed if necessary to clear any obstructions. Filter mediums will need to be replaced by plant machinery or by manual labour, and plantings also replaced. Table 1 below provides a schedule of maintenance procedures for the stormwater system.

Table 1 - Operation and Maintenance Intervals and Procedures

Item	Inspection Interval	Maintenance Interval	Task/Procedure
Pits and Pipes Network	Quarterly	As required / Yearly	Remove and Dispose of Debris from Item
Litter Baskets	Quarterly	As required / Yearly	Remove and Dispose of Debris from Item
Bio-retention Filter and Outlet	Yearly	25 Years As Required	Replace Filter Medium Remove and Dispose of Debris from Item
Rainwater Re-Use Tank	Yearly	5 Years Maximum	5 Years Maximum

6. CONCLUSIONS AND RECOMMENDATIONS

RGH Consulting Group Pty Ltd has been engaged by Bloc Pty Ltd to undertake conceptual stormwater and civil engineering design for Development Application and a Stormwater Management Plan Report associated with the proposed Multi-Storey Residential Building development at Lots 1 DP 90877, 122 DP 578045, 1-3 DP155951 and 3-4 DP 32518, 482-488 The Esplanade, Warners Bay.

This SMP Report has shown that Council's requirements for short-term construction stormwater quality and long-term stormwater quality targets have been met provided the detailed designers adopt the strategies suggested.

Overall, it is proposed to collect all stormwater from roof areas into rainwater re-use tanks, running through proprietary Ecosol Litter Baskets (or approved equivalent) and a bio-retention area to manage stormwater effectively and efficiently. An overview of sediment and erosion control has also been provided, with recommendations for basin sizes or staged land release within.

Further detailed design adopting the items designed and described within this SMP Report will need to be produced in order to provide adequate tender and construction documentation for constructors.

Therefore, it is the recommendation of RGH Consulting Group Pty Ltd that the Stormwater Management Plan and strategy contained within this Report be approved and adopted by Council for the proposed development.

7. REFERENCES

Australian Rainfall and Runoff, ***"A Guide to Flood Estimation"***, Volume 1, 2001.

Lake Macquarie Council, ***"Development Control Plan – Engineering Design Guidelines"***, July 2016.

Lake Macquarie Council, ***"Handbook on Drainage Design Guidelines"***, December 2013.

Lake Macquarie Council, ***"Stormwater Quality Improvement Devices Guidelines"***, December 2013.

Lake Macquarie Council, ***"Water Cycles Management Guidelines"***, Revision 2, June, 2013.

NSW Government ***"Floodplain Development Manual"***, April 2005.

Streeter, V.L., and Wylie, E.B., ***"Fluid Mechanics"***, McGraw Hill, 1983.

APPENDIX A

Detailed Site Survey

King Street

Note:

This survey is for design purposes only, the BOUNDARIES have been finalised. Critical relationships to boundaries require more extensive boundary investigation.

Only visible SERVICES have been located, confirmation by relevant authorities should be undertaken prior to

DATES OF SURVEY
27/9/2002 survey of lots 1,2 & 3 DP155951
15/7/2002 survey of lots 1 DP 90877 & lot 100 DP578045
15/2/2000 survey of lots 36.4 DP32518

DRAWING FILE: DWG 7622
REDUCTION RATIO(S): 1:200
ORIGIN OF LEVELS: PM 4044
R.L. 10.351

DATUM AND CONTOUR INTERVAL

CHECKED BY C.C.

Surveyor Registered under The Surveyors

PREPARED BY:
C.J. Cadman Pty. Ltd. A.C.N. 000 687 827 Trading as
CADMAN CONSULTANTS
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Suite.10 No.1 THE BOULEVARDE
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TORONTO 2283

Detail & Contour Surveys
Cnr Howard & King Streets
& The Esplanade
Warners Bay

SHEET No. 1
OF 1 SHEET

INSTRUCTION No.
8395

APPENDIX B

MUSIC Modelling Results

LAKE MACQUARIE CITY COUNCIL

MUSIC-*link* Report

Project Details		Company Details	
Project:	20160518 - 482-488 The Esplanade, Warners Bay	**Company:**	RGH Consulting Group Pty Ltd
Report Export Date:	16/11/2017	**Contact:**	Nick Lane
Catchment Name:	20160518_MUSIC_20171116	**Address:**	Unit 1, 3 Teamster Close, Tuggerah
Catchment Area:	0.507ha	**Phone:**	(02) 4351 9022
Impervious Area*:	84.84%	**Email:**	n.lane@rghconsulting.com.au
Rainfall Station:			
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1999 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	902mm		
Evapotranspiration:	1408mm		
MUSIC Version:	6.2.1		
MUSIC-link data Version:	6.22		
Study Area:	North Region		
Scenario:	North Region		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Receiving Node	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	8.36%	Rain Water Tank Node	2	Urban Source Node	6
TSS	80.4%	Bio Retention Node	2		
TP	57.8%	GPT Node	1		
TN	50.2%				
GP	97.5%				

Comments

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Bioretention	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	Bioretention	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	Bioretention	PET Scaling Factor	2.1	2.1	2.1
Bio	Bioretention	PET Scaling Factor	2.1	2.1	2.1
GPT	Ecosol Litter Basket - 200	Hi-flow bypass rate (cum/sec)	None	None	0.05
Rain	Rainwater Tank	% Reuse Demand Met	80	None	80.91
Rain	Rainwater Tank	% Reuse Demand Met	80	None	80.36
Receiving	Receiving Node	% Load Reduction	None	None	8.36
Receiving	Receiving Node	GP % Load Reduction	70	None	97.5
Receiving	Receiving Node	TN % Load Reduction	45	None	50.2
Receiving	Receiving Node	TP % Load Reduction	45	None	57.8
Receiving	Receiving Node	TSS % Load Reduction	80	None	80.4
Urban	East Roof	Area Impervious (ha)	None	None	0.119
Urban	East Roof	Area Pervious (ha)	None	None	0
Urban	East Roof	Total Area (ha)	None	None	0.119
Urban	Gym Roof	Area Impervious (ha)	None	None	0.008
Urban	Gym Roof	Area Pervious (ha)	None	None	0
Urban	Gym Roof	Total Area (ha)	None	None	0.008
Urban	Landscaping	Area Impervious (ha)	None	None	0.129
Urban	Landscaping	Area Pervious (ha)	None	None	0.066
Urban	Landscaping	Total Area (ha)	None	None	0.196
Urban	Pool	Area Impervious (ha)	None	None	0.032
Urban	Pool	Area Pervious (ha)	None	None	0
Urban	Pool	Total Area (ha)	None	None	0.032
Urban	Uncaptured Landscaping	Area Impervious (ha)	None	None	0.008
Urban	Uncaptured Landscaping	Area Pervious (ha)	None	None	0.009
Urban	Uncaptured Landscaping	Total Area (ha)	None	None	0.018
Urban	West Roof	Area Impervious (ha)	None	None	0.134
Urban	West Roof	Area Pervious (ha)	None	None	0
Urban	West Roof	Total Area (ha)	None	None	0.134

Only certain parameters are reported when they pass validation

MUSIC SUMMARY REPORT

Source nodes

Location	East Roof	West Roof	Gym Roof	Pool	Landscaping	Uncaptured Landscaping
ID	1	2	3	4	5	11
Node Type	UrbanSourceNode	UrbanSourceNode	UrbanSourceNode	UrbanSourceNode	UrbanSourceNode	UrbanSourceNode
Zoning Surface Type	Roof	Roof	Roof	Mixed	Mixed	Mixed
Total Area (ha)	0.119	0.134	0.008	0.032	0.196	0.018
Area Impervious (ha)	0.119	0.134	0.008	0.032	0.129023582	0.008118134
Area Pervious (ha)	0	0	0	0	0.066976418	0.009881866
Field Capacity (mm)	70	70	70	70	70	70
Pervious Area Infiltration Capacity coefficient - a	210	210	210	210	210	210
Pervious Area Infiltration Capacity exponent - b	4.7	4.7	4.7	4.7	4.7	4.7
Impervious Area Rainfall Threshold (mm/day)	1	1	1	1	1	1
Pervious Area Soil Storage Capacity (mm)	170	170	170	170	170	170
Pervious Area Soil Initial Storage (% of Capacity)	30	30	30	30	30	30
Groundwater Initial Depth (mm)	10	10	10	10	10	10
Groundwater Daily Recharge Rate (%)	50	50	50	50	50	50
Groundwater Daily Baseflow Rate (%)	5	5	5	5	5	5
Groundwater Daily Deep Seepage Rate (%)	0	0	0	0	0	0
Stormflow Total Suspended Solids Mean (log mg/L)	1.3	1.3	1.3	2.15	2.15	2.15
Stormflow Total Suspended Solids Standard Deviation (log mg/L)	0.32	0.32	0.32	0.32	0.32	0.32
Stormflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0
Stormflow Total Phosphorus Mean (log mg/L)	-0.89	-0.89	-0.89	-0.6	-0.6	-0.6
Stormflow Total Phosphorus Standard Deviation (log mg/L)	0.25	0.25	0.25	0.25	0.25	0.25
Stormflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Phosphorus Serial Correlation	0	0	0	0	0	0
Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3	0.3	0.3	0.3
Stormflow Total Nitrogen Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19
Stormflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Nitrogen Serial Correlation	0	0	0	0	0	0
Baseflow Total Suspended Solids Mean (log mg/L)	1.1	1.1	1.1	1.2	1.2	1.2
Baseflow Total Suspended Solids Standard Deviation (log mg/L)	0.17	0.17	0.17	0.17	0.17	0.17
Baseflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0
Baseflow Total Phosphorus Mean (log mg/L)	-0.82	-0.82	-0.82	-0.85	-0.85	-0.85
Baseflow Total Phosphorus Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19
Baseflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Phosphorus Serial Correlation	0	0	0	0	0	0
Baseflow Total Nitrogen Mean (log mg/L)	0.32	0.32	0.32	0.11	0.11	0.11
Baseflow Total Nitrogen Standard Deviation (log mg/L)	0.12	0.12	0.12	0.12	0.12	0.12
Baseflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Nitrogen Serial Correlation	0	0	0	0	0	0
Flow based constituent generation - enabled	Off	Off	Off	Off	Off	Off
Flow based constituent generation - flow file						
Flow based constituent generation - base flow column						
Flow based constituent generation - pervious flow column						
Flow based constituent generation - impervious flow column						
Flow based constituent generation - unit						
OUT - Mean Annual Flow (ML/yr)	0.954	1.07	6.41E-02	0.257	1.18	8.59E-02
OUT - TSS Mean Annual Load (kg/yr)	24.9	28.3	1.7	47.6	200	13.6
OUT - TP Mean Annual Load (kg/yr)	0.143	0.162	9.67E-03	7.51E-02	0.336	2.31E-02
OUT - TN Mean Annual Load (kg/yr)	2.1	2.33	0.142	0.563	2.52	0.179
OUT - Gross Pollutant Mean Annual Load (kg/yr)	26.1	29.3	1.75	7.01	34.7	2.54
Rain In (ML/yr)	1.0732	1.20848	0.0721479	0.288592	1.76763	0.162333
ET Loss (ML/yr)	0.119083	0.134094	0.0080056	0.0320223	0.588545	0.0763082
Deep Seepage Loss (ML/yr)	0	0	0	0	0	0
Baseflow Out (ML/yr)	0	0	0	0	0.0845244	0.0125569
Imp. Stormflow Out (ML/yr)	0.954119	1.07438	0.0641424	0.25657	1.03718	0.0649442
Perv. Stormflow Out (ML/yr)	0	0	0	0	0.0567522	0.0084311
Total Stormflow Out (ML/yr)	0.954119	1.07438	0.0641424	0.25657	1.09393	0.0733753
Total Outflow (ML/yr)	0.954119	1.07438	0.0641424	0.25657	1.17846	0.0859322
Change in Soil Storage (ML/yr)	0	0	0	0	0.0006234	9.26E-05

TSS Baseflow Out (kg/yr)	0	0	0	0	1.44709	0.214743
TSS Total Stormflow Out (kg/yr)	24.9356	28.3411	1.69967	47.6028	198.868	13.3912
TSS Total Outflow (kg/yr)	24.9356	28.3411	1.69967	47.6028	200.315	13.6059
TP Baseflow Out (kg/yr)	0	0	0	0	0.0131354	0.0019508
TP Total Stormflow Out (kg/yr)	0.142687	0.162201	0.0096679	0.0751071	0.322394	0.0211791
TP Total Outflow (kg/yr)	0.142687	0.162201	0.0096679	0.0751071	0.335529	0.0231299
TN Baseflow Out (kg/yr)	0	0	0	0	0.11296	0.016805
TN Total Stormflow Out (kg/yr)	2.09675	2.3301	0.141627	0.563108	2.40369	0.162665
TN Total Outflow (kg/yr)	2.09675	2.3301	0.141627	0.563108	2.51665	0.17947
GP Total Outflow (kg/yr)	26.0627	29.3479	1.75211	7.00846	34.77	2.55433

No Imported Data Source nodes

USTM treatment nodes

Location	Rainwater Tank	Rainwater Tank	Bioretention
ID	6	7	8
Node Type	RainWaterTankNode	RainWaterTankNode	BioRetentionNodeV4
Lo-flow bypass rate (cum/sec)	0	0	0
Hi-flow bypass rate (cum/sec)	100	100	100
Inlet pond volume	0	0	
Area (sqm)	2.5	2.5	34
Initial Volume (m^3)	5	5	
Extended detention depth (m)	0.2	0.2	0.3
Number of Rainwater tanks	1	1	
Permanent Pool Volume (cubic metres)	5	5	
Proportion vegetated	0	0	
Equivalent Pipe Diameter (mm)	100	100	
Overflow weir width (m)	10	10	2
Notional Detention Time (hrs)	1.33E-02	1.33E-02	
Orifice Discharge Coefficient	0.6	0.6	
Weir Coefficient	1.7	1.7	1.7
Number of CSTR Cells	2	2	3
Total Suspended Solids - k (m/yr)	400	400	8000
Total Suspended Solids - C* (mg/L)	12	12	20
Total Suspended Solids - C** (mg/L)	0	0	
Total Phosphorus - k (m/yr)	300	300	6000
Total Phosphorus - C* (mg/L)	0.13	0.13	0.13
Total Phosphorus - C** (mg/L)	0	0	
Total Nitrogen - k (m/yr)	40	40	500
Total Nitrogen - C* (mg/L)	1.4	1.4	1.4
Total Nitrogen - C** (mg/L)	0	0	
Threshold Hydraulic Loading for C** (m/yr)	0	0	
Horizontal Flow Coefficient			3
Reuse Enabled	On	On	Off
Max drawdown height (m)	2	2	
Annual Demand Enabled	Off	Off	Off
Annual Demand Value (ML/year)			
Annual Demand Distribution			
Annual Demand Monthly Distribution: Jan			
Annual Demand Monthly Distribution: Feb			
Annual Demand Monthly Distribution: Mar			
Annual Demand Monthly Distribution: Apr			
Annual Demand Monthly Distribution: May			
Annual Demand Monthly Distribution: Jun			
Annual Demand Monthly Distribution: Jul			
Annual Demand Monthly Distribution: Aug			
Annual Demand Monthly Distribution: Sep			
Annual Demand Monthly Distribution: Oct			
Annual Demand Monthly Distribution: Nov			
Annual Demand Monthly Distribution: Dec			
Daily Demand Enabled	On	On	Off
Daily Demand Value (ML/day)	0.0004	0.0004	
Custom Demand Enabled	Off	Off	Off
Custom Demand Time Series File			

Custom Demand Time Series Units			
Filter area (sqm)			25
Filter perimeter (m)			14
Filter depth (m)			0.55
Filter Median Particle Diameter (mm)			
Saturated Hydraulic Conductivity (mm/hr)			180
Infiltration Media Porosity			0.35
Length (m)			
Bed slope			
Base Width (m)			
Top width (m)			
Vegetation height (m)			
Vegetation Type		Vegetated with Effective Nutrient Removal Plants	
Total Nitrogen Content in Filter (mg/kg)			800
Orthophosphate Content in Filter (mg/kg)			55
Is Base Lined?		Yes	
Is Underdrain Present?		Yes	
Is Submerged Zone Present?		No	
Submerged Zone Depth (m)			
B for Media Soil Texture	-9999	-9999	13
Proportion of upstream impervious area treated			
Exfiltration Rate (mm/hr)	0	0	0
Evaporative Loss as % of PET	0	0	100
Depth in metres below the drain pipe			
TSS A Coefficient			
TSS B Coefficient			
TP A Coefficient			
TP B Coefficient			
TN A Coefficient			
TN B Coefficient			
Sfc			0.61
S*			0.37
Sw			0.11
Sh			0.05
Emax (m/day)			0.008
Ew (m/day)			0.001
IN - Mean Annual Flow (ML/yr)	1.07	0.954	3.29
IN - TSS Mean Annual Load (kg/yr)	28.3	24.9	293
IN - TP Mean Annual Load (kg/yr)	0.162	0.143	0.685
IN - TN Mean Annual Load (kg/yr)	2.33	2.1	7.09
IN - Gross Pollutant Mean Annual Load (kg/yr)	29.3	26.1	43.5
OUT - Mean Annual Flow (ML/yr)	0.956	0.837	3.23
OUT - TSS Mean Annual Load (kg/yr)	23.4	20.2	77
OUT - TP Mean Annual Load (kg/yr)	0.142	0.123	0.467
OUT - TN Mean Annual Load (kg/yr)	2.05	1.82	4.15
OUT - Gross Pollutant Mean Annual Load (kg/yr)	0	0	0
Flow In (ML/yr)	1.07441	0.954125	3.28797
ET Loss (ML/yr)	0	0	0.066313
Infiltration Loss (ML/yr)	0	0	0
Low Flow Bypass Out (ML/yr)	0	0	0
High Flow Bypass Out (ML/yr)	0	0	0
Orifice / Filter Out (ML/yr)	0.884121	0.783463	1.81972
Weir Out (ML/yr)	0.0720767	0.0532736	1.4041
Transfer Function Out (ML/yr)	0	0	0
Reuse Supplied (ML/yr)	0.118387	0.117587	0
Reuse Requested (ML/yr)	0.146308	0.146308	0
% Reuse Demand Met	80.9163	80.3695	0
% Load Reduction	11.0025	12.3033	1.9514
TSS Flow In (kg/yr)	28.3411	24.9356	292.654
TSS ET Loss (kg/yr)	0	0	0
TSS Infiltration Loss (kg/yr)	0	0	0
TSS Low Flow Bypass Out (kg/yr)	0	0	0
TSS High Flow Bypass Out (kg/yr)	0	0	0
TSS Orifice / Filter Out (kg/yr)	21.6301	18.9398	4.41083

TSS Weir Out (kg/yr)	1.81473	1.27002	72.539
TSS Transfer Function Out (kg/yr)	0	0	0
TSS Reuse Supplied (kg/yr)	1.79626	1.77053	0
TSS Reuse Requested (kg/yr)	0	0	0
TSS % Reuse Demand Met	0	0	0
TSS % Load Reduction	17.2762	18.9519	73.7062
TP Flow In (kg/yr)	0.162201	0.142687	0.684312
TP ET Loss (kg/yr)	0	0	0
TP Infiltration Loss (kg/yr)	0	0	0
TP Low Flow Bypass Out (kg/yr)	0	0	0
TP High Flow Bypass Out (kg/yr)	0	0	0
TP Orifice / Filter Out (kg/yr)	0.131282	0.115196	0.226353
TP Weir Out (kg/yr)	0.0106986	0.00782473	0.240406
TP Transfer Function Out (kg/yr)	0	0	0
TP Reuse Supplied (kg/yr)	0.016034	0.0158859	0
TP Reuse Requested (kg/yr)	0	0	0
TP % Reuse Demand Met	0	0	0
TP % Load Reduction	12.4663	13.7828	31.7915
TN Flow In (kg/yr)	2.3301	2.09675	7.07757
TN ET Loss (kg/yr)	0	0	0
TN Infiltration Loss (kg/yr)	0	0	0
TN Low Flow Bypass Out (kg/yr)	0	0	0
TN High Flow Bypass Out (kg/yr)	0	0	0
TN Orifice / Filter Out (kg/yr)	1.9014	1.70315	1.19739
TN Weir Out (kg/yr)	0.147788	0.114844	2.95533
TN Transfer Function Out (kg/yr)	0	0	0
TN Reuse Supplied (kg/yr)	0.229296	0.22804	0
TN Reuse Requested (kg/yr)	0	0	0
TN % Reuse Demand Met	0	0	0
TN % Load Reduction	12.0558	13.2947	41.3256
GP Flow In (kg/yr)	29.3479	26.0627	43.4596
GP ET Loss (kg/yr)	0	0	0
GP Infiltration Loss (kg/yr)	0	0	0
GP Low Flow Bypass Out (kg/yr)	0	0	0
GP High Flow Bypass Out (kg/yr)	0	0	0
GP Orifice / Filter Out (kg/yr)	0	0	0
GP Weir Out (kg/yr)	0	0	0
GP Transfer Function Out (kg/yr)	0	0	0
GP Reuse Supplied (kg/yr)	0	0	0
GP Reuse Requested (kg/yr)	0	0	0
GP % Reuse Demand Met	0	0	0
GP % Load Reduction	100	100	100
PET Scaling Factor			2.1

Generic treatment nodes		
Location	Ecosol Litter Basket - 200	
ID	10	
Node Type	GPTNode	
Lo-flow bypass rate (cum/sec)	0	
Hi-flow bypass rate (cum/sec)	0.05	
Flow Transfer Function		
Input (cum/sec)	0	
Output (cum/sec)	0	
Input (cum/sec)	10	
Output (cum/sec)	10	
Input (cum/sec)		
Output (cum/sec)		
Input (cum/sec)		
Output (cum/sec)		
Input (cum/sec)		
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Output (cum/sec)		
Input (cum/sec)		
Output (cum/sec)		
Input (cum/sec)		
Output (cum/sec)		
Input (cum/sec)		
Output (cum/sec)		
Gross Pollutant Transfer Function		
Enabled	TRUE	
Input (kg/ML)		0
Output (kg/ML)		0
Input (kg/ML)		1000
Output (kg/ML)		0
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
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Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Total Nitrogen Transfer Function		
Enabled	TRUE	
Input (mg/L)		0
Output (mg/L)		0
Input (mg/L)		1000
Output (mg/L)		890
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Total Phosphorus Transfer Function		
Enabled	TRUE	
Input (mg/L)		0
Output (mg/L)		0
Input (mg/L)		1000
Output (mg/L)		610
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		

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Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Total Suspended Solids Transfer Function		
Enabled		TRUE
Input (mg/L)		0
Output (mg/L)		0
Input (mg/L)		1000
Output (mg/L)		590
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
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Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
TSS Flow based Efficiency Enabled	Off	
TSS Flow based Efficiency		
TP Flow based Efficiency Enabled	Off	
TP Flow based Efficiency		
TN Flow based Efficiency Enabled	Off	
TN Flow based Efficiency		
GP Flow based Efficiency Enabled	Off	
GP Flow based Efficiency		
IN - Mean Annual Flow (ML/yr)		3.23
IN - TSS Mean Annual Load (kg/yr)		77
IN - TP Mean Annual Load (kg/yr)		0.467
IN - TN Mean Annual Load (kg/yr)		4.15
IN - Gross Pollutant Mean Annual Load (kg/yr)		0
OUT - Mean Annual Flow (ML/yr)		3.23
OUT - TSS Mean Annual Load (kg/yr)		48.4
OUT - TP Mean Annual Load (kg/yr)		0.292
OUT - TN Mean Annual Load (kg/yr)		3.72
OUT - Gross Pollutant Mean Annual Load (kg/yr)		0
Flow In (ML/yr)		3.2223
ET Loss (ML/yr)		0
Infiltration Loss (ML/yr)		0
Low Flow Bypass Out (ML/yr)		0
High Flow Bypass Out (ML/yr)		0.105166
Orifice / Filter Out (ML/yr)		0
Weir Out (ML/yr)		0
Transfer Function Out (ML/yr)		3.11721
Reuse Supplied (ML/yr)		0
Reuse Requested (ML/yr)		0
% Reuse Demand Met		0
% Load Reduction		-0.00228718
TSS Flow In (kg/yr)		76.8378
TSS ET Loss (kg/yr)		0
TSS Infiltration Loss (kg/yr)		0

TSS Low Flow Bypass Out (kg/yr)	0
TSS High Flow Bypass Out (kg/yr)	7.36536
TSS Orifice / Filter Out (kg/yr)	0
TSS Weir Out (kg/yr)	0
TSS Transfer Function Out (kg/yr)	40.9907
TSS Reuse Supplied (kg/yr)	0
TSS Reuse Requested (kg/yr)	0
TSS % Reuse Demand Met	0
TSS % Load Reduction	37.0673
TP Flow In (kg/yr)	0.466505
TP ET Loss (kg/yr)	0
TP Infiltration Loss (kg/yr)	0
TP Low Flow Bypass Out (kg/yr)	0
TP High Flow Bypass Out (kg/yr)	0.0194684
TP Orifice / Filter Out (kg/yr)	0
TP Weir Out (kg/yr)	0
TP Transfer Function Out (kg/yr)	0.272683
TP Reuse Supplied (kg/yr)	0
TP Reuse Requested (kg/yr)	0
TP % Reuse Demand Met	0
TP % Load Reduction	37.3744
TN Flow In (kg/yr)	4.1472
TN ET Loss (kg/yr)	0
TN Infiltration Loss (kg/yr)	0
TN Low Flow Bypass Out (kg/yr)	0
TN High Flow Bypass Out (kg/yr)	0.217924
TN Orifice / Filter Out (kg/yr)	0
TN Weir Out (kg/yr)	0
TN Transfer Function Out (kg/yr)	3.49802
TN Reuse Supplied (kg/yr)	0
TN Reuse Requested (kg/yr)	0
TN % Reuse Demand Met	0
TN % Load Reduction	10.3988
GP Flow In (kg/yr)	0
GP ET Loss (kg/yr)	0
GP Infiltration Loss (kg/yr)	0
GP Low Flow Bypass Out (kg/yr)	0
GP High Flow Bypass Out (kg/yr)	0
GP Orifice / Filter Out (kg/yr)	0
GP Weir Out (kg/yr)	0
GP Transfer Function Out (kg/yr)	0
GP Reuse Supplied (kg/yr)	0
GP Reuse Requested (kg/yr)	0
GP % Reuse Demand Met	0
GP % Load Reduction	100

Other nodes

Location	Receiving Node	
ID		9
Node Type	ReceivingNode	
IN - Mean Annual Flow (ML/yr)		3.31
IN - TSS Mean Annual Load (kg/yr)		62
IN - TP Mean Annual Load (kg/yr)		0.316
IN - TN Mean Annual Load (kg/yr)		3.9
IN - Gross Pollutant Mean Annual Load (kg/yr)		2.54
OUT - Mean Annual Flow (ML/yr)		3.31
OUT - TSS Mean Annual Load (kg/yr)		62
OUT - TP Mean Annual Load (kg/yr)		0.316
OUT - TN Mean Annual Load (kg/yr)		3.9
OUT - Gross Pollutant Mean Annual Load (kg/yr)		2.54
% Load Reduction		8.36
TSS % Load Reduction		80.4
TN % Load Reduction		50.2
TP % Load Reduction		57.8

GP % Load Reduction	97.5

Links

Location	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link
Source node ID	1	2	6	4	8	10	5	3	11	7
Target node ID	7	6	8	8	10	9	8	8	9	8
Muskingum-Cunge Routing	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed
Muskingum K										
Muskingum theta										
IN - Mean Annual Flow (ML/yr)	0.954	1.07	0.956	0.257	3.23	3.23	1.18	6.41E-02	8.59E-02	0.837
IN - TSS Mean Annual Load (kg/yr)	24.9	28.3	23.4	47.6	77	48.4	200	1.7	13.6	20.2
IN - TP Mean Annual Load (kg/yr)	0.143	0.162	0.142	7.51E-02	0.467	0.292	0.336	9.67E-03	2.31E-02	0.123
IN - TN Mean Annual Load (kg/yr)	2.1	2.33	2.05	0.563	4.15	3.72	2.52	0.142	0.179	1.82
IN - Gross Pollutant Mean Annual Load (kg/yr)	26.1	29.3	0	7.01	0	0	34.7	1.75	2.54	0
OUT - Mean Annual Flow (ML/yr)	0.954	1.07	0.956	0.257	3.23	3.23	1.18	6.41E-02	8.59E-02	0.837
OUT - TSS Mean Annual Load (kg/yr)	24.9	28.3	23.4	47.6	77	48.4	200	1.7	13.6	20.2
OUT - TP Mean Annual Load (kg/yr)	0.143	0.162	0.142	7.51E-02	0.467	0.292	0.336	9.67E-03	2.31E-02	0.123
OUT - TN Mean Annual Load (kg/yr)	2.1	2.33	2.05	0.563	4.15	3.72	2.52	0.142	0.179	1.82
OUT - Gross Pollutant Mean Annual Load (kg/yr)	26.1	29.3	0	7.01	0	0	34.7	1.75	2.54	0

Catchment Details

Catchment Name	20160518_MUSIC_20171116
Timestep	6 Minutes
Start Date	1/01/1999
End Date	31/12/2008 23:54
Rainfall Station	
ET Station	User-defined monthly PET
Mean Annual Rainfall (mm)	902
Mean Annual ET (mm)	1408
MUSIC-link Area	North Region
MUSIC-link Scenario	North Region

APPENDIX C

Sediment and Erosion Control Calculations

Note: These "Detailed Calculation" spreadsheets relate only to high erosion hazard lands as identified in figure 4.6 or where the designer chooses to use the RUSLE to size sediment basins. The "Standard Calculation" spreadsheets should be used on low erosion hazard lands as identified by figure 4.6 and where the designer chooses not to run the RUSLE in calculations.

1. Site Data Sheet

Site Name: **20160518 - 482-488 The Esplanade, Warners Bay**

Site Location: **LAKE MACQUARIE**

Precinct: NOT APPLICABLE

Description of Site: Site is existing steep land, covered in coastal shrubs and exposed. Group B Warners Bay formation adopted. Slopes with reasonable gradients falling to the west. Checking for all K Factors as listed.

Site 1 (Case 1): Type D Soils, 'K' = 0.037 - Stage 1
Site 2 (Case 2): Type D Soils, 'K' = 0.059 - Stage 1
Site 3 (Case 3): Type D Soils, 'K' = 0.027 - Stage 1

Site area	Site						Remarks
	1	2	3	4	5	6	
Total catchment area (ha)	5.10	5.10	5.10				
Disturbed catchment area (ha)	5.10	5.10	5.10				
Soil analysis							
% sand (faction 0.02 to 2.00 mm	53	53	53				Soil texture should be assessed through mechanical dispersion only. Dispersing agents (e.g. Calgon) should not be used
% silt (fraction 0.002 to 0.02 mm)	30	30	30				
% clay (fraction finer than 0.002 mm)	17	17	17				
Dispersion percentage	32.0	32.0	32.0				E.g. enter 10 for dispersion of 10%
% of whole soil dispersible	10.24	10.24	10.24				See Section 6.3.3(e)
Soil Texture Group	D	D	D				See Section 6.3.3(c), (d) and (e)
Rainfall data							
Design rainfall depth (days)	5	5	5				See Sections 6.3.4 (d) and (e)
Design rainfall depth (percentile)	75	75	75				See Sections 6.3.4 (f) and (g)
x-day, y-percentile rainfall event	24.4	24.4	24.4				See Section 6.3.4 (h)
Rainfall intensity: 2-year, 6-hour storm	13.1	13.1	13.1				See IFD chart for the site
RUSLE Factors							
Rainfall erosivity (*R* -factor)	3714	3714	3714				Automatic calculation from above data
Soil erodibility (*K* -factor)	0.037	0.059	0.027				RUSLE data can be obtained from Appendixes A, B and C
Slope length (m)	55	55	55				
Slope gradient (%)	4	4	4				
Length/gradient (*LS* -factor)	0.71	0.71	0.71				
Erosion control practice (*P* -factor)	1.3	1.3	1.3				
Ground cover (*C* -factor)	1	1	1				
Calculations							
Soil loss (t/ha/yr)	127	202	93				
Soil Loss Class	1 - V.LOW	2 - LOW	1 - V.LOW				See Section 4.4.2(b)
Soil loss (m^3/ha/yr)	98	156	71				
Sediment basin storage volume, m^3	85	135	62				See Sections 6.3.4(i) and 6.3.5 (e)

Job no CA170039

21/11/2017

Andrew Redwin
Bloc
Unit 9, 18 National Circuit
Barton, NSW 2600

Dear Andrew

Lakehouse Village, 482 The Esplanade, Warners Bay – Preliminary fire safety engineering review

The design of the proposed development at 482 The Esplanade, Warners Bay will incorporate performance solutions complying with the performance requirements of National Construction Code Series Volume One – Building Code of Australia (BCA)[1]. Defire has undertaken a preliminary fire safety engineering review of the proposed design for the development application submission at the request of Bloc. The review was based on the drawings listed in Attachment 1.

The intent of the review was to determine whether we believe the design can be demonstrated to achieve compliance with the performance requirements of the BCA.

The performance solutions identified to date are listed in Table 1.

Item	Description of performance solution	DTS provision	Performance requirement	Comment
1.	Openings within the external wall of the western tower and located within 3m of the southern boundary are not protected in accordance with clause C3.4 of the BCA.	Clauses C3.2 and C3.4	CP2	The openings to the bathrooms located approximately 1.3m from the southern boundary will be required to be protected with radiant heat attenuation screens. The balcony openings from the living room and bedrooms that are within 3m of the southern boundary will be required to be protected with fire-rated blade walls located along the southern edge of the balcony.
2.	The maximum travel distance from the sole-occupancy units within the north-western and north-eastern residential corridors to the single exits is up to 11m instead of 6m.	Clause D1.4	DP4 and EP2.2	Medium temperature smoke seals will be required to be installed to doors opening into the common corridors where increased travel distances occur. Heat detectors will be required to be installed into the sole-occupancy units opening into the common corridors where increased travel distances occur.

[1] National Construction Code 2016, Volume One – Building Code of Australia, Australian Building Codes Board, Australia.

Item	Description of performance solution	DTS provision	Performance requirement	Comment
				The building is to be provided with a building occupant warning system. Additional speakers located within 1.5m of the unit entry doors opening into the common corridors where increased travel distances occur are to be provided.
3.	The following fire-isolated stairs serving the building discharge internally within the building.	Clause D1.7	DP5	The three western fire-isolated stairs discharge on the lower ground floor into lobby areas. The lobby areas must be free from combustibles and comply with the fire hazard properties in specification C1.1 of the BCA for fire-isolated exits. The lobby areas and adjacent commercial tenancies are to be fire separated. The fire-isolated stairs also provide access to the upper ground floor residential corridor which provides occupants with an alternative path of travel to King Street. The doors to the lower ground floor lobby area and upper ground floor residential corridor must incorporate vision panels and be fitted with smoke seals. The lift doors that open into the lobby area on the lower ground floor must be protected with Smoke Guard smoke curtains. The north-eastern fire-isolated stair discharges into the upper ground floor residential public corridor. Occupants discharge into a space fire-separated from the corridor by automatic closing fire doors to the east and west that incorporate vision panels. The public corridor must not be used for storage and must not contain any combustible items. The south-eastern fire-isolated stair discharges into a covered area on the upper ground floor that is fire separated from the adjoining parts of the building. The opening to the waste room is to be protected with a -/60/- fire shutter. An additional door is provided from the stair to the residential public corridor. The doors to the discharge area and public corridor must incorporate vision panels and be fitted with smoke seals.

Table 1 Preliminary list of performance solutions

It is Defire's professional opinion that it is possible to develop performance solutions for the issues identified to demonstrate compliance with the relevant performance requirements of the BCA without major changes to the proposed design.

The details of the proposed performance solutions are subject to the outcome of the fire engineering brief and analysis which will be carried out in accordance with the International Fire Engineering Guidelines (IFEG)[2].

The performance solutions for the building will be developed as part of the ongoing design and development process and documented in a format suitable for submission to the relevant approval authorities. It is noted that additional performance solutions may be identified during the ongoing design development process in consultation with the design team.

Please contact me on 02 9211 4333 if you have any questions.

Yours sincerely

Genevieve Fick
Fire safety engineer
Defire – Innovative fire safety

[2] International Fire Engineering Guidelines – Edition 2005, Australian Building Codes Board, Australia.

Attachment 1 Drawings and information

Drawing title	Dwg no	Date	Drawn
Plan – basement 1	DA101 rev G	15/11/2017	Stewart Architecture
Plan – lower ground	DA102 rev G	15/11/2017	
Plan – upper ground	DA103 rev H	15/11/2017	
Plan – level 2	DA104 rev F	08/11/2017	
Plan – level 3	DA105 rev F	08/11/2017	
Plan – level 4	DA106 rev F	08/11/2017	
Plan – level 5	DA107 rev E	19/10/2017	
Plan – level 6	DA108 rev F	19/10/2017	
Plan – level 7	DA109 rev F	08/11/2017	
Plan – roof	DA110 rev F	08/11/2017	

Ref: 17/021

30th October 2017

ADW Johnson
Unit 7, 335 Hillsborough Road
WARNERS BAY NSW 2282

Attention: - Mr Brett Stein

Dear Brett,

RE: Parking Variation Justification – Mixed Use Development – 12 – 16 King Street, 482 – 488 The Esplanade & 1 Howard Street, Warners Bay.

Reference is made to our meeting with Lake Macquarie City Council officers on Wednesday 25th October 2017 regarding the on-site car parking supply and allocation for this project. At this meeting Council requested that the applicant must justify the provision of additional resident parking within the complex as well as the proposed allocation of visitor and commercial on-site car parking.

It is noted that the project provides more on-site car parking (212 car spaces in total) than required to satisfy the requirements of the Lake Macquarie DCP in respect of the Warners Bay Town Centre, which requires only (151 spaces).

The development proposes to provide 178 resident spaces to service the 111 units, 7 commercial only secure commercial tenant spaces and 28 shared visitor spaces for use by both the residential visitors and the commercial tenancy staff and customers. Notwithstanding the residential over supply, the DCP requirement that is being varied in this complex is that the DCP requires a total of 56 spaces for use by the commercial tenancies and the resident visitors while the development is only providing a total of 34 spaces for these purposes.

In seeking approval for the parking supply and allocation proposed the applicant is seeking to justify a variation to Council's DCP requirements. It is considered that due to the size of the development and the location of the development there are a number of valid arguments to support the variation which are described below.

1. Public Transport Usage

It would appear that the Lake Macquarie DCP through the parking rates adopted is trying to increase the use of public transport limiting the number of car parking spaces for residents within the development. However at this stage public transport usage for travel to and from work in the Lake Macquarie LGA is less than 3 % of trips due mainly to relatively poor public transport services in the area.

Whilst the site has convenient access to public transport unfortunately the services are currently not frequent enough nor do they provide an express service to the

major employment areas surrounding the site. Therefore there is little if any benefit in catching public transport to and from work from the site and it is highly likely that residents / tenants of the development will be travelling to and from work by private car. Many households are currently double income households it is also likely that more than one vehicle will be required for the travel to and from work from many of the apartments. Council suggested future residents may be retirees wishing to downsize. Marketing advice indicates many potential buyers particularly those at the higher end of the market will seek to maintain the independence of owning two cars and require parking even if the total number of kilometres travelled is reduced without needing to commute daily to work.

Therefore unless a suitable number of resident parks are provided within the development the proposal is likely to generate some on-street car parking demand in nearby streets. This would be detrimental to the surrounding road network which already exhibits a demand for on-street car parking demand.

2. Residential Parking Demand

As discussed above the nature and size of the development is likely to generate a peak parking demand for residents and tenants well in excess of the DCP parking requirement and probably on average in the order of 1.5 – 2 spaces per unit Compliance with the DCP parking requirement for resident parking would result in visitor car parking being utilised as resident overflow parking rather than for its true purpose of providing on-site car parking for guests of residents. It is considered that by providing additional residential parking to meet the likely true demand for residential parking this would support the use of the provided visitor car parking as short term parking for guests of the residents. Further, if parking spaces for those units with more than one space are not occupied they would be available for visitors at the owners discretion thereby reducing demand for visitor spaces. Marketing of the development has been underway for a number of weeks, without guarantees the agent has advised that all purchasers of 2 and 3 bedroom units are seeking a minimum of 2 car parking spaces.

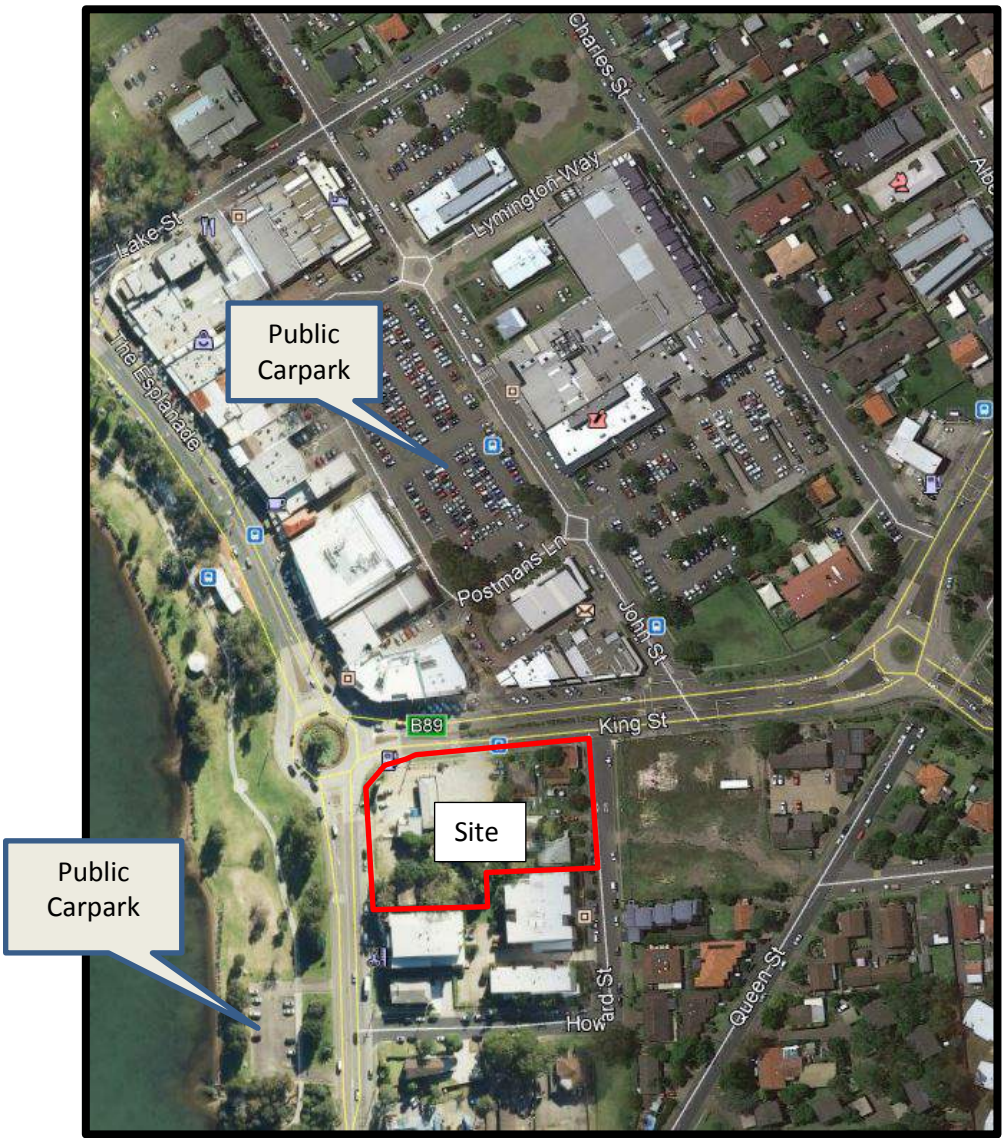
3. Cross-Use of Development Components

The argument in this respect is that the proposed development will have a significant number of residents and these residents are highly likely to use the commercial tenancy as both staff and customers of these tenancies. As such as a resident park is already assigned to the residents they are not going to require to use the commercial spaces therefore the peak parking demand for the commercial tenancies is likely to be less than for a stand-alone tenancy.

4. Location of site within the Warners Bay Town Centre Precinct

The location of the site within the Warners Bay Town Centre is likely to attract customers from outside the local area to the commercial tenancies however is also going to encourage multi-trip making for these customers. For instance people utilising the commercial tenancies may well be employees of other businesses in the area who have already parked in other areas of the Town Centre and walk to the proposed development or are customers of other businesses in the area who are

likely to park in the open public parking areas to visit more than the one commercial premises including those within the development. The following plan shows the location of parking relative to the development.



Warners Bay Town Centre

The site is also within convenient walking distance of numerous residential areas and residential developments therefore the commercial tenancies are likely to encourage nearby residents to walk to the commercial tenancy.

Visitors to caffes and restaurants also have the potential to use taxis or alternative means of travel.

5. Different peak parking demand periods – visitor v's commercial parking

The main argument in the supply and allocation of on-site parking in this development revolves around the different peak parking demand periods for the

commercial tenancies and the visitor car parking. The peak parking demand period for visitor parking i.e. 5 pm to 9 am is generally outside general business hours which will be the peak parking demand period for the commercial tenancies and as such there should be scope to share visitor and commercial parking. This allows for a more efficient use of on-site car parking rather than have blocks of parking vacant for long periods of time within the development.

It is acknowledged that some of the commercial tenancies may have trading hours beyond 5 pm until later in the evening however in this period the available and convenient public parking areas within the Warners Bay Town Centre are underutilised. This is a key consideration as the highest demand for the shared visitor and commercial spaces is likely to be after residents have returned home in the evening and any caffee or businesses is still open.

6. Reduced visitor car parking rates.

To evidence the advantages of reduced visitor car parking it is noted that Newcastle City Council has recently been approving major residential flat buildings and mixed use developments with both reduced visitor car parking requirements (25% of DCP requirement) and shared visitor / commercial car parking (Verve Apartments – King Street and Herald Apartments - Bolton Street). As previously mentioned this results in a more efficient and effective use of on-site car parking as a result of the different peak parking demand periods (point 5) and also is seen as a suitable strategy for encouraging public transport use.

Restricting the visitor parking spaces means that visitors travelling by cars may need to seek an alternative parking space whether on-street or in a nearby public car park. This impact will generally be short term and if difficult to obtain an alternative parking space may encourage a change of trip making mode i.e. public transport. Whilst probably more appropriate for a major metropolitan area it may be a more appropriate public transport strategy with less adverse impact than restricting residential parking in a residential flat building in Warners Bay.

Overall it is considered that the cumulative impacts of the above 6 points would justify the proposed on-site car parking supply and allocation within the proposed mixed –use development at 12 – 16 King Street, 482 – 488 The Esplanade & 1 Howard Street, Warners Bay.

For further information please do not hesitate to contact me on 02 4936 6200 or 0423 324 188.

Yours sincerely

Jeff Garry
Director
Intersect Traffic

LAKE MACQUARIE CITY COUNCIL

MUSIC-*link* Report

Project Details		Company Details	
Project:	20160518 - 482-488 The Esplanade, Warners Bay	**Company:**	RGH Consulting Group Pty Ltd
Report Export Date:	16/11/2017	**Contact:**	Nick Lane
Catchment Name:	20160518_MUSIC_20171116	**Address:**	Unit 1, 3 Teamster Close, Tuggerah
Catchment Area:	0.507ha	**Phone:**	(02) 4351 9022
Impervious Area*:	84.84%	**Email:**	n.lane@rghconsulting.com.au
Rainfall Station:			
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1999 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	902mm		
Evapotranspiration:	1408mm		
MUSIC Version:	6.2.1		
MUSIC-link data Version:	6.22		
Study Area:	North Region		
Scenario:	North Region		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Receiving Node	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	8.36%	Rain Water Tank Node	2	Urban Source Node	6
TSS	80.4%	Bio Retention Node	2		
TP	57.8%	GPT Node	1		
TN	50.2%				
GP	97.5%				

Comments

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Bioretention	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	Bioretention	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	Bioretention	PET Scaling Factor	2.1	2.1	2.1
Bio	Bioretention	PET Scaling Factor	2.1	2.1	2.1
GPT	Ecosol Litter Basket - 200	Hi-flow bypass rate (cum/sec)	None	None	0.05
Rain	Rainwater Tank	% Reuse Demand Met	80	None	80.91
Rain	Rainwater Tank	% Reuse Demand Met	80	None	80.36
Receiving	Receiving Node	% Load Reduction	None	None	8.36
Receiving	Receiving Node	GP % Load Reduction	70	None	97.5
Receiving	Receiving Node	TN % Load Reduction	45	None	50.2
Receiving	Receiving Node	TP % Load Reduction	45	None	57.8
Receiving	Receiving Node	TSS % Load Reduction	80	None	80.4
Urban	East Roof	Area Impervious (ha)	None	None	0.119
Urban	East Roof	Area Pervious (ha)	None	None	0
Urban	East Roof	Total Area (ha)	None	None	0.119
Urban	Gym Roof	Area Impervious (ha)	None	None	0.008
Urban	Gym Roof	Area Pervious (ha)	None	None	0
Urban	Gym Roof	Total Area (ha)	None	None	0.008
Urban	Landscaping	Area Impervious (ha)	None	None	0.129
Urban	Landscaping	Area Pervious (ha)	None	None	0.066
Urban	Landscaping	Total Area (ha)	None	None	0.196
Urban	Pool	Area Impervious (ha)	None	None	0.032
Urban	Pool	Area Pervious (ha)	None	None	0
Urban	Pool	Total Area (ha)	None	None	0.032
Urban	Uncaptured Landscaping	Area Impervious (ha)	None	None	0.008
Urban	Uncaptured Landscaping	Area Pervious (ha)	None	None	0.009
Urban	Uncaptured Landscaping	Total Area (ha)	None	None	0.018
Urban	West Roof	Area Impervious (ha)	None	None	0.134
Urban	West Roof	Area Pervious (ha)	None	None	0
Urban	West Roof	Total Area (ha)	None	None	0.134

Only certain parameters are reported when they pass validation

MUSIC SUMMARY REPORT

Source nodes

Location	East Roof	West Roof	Gym Roof	Pool	Landscaping	Uncaptured Landscaping
ID	1	2	3	4	5	11
Node Type	UrbanSourceNode	UrbanSourceNode	UrbanSourceNode	UrbanSourceNode	UrbanSourceNode	UrbanSourceNode
Zoning Surface Type	Roof	Roof	Roof	Mixed	Mixed	Mixed
Total Area (ha)	0.119	0.134	0.008	0.032	0.196	0.018
Area Impervious (ha)	0.119	0.134	0.008	0.032	0.129023582	0.008118134
Area Pervious (ha)	0	0	0	0	0.066976418	0.009881866
Field Capacity (mm)	70	70	70	70	70	70
Pervious Area Infiltration Capacity coefficient - a	210	210	210	210	210	210
Pervious Area Infiltration Capacity exponent - b	4.7	4.7	4.7	4.7	4.7	4.7
Impervious Area Rainfall Threshold (mm/day)	1	1	1	1	1	1
Pervious Area Soil Storage Capacity (mm)	170	170	170	170	170	170
Pervious Area Soil Initial Storage (% of Capacity)	30	30	30	30	30	30
Groundwater Initial Depth (mm)	10	10	10	10	10	10
Groundwater Daily Recharge Rate (%)	50	50	50	50	50	50
Groundwater Daily Baseflow Rate (%)	5	5	5	5	5	5
Groundwater Daily Deep Seepage Rate (%)	0	0	0	0	0	0
Stormflow Total Suspended Solids Mean (log mg/L)	1.3	1.3	1.3	2.15	2.15	2.15
Stormflow Total Suspended Solids Standard Deviation (log mg/L)	0.32	0.32	0.32	0.32	0.32	0.32
Stormflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0
Stormflow Total Phosphorus Mean (log mg/L)	-0.89	-0.89	-0.89	-0.6	-0.6	-0.6
Stormflow Total Phosphorus Standard Deviation (log mg/L)	0.25	0.25	0.25	0.25	0.25	0.25
Stormflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Phosphorus Serial Correlation	0	0	0	0	0	0
Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3	0.3	0.3	0.3
Stormflow Total Nitrogen Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19
Stormflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Stormflow Total Nitrogen Serial Correlation	0	0	0	0	0	0
Baseflow Total Suspended Solids Mean (log mg/L)	1.1	1.1	1.1	1.2	1.2	1.2
Baseflow Total Suspended Solids Standard Deviation (log mg/L)	0.17	0.17	0.17	0.17	0.17	0.17
Baseflow Total Suspended Solids Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Suspended Solids Serial Correlation	0	0	0	0	0	0
Baseflow Total Phosphorus Mean (log mg/L)	-0.82	-0.82	-0.82	-0.85	-0.85	-0.85
Baseflow Total Phosphorus Standard Deviation (log mg/L)	0.19	0.19	0.19	0.19	0.19	0.19
Baseflow Total Phosphorus Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Phosphorus Serial Correlation	0	0	0	0	0	0
Baseflow Total Nitrogen Mean (log mg/L)	0.32	0.32	0.32	0.11	0.11	0.11
Baseflow Total Nitrogen Standard Deviation (log mg/L)	0.12	0.12	0.12	0.12	0.12	0.12
Baseflow Total Nitrogen Estimation Method	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic	Stochastic
Baseflow Total Nitrogen Serial Correlation	0	0	0	0	0	0
Flow based constituent generation - enabled	Off	Off	Off	Off	Off	Off
Flow based constituent generation - flow file						
Flow based constituent generation - base flow column						
Flow based constituent generation - pervious flow column						
Flow based constituent generation - impervious flow column						
Flow based constituent generation - unit						
OUT - Mean Annual Flow (ML/yr)	0.954	1.07	6.41E-02	0.257	1.18	8.59E-02
OUT - TSS Mean Annual Load (kg/yr)	24.9	28.3	1.7	47.6	200	13.6
OUT - TP Mean Annual Load (kg/yr)	0.143	0.162	9.67E-03	7.51E-02	0.336	2.31E-02
OUT - TN Mean Annual Load (kg/yr)	2.1	2.33	0.142	0.563	2.52	0.179
OUT - Gross Pollutant Mean Annual Load (kg/yr)	26.1	29.3	1.75	7.01	34.7	2.54
Rain In (ML/yr)	1.0732	1.20848	0.0721479	0.288592	1.76763	0.162333
ET Loss (ML/yr)	0.119083	0.134094	0.0080056	0.0320223	0.588545	0.0763082
Deep Seepage Loss (ML/yr)	0	0	0	0	0	0
Baseflow Out (ML/yr)	0	0	0	0	0.0845244	0.0125569
Imp. Stormflow Out (ML/yr)	0.954119	1.07438	0.0641424	0.25657	1.03718	0.0649442
Perv. Stormflow Out (ML/yr)	0	0	0	0	0.0567522	0.0084311
Total Stormflow Out (ML/yr)	0.954119	1.07438	0.0641424	0.25657	1.09393	0.0733753
Total Outflow (ML/yr)	0.954119	1.07438	0.0641424	0.25657	1.17846	0.0859322
Change in Soil Storage (ML/yr)	0	0	0	0	0.0006234	9.26E-05

TSS Baseflow Out (kg/yr)	0	0	0	0	1.44709	0.214743
TSS Total Stormflow Out (kg/yr)	24.9356	28.3411	1.69967	47.6028	198.868	13.3912
TSS Total Outflow (kg/yr)	24.9356	28.3411	1.69967	47.6028	200.315	13.6059
TP Baseflow Out (kg/yr)	0	0	0	0	0.0131354	0.0019508
TP Total Stormflow Out (kg/yr)	0.142687	0.162201	0.0096679	0.0751071	0.322394	0.0211791
TP Total Outflow (kg/yr)	0.142687	0.162201	0.0096679	0.0751071	0.335529	0.0231299
TN Baseflow Out (kg/yr)	0	0	0	0	0.11296	0.016805
TN Total Stormflow Out (kg/yr)	2.09675	2.3301	0.141627	0.563108	2.40369	0.162665
TN Total Outflow (kg/yr)	2.09675	2.3301	0.141627	0.563108	2.51665	0.17947
GP Total Outflow (kg/yr)	26.0627	29.3479	1.75211	7.00846	34.77	2.55433

No Imported Data Source nodes

USTM treatment nodes

Location	Rainwater Tank	Rainwater Tank	Bioretention
ID	6	7	8
Node Type	RainWaterTankNode	RainWaterTankNode	BioRetentionNodeV4
Lo-flow bypass rate (cum/sec)	0	0	0
Hi-flow bypass rate (cum/sec)	100	100	100
Inlet pond volume	0	0	
Area (sqm)	2.5	2.5	34
Initial Volume (m^3)	5	5	
Extended detention depth (m)	0.2	0.2	0.3
Number of Rainwater tanks	1	1	
Permanent Pool Volume (cubic metres)	5	5	
Proportion vegetated	0	0	
Equivalent Pipe Diameter (mm)	100	100	
Overflow weir width (m)	10	10	2
Notional Detention Time (hrs)	1.33E-02	1.33E-02	
Orifice Discharge Coefficient	0.6	0.6	
Weir Coefficient	1.7	1.7	1.7
Number of CSTR Cells	2	2	3
Total Suspended Solids - k (m/yr)	400	400	8000
Total Suspended Solids - C* (mg/L)	12	12	20
Total Suspended Solids - C** (mg/L)	0	0	
Total Phosphorus - k (m/yr)	300	300	6000
Total Phosphorus - C* (mg/L)	0.13	0.13	0.13
Total Phosphorus - C** (mg/L)	0	0	
Total Nitrogen - k (m/yr)	40	40	500
Total Nitrogen - C* (mg/L)	1.4	1.4	1.4
Total Nitrogen - C** (mg/L)	0	0	
Threshold Hydraulic Loading for C** (m/yr)	0	0	
Horizontal Flow Coefficient			3
Reuse Enabled	On	On	Off
Max drawdown height (m)	2	2	
Annual Demand Enabled	Off	Off	Off
Annual Demand Value (ML/year)			
Annual Demand Distribution			
Annual Demand Monthly Distribution: Jan			
Annual Demand Monthly Distribution: Feb			
Annual Demand Monthly Distribution: Mar			
Annual Demand Monthly Distribution: Apr			
Annual Demand Monthly Distribution: May			
Annual Demand Monthly Distribution: Jun			
Annual Demand Monthly Distribution: Jul			
Annual Demand Monthly Distribution: Aug			
Annual Demand Monthly Distribution: Sep			
Annual Demand Monthly Distribution: Oct			
Annual Demand Monthly Distribution: Nov			
Annual Demand Monthly Distribution: Dec			
Daily Demand Enabled	On	On	Off
Daily Demand Value (ML/day)	0.0004	0.0004	
Custom Demand Enabled	Off	Off	Off
Custom Demand Time Series File			

Custom Demand Time Series Units			
Filter area (sqm)			25
Filter perimeter (m)			14
Filter depth (m)			0.55
Filter Median Particle Diameter (mm)			
Saturated Hydraulic Conductivity (mm/hr)			180
Infiltration Media Porosity			0.35
Length (m)			
Bed slope			
Base Width (m)			
Top width (m)			
Vegetation height (m)			
Vegetation Type		Vegetated with Effective Nutrient Removal Plants	
Total Nitrogen Content in Filter (mg/kg)			800
Orthophosphate Content in Filter (mg/kg)			55
Is Base Lined?		Yes	
Is Underdrain Present?		Yes	
Is Submerged Zone Present?		No	
Submerged Zone Depth (m)			
B for Media Soil Texture	-9999	-9999	13
Proportion of upstream impervious area treated			
Exfiltration Rate (mm/hr)	0	0	0
Evaporative Loss as % of PET	0	0	100
Depth in metres below the drain pipe			
TSS A Coefficient			
TSS B Coefficient			
TP A Coefficient			
TP B Coefficient			
TN A Coefficient			
TN B Coefficient			
Sfc			0.61
S*			0.37
Sw			0.11
Sh			0.05
Emax (m/day)			0.008
Ew (m/day)			0.001
IN - Mean Annual Flow (ML/yr)	1.07	0.954	3.29
IN - TSS Mean Annual Load (kg/yr)	28.3	24.9	293
IN - TP Mean Annual Load (kg/yr)	0.162	0.143	0.685
IN - TN Mean Annual Load (kg/yr)	2.33	2.1	7.09
IN - Gross Pollutant Mean Annual Load (kg/yr)	29.3	26.1	43.5
OUT - Mean Annual Flow (ML/yr)	0.956	0.837	3.23
OUT - TSS Mean Annual Load (kg/yr)	23.4	20.2	77
OUT - TP Mean Annual Load (kg/yr)	0.142	0.123	0.467
OUT - TN Mean Annual Load (kg/yr)	2.05	1.82	4.15
OUT - Gross Pollutant Mean Annual Load (kg/yr)	0	0	0
Flow In (ML/yr)	1.07441	0.954125	3.28797
ET Loss (ML/yr)	0	0	0.066313
Infiltration Loss (ML/yr)	0	0	0
Low Flow Bypass Out (ML/yr)	0	0	0
High Flow Bypass Out (ML/yr)	0	0	0
Orifice / Filter Out (ML/yr)	0.884121	0.783463	1.81972
Weir Out (ML/yr)	0.0720767	0.0532736	1.4041
Transfer Function Out (ML/yr)	0	0	0
Reuse Supplied (ML/yr)	0.118387	0.117587	0
Reuse Requested (ML/yr)	0.146308	0.146308	0
% Reuse Demand Met	80.9163	80.3695	0
% Load Reduction	11.0025	12.3033	1.9514
TSS Flow In (kg/yr)	28.3411	24.9356	292.654
TSS ET Loss (kg/yr)	0	0	0
TSS Infiltration Loss (kg/yr)	0	0	0
TSS Low Flow Bypass Out (kg/yr)	0	0	0
TSS High Flow Bypass Out (kg/yr)	0	0	0
TSS Orifice / Filter Out (kg/yr)	21.6301	18.9398	4.41083

TSS Weir Out (kg/yr)	1.81473	1.27002	72.539
TSS Transfer Function Out (kg/yr)	0	0	0
TSS Reuse Supplied (kg/yr)	1.79626	1.77053	0
TSS Reuse Requested (kg/yr)	0	0	0
TSS % Reuse Demand Met	0	0	0
TSS % Load Reduction	17.2762	18.9519	73.7062
TP Flow In (kg/yr)	0.162201	0.142687	0.684312
TP ET Loss (kg/yr)	0	0	0
TP Infiltration Loss (kg/yr)	0	0	0
TP Low Flow Bypass Out (kg/yr)	0	0	0
TP High Flow Bypass Out (kg/yr)	0	0	0
TP Orifice / Filter Out (kg/yr)	0.131282	0.115196	0.226353
TP Weir Out (kg/yr)	0.0106986	0.00782473	0.240406
TP Transfer Function Out (kg/yr)	0	0	0
TP Reuse Supplied (kg/yr)	0.016034	0.0158859	0
TP Reuse Requested (kg/yr)	0	0	0
TP % Reuse Demand Met	0	0	0
TP % Load Reduction	12.4663	13.7828	31.7915
TN Flow In (kg/yr)	2.3301	2.09675	7.07757
TN ET Loss (kg/yr)	0	0	0
TN Infiltration Loss (kg/yr)	0	0	0
TN Low Flow Bypass Out (kg/yr)	0	0	0
TN High Flow Bypass Out (kg/yr)	0	0	0
TN Orifice / Filter Out (kg/yr)	1.9014	1.70315	1.19739
TN Weir Out (kg/yr)	0.147788	0.114844	2.95533
TN Transfer Function Out (kg/yr)	0	0	0
TN Reuse Supplied (kg/yr)	0.229296	0.22804	0
TN Reuse Requested (kg/yr)	0	0	0
TN % Reuse Demand Met	0	0	0
TN % Load Reduction	12.0558	13.2947	41.3256
GP Flow In (kg/yr)	29.3479	26.0627	43.4596
GP ET Loss (kg/yr)	0	0	0
GP Infiltration Loss (kg/yr)	0	0	0
GP Low Flow Bypass Out (kg/yr)	0	0	0
GP High Flow Bypass Out (kg/yr)	0	0	0
GP Orifice / Filter Out (kg/yr)	0	0	0
GP Weir Out (kg/yr)	0	0	0
GP Transfer Function Out (kg/yr)	0	0	0
GP Reuse Supplied (kg/yr)	0	0	0
GP Reuse Requested (kg/yr)	0	0	0
GP % Reuse Demand Met	0	0	0
GP % Load Reduction	100	100	100
PET Scaling Factor			2.1

Generic treatment nodes		
Location	Ecosol Litter Basket - 200	
ID	10	
Node Type	GPTNode	
Lo-flow bypass rate (cum/sec)	0	
Hi-flow bypass rate (cum/sec)	0.05	
Flow Transfer Function		
Input (cum/sec)	0	
Output (cum/sec)	0	
Input (cum/sec)	10	
Output (cum/sec)	10	
Input (cum/sec)		
Output (cum/sec)		
Input (cum/sec)		
Output (cum/sec)		
Input (cum/sec)		
Output (cum/sec)		
Input (cum/sec)		
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Input (cum/sec)		

Output (cum/sec)		
Input (cum/sec)		
Output (cum/sec)		
Input (cum/sec)		
Output (cum/sec)		
Input (cum/sec)		
Output (cum/sec)		
Gross Pollutant Transfer Function		
Enabled	TRUE	
Input (kg/ML)		0
Output (kg/ML)		0
Input (kg/ML)		1000
Output (kg/ML)		0
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Input (kg/ML)		
Output (kg/ML)		
Total Nitrogen Transfer Function		
Enabled	TRUE	
Input (mg/L)		0
Output (mg/L)		0
Input (mg/L)		1000
Output (mg/L)		890
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Total Phosphorus Transfer Function		
Enabled	TRUE	
Input (mg/L)		0
Output (mg/L)		0
Input (mg/L)		1000
Output (mg/L)		610
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		

Output (mg/L)		
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Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Total Suspended Solids Transfer Function		
Enabled		TRUE
Input (mg/L)		0
Output (mg/L)		0
Input (mg/L)		1000
Output (mg/L)		590
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
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Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
Input (mg/L)		
Output (mg/L)		
TSS Flow based Efficiency Enabled	Off	
TSS Flow based Efficiency		
TP Flow based Efficiency Enabled	Off	
TP Flow based Efficiency		
TN Flow based Efficiency Enabled	Off	
TN Flow based Efficiency		
GP Flow based Efficiency Enabled	Off	
GP Flow based Efficiency		
IN - Mean Annual Flow (ML/yr)		3.23
IN - TSS Mean Annual Load (kg/yr)		77
IN - TP Mean Annual Load (kg/yr)		0.467
IN - TN Mean Annual Load (kg/yr)		4.15
IN - Gross Pollutant Mean Annual Load (kg/yr)		0
OUT - Mean Annual Flow (ML/yr)		3.23
OUT - TSS Mean Annual Load (kg/yr)		48.4
OUT - TP Mean Annual Load (kg/yr)		0.292
OUT - TN Mean Annual Load (kg/yr)		3.72
OUT - Gross Pollutant Mean Annual Load (kg/yr)		0
Flow In (ML/yr)		3.2223
ET Loss (ML/yr)		0
Infiltration Loss (ML/yr)		0
Low Flow Bypass Out (ML/yr)		0
High Flow Bypass Out (ML/yr)		0.105166
Orifice / Filter Out (ML/yr)		0
Weir Out (ML/yr)		0
Transfer Function Out (ML/yr)		3.11721
Reuse Supplied (ML/yr)		0
Reuse Requested (ML/yr)		0
% Reuse Demand Met		0
% Load Reduction		-0.00228718
TSS Flow In (kg/yr)		76.8378
TSS ET Loss (kg/yr)		0
TSS Infiltration Loss (kg/yr)		0

TSS Low Flow Bypass Out (kg/yr)	0
TSS High Flow Bypass Out (kg/yr)	7.36536
TSS Orifice / Filter Out (kg/yr)	0
TSS Weir Out (kg/yr)	0
TSS Transfer Function Out (kg/yr)	40.9907
TSS Reuse Supplied (kg/yr)	0
TSS Reuse Requested (kg/yr)	0
TSS % Reuse Demand Met	0
TSS % Load Reduction	37.0673
TP Flow In (kg/yr)	0.466505
TP ET Loss (kg/yr)	0
TP Infiltration Loss (kg/yr)	0
TP Low Flow Bypass Out (kg/yr)	0
TP High Flow Bypass Out (kg/yr)	0.0194684
TP Orifice / Filter Out (kg/yr)	0
TP Weir Out (kg/yr)	0
TP Transfer Function Out (kg/yr)	0.272683
TP Reuse Supplied (kg/yr)	0
TP Reuse Requested (kg/yr)	0
TP % Reuse Demand Met	0
TP % Load Reduction	37.3744
TN Flow In (kg/yr)	4.1472
TN ET Loss (kg/yr)	0
TN Infiltration Loss (kg/yr)	0
TN Low Flow Bypass Out (kg/yr)	0
TN High Flow Bypass Out (kg/yr)	0.217924
TN Orifice / Filter Out (kg/yr)	0
TN Weir Out (kg/yr)	0
TN Transfer Function Out (kg/yr)	3.49802
TN Reuse Supplied (kg/yr)	0
TN Reuse Requested (kg/yr)	0
TN % Reuse Demand Met	0
TN % Load Reduction	10.3988
GP Flow In (kg/yr)	0
GP ET Loss (kg/yr)	0
GP Infiltration Loss (kg/yr)	0
GP Low Flow Bypass Out (kg/yr)	0
GP High Flow Bypass Out (kg/yr)	0
GP Orifice / Filter Out (kg/yr)	0
GP Weir Out (kg/yr)	0
GP Transfer Function Out (kg/yr)	0
GP Reuse Supplied (kg/yr)	0
GP Reuse Requested (kg/yr)	0
GP % Reuse Demand Met	0
GP % Load Reduction	100

Other nodes

Location	Receiving Node	
ID		9
Node Type	ReceivingNode	
IN - Mean Annual Flow (ML/yr)		3.31
IN - TSS Mean Annual Load (kg/yr)		62
IN - TP Mean Annual Load (kg/yr)		0.316
IN - TN Mean Annual Load (kg/yr)		3.9
IN - Gross Pollutant Mean Annual Load (kg/yr)		2.54
OUT - Mean Annual Flow (ML/yr)		3.31
OUT - TSS Mean Annual Load (kg/yr)		62
OUT - TP Mean Annual Load (kg/yr)		0.316
OUT - TN Mean Annual Load (kg/yr)		3.9
OUT - Gross Pollutant Mean Annual Load (kg/yr)		2.54
% Load Reduction		8.36
TSS % Load Reduction		80.4
TN % Load Reduction		50.2
TP % Load Reduction		57.8

GP % Load Reduction	97.5

Links

Location	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link	Drainage Link
Source node ID	1	2	6	4	8	10	5	3	11	7
Target node ID	7	6	8	8	10	9	8	8	9	8
Muskingum-Cunge Routing	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed	Not Routed
Muskingum K										
Muskingum theta										
IN - Mean Annual Flow (ML/yr)	0.954	1.07	0.956	0.257	3.23	3.23	1.18	6.41E-02	8.59E-02	0.837
IN - TSS Mean Annual Load (kg/yr)	24.9	28.3	23.4	47.6	77	48.4	200	1.7	13.6	20.2
IN - TP Mean Annual Load (kg/yr)	0.143	0.162	0.142	7.51E-02	0.467	0.292	0.336	9.67E-03	2.31E-02	0.123
IN - TN Mean Annual Load (kg/yr)	2.1	2.33	2.05	0.563	4.15	3.72	2.52	0.142	0.179	1.82
IN - Gross Pollutant Mean Annual Load (kg/yr)	26.1	29.3	0	7.01	0	0	34.7	1.75	2.54	0
OUT - Mean Annual Flow (ML/yr)	0.954	1.07	0.956	0.257	3.23	3.23	1.18	6.41E-02	8.59E-02	0.837
OUT - TSS Mean Annual Load (kg/yr)	24.9	28.3	23.4	47.6	77	48.4	200	1.7	13.6	20.2
OUT - TP Mean Annual Load (kg/yr)	0.143	0.162	0.142	7.51E-02	0.467	0.292	0.336	9.67E-03	2.31E-02	0.123
OUT - TN Mean Annual Load (kg/yr)	2.1	2.33	2.05	0.563	4.15	3.72	2.52	0.142	0.179	1.82
OUT - Gross Pollutant Mean Annual Load (kg/yr)	26.1	29.3	0	7.01	0	0	34.7	1.75	2.54	0

Catchment Details

Catchment Name	20160518_MUSIC_20171116
Timestep	6 Minutes
Start Date	1/01/1999
End Date	31/12/2008 23:54
Rainfall Station	
ET Station	User-defined monthly PET
Mean Annual Rainfall (mm)	902
Mean Annual ET (mm)	1408
MUSIC-link Area	North Region
MUSIC-link Scenario	North Region

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NEIGHBOUR FACADE STUDY	4
ESPLANADE NEIGHBOUR : PLANS	5
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THE ESPLANADE : OVERLOOKING STUDY	8
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PROJECT BACKGROUND

In 2016 Stewart Architecture and SHAC prepared a design for a new mixed use development at Lots 1-3 of DP 155951, Lot 2 of DP 1116535 and Lots 3-4 of DP 32518

A Development Application was submitted in April 2017 following consultation with Council and relevant government entities. During consultation with the Lake Macquarie Design Review Panel it was requested to prepare a report to confirm the interface to southern properties and justify the design proposal in terms of interface and overshadowing.

PURPOSE OF THE REPORT & EXECUTIVE SUMMARY

This report provides careful analysis of the existing development to the south of the proposal and confirms that the proposal

1. Has less overshadowing impact than that permitted by the building envelope under the Apartment Design Guide (ADG),
2. Maintains greater than minimum solar access requirements to the existing residential dwellings to the South.
3. Has minimal overlooking opportunities to the private open space of the existing residential dwellings to the South.

ENVELOPE ANALYSIS : WARNERS BAY

The following report examines the solar impact of the proposed 'Lakehouse Village' to its Southern neighbours. Parameters for the comparison have been drawn from the Apartment Design Guide (ADG): particularly regarding maximum permissible building depths, building separation, setbacks, landscaped area and solar access. The 'permitted form' is described further on page 8.

The impact of the propose 'Lakehouse Village' scheme has been examined in direct comparison with a 'maximum permitted form' under the ADG. Careful analysis has been undertaken to identify all 'habitable rooms' of the adjoining southern neighbours to effectively assess the impact of both masses.

The Development Control Plan (DCP) also provides design guidance for the site, particularly with respect to The Esplanade Street wall.

The following pages outline the 'habitable rooms' of the neighbouring building and portray shadow analysis of each scheme to the habitable rooms' windows in question.

WEST ELEVATION
PROPOSED DESIGN (BLACK) VS ADG PERMITTED FORM (DASHED BLUE)

SECTION NORTH:SOUTH
PROPOSED DESIGN (BLACK) VS ADG PERMITTED FORM (DASHED BLUE)

LAKEHOUSE VILLAGE | WARNERS BAY

NEIGHBOUR FACADE STUDY

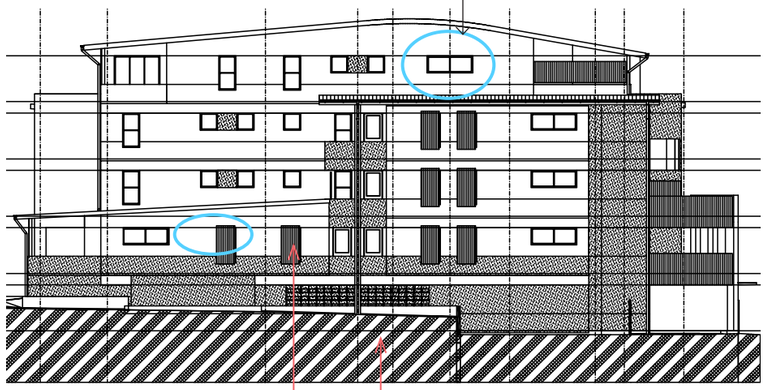
THE ESPLANADE NEIGHBOUR

NOTE : LIVING ROOM WINDOWS CIRCLED BLUE

EAST ELEVATION

DEEPLY RECESSED BALCONY

BLUE CIRCLE INDICATES A LIVING ROOM



NORTH ELEVATION (FACING THE SITE)

DENSE ESTABLISHED PLANTING BETWEEN THIS ELEVATION AND PROPOSED DESIGN'S SITE

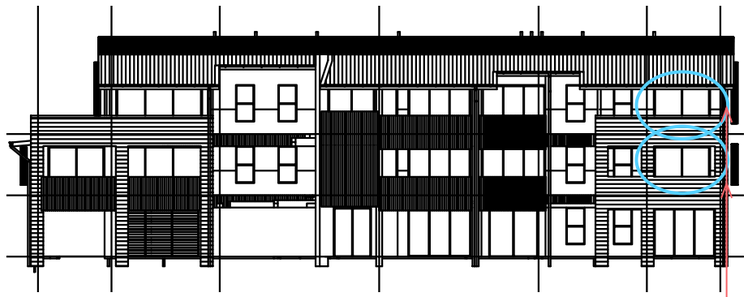
WEST (STREET) ELEVATION

DEEPLY RECESSED BALCONY

NOTE: EXTERNAL SCREENING SHOWN ON DOCUMENTATION HAS NOT BEEN CONSTRUCTED

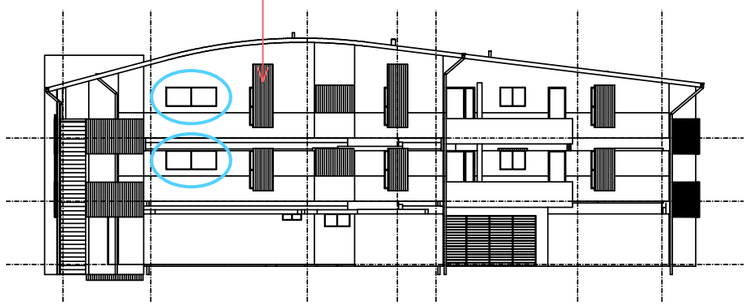
HOWARD STREET NEIGHBOUR

NOTE : LIVING ROOM WINDOWS CIRCLED BLUE

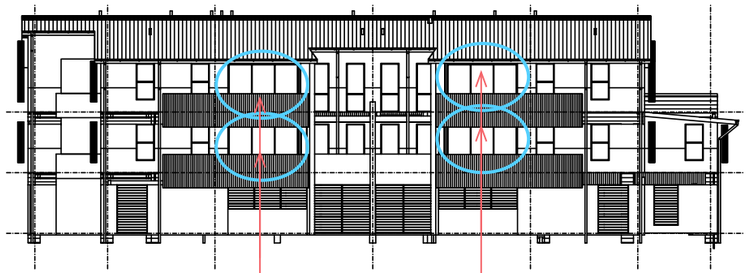


EAST (STREET) ELEVATION

DEEPLY RECESSED BALCONIES



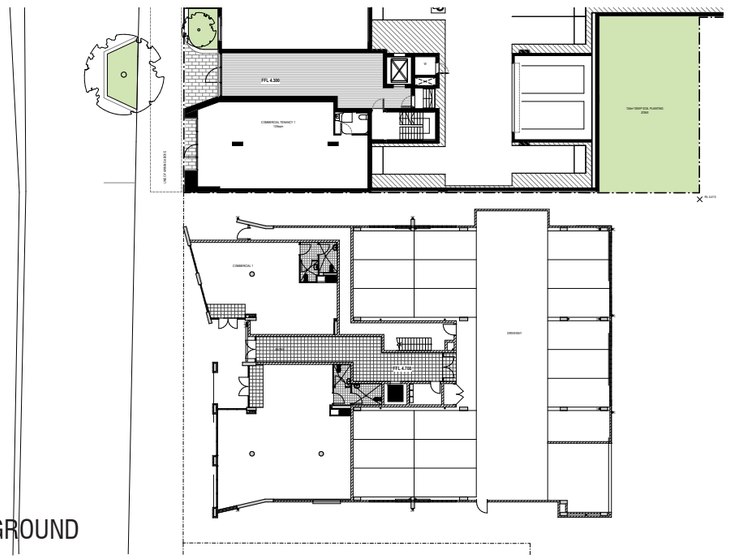
NORTH ELEVATION (FACING THE SITE)



WEST ELEVATION

DEEPLY RECESSED BALCONIES

THE ESPLANADE NEIGHBOUR PLANS



GROUND

Redacted

Redacted

Redacted

Redacted

LEVEL 1

Redacted

Redacted

Redacted

LEVEL 2

Redacted

LEVEL 3

Redacted

LEVEL 4

Redacted

ROOF

LIVING

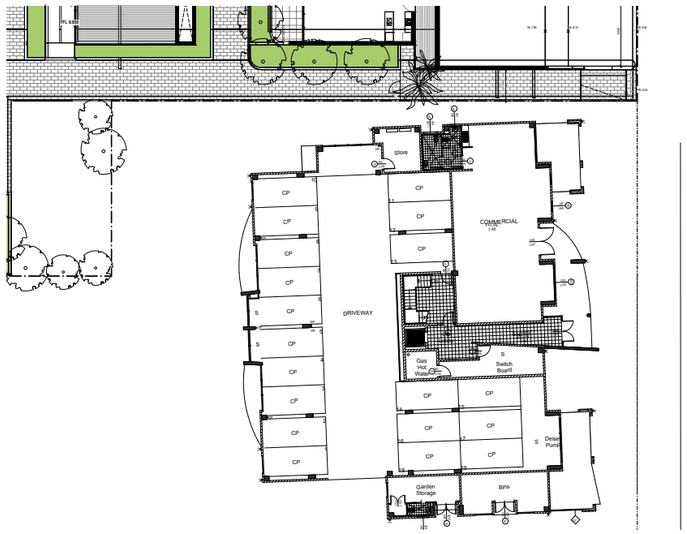
DINING

BEDROOM

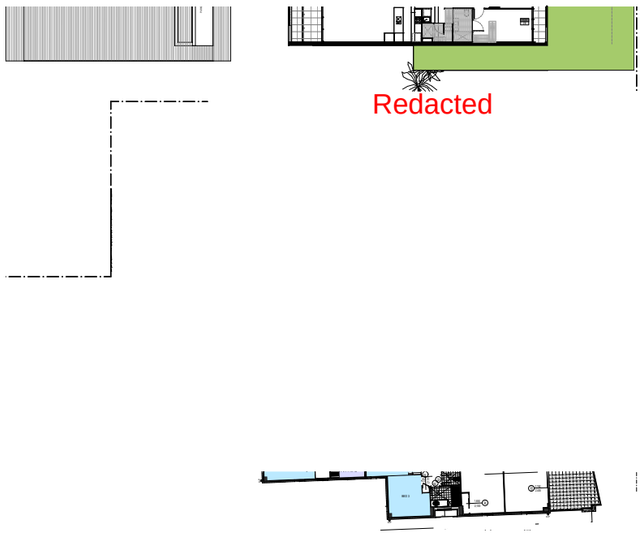
WET AREA

LAKEHOUSE VILLAGE | WARNERS BAY

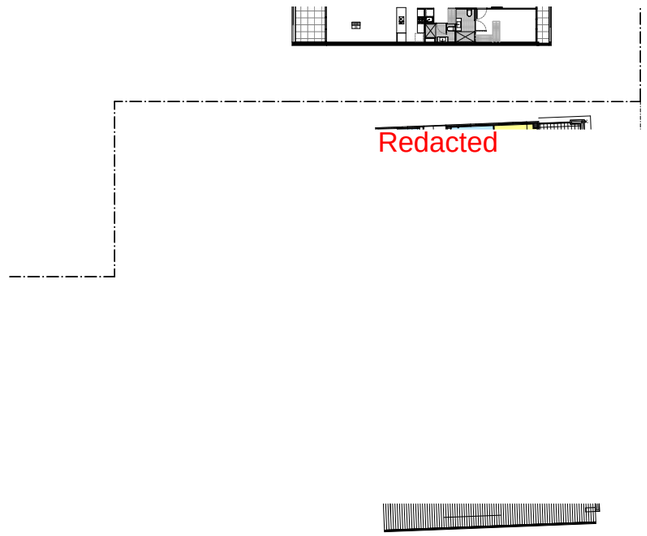
HOWARD STREET NEIGHBOUR PLANS



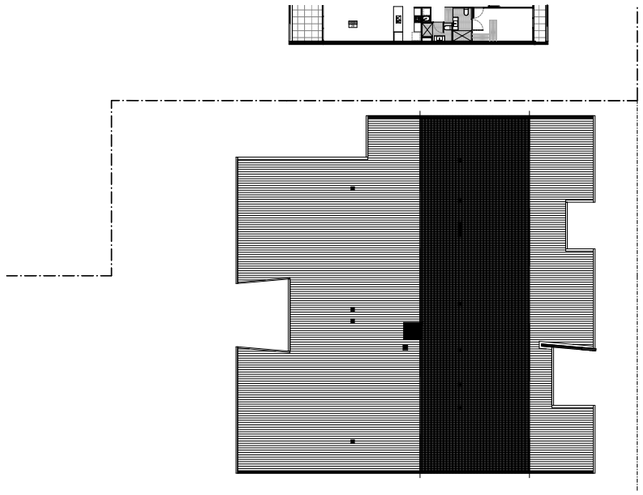
GROUND



LEVEL 1



LEVEL 2



ROOF

LIVING

DINING

BEDROOM

WET AREA

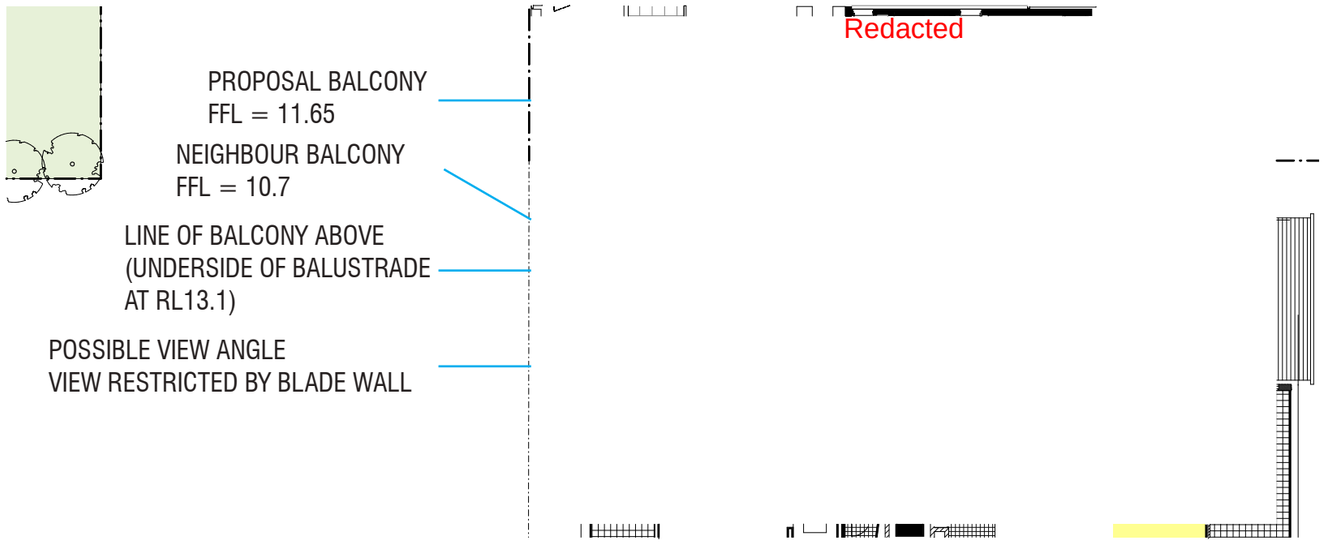
THE ESPLANADE - OVERLOOKING STUDY

REFER PAGE 11 FOR FURTHER

Redacted

NO OVERLOOKING DUE
TO STREET WALL

LE



Redacted

PROPOSAL BALCONY
FFL = 11.65

NEIGHBOUR BALCONY
FFL = 10.7

LINE OF BALCONY ABOVE
(UNDERSIDE OF BALUSTRADE
AT RL13.1)

POSSIBLE VIEW ANGLE
VIEW RESTRICTED BY BLADE WALL

LEVEL 2

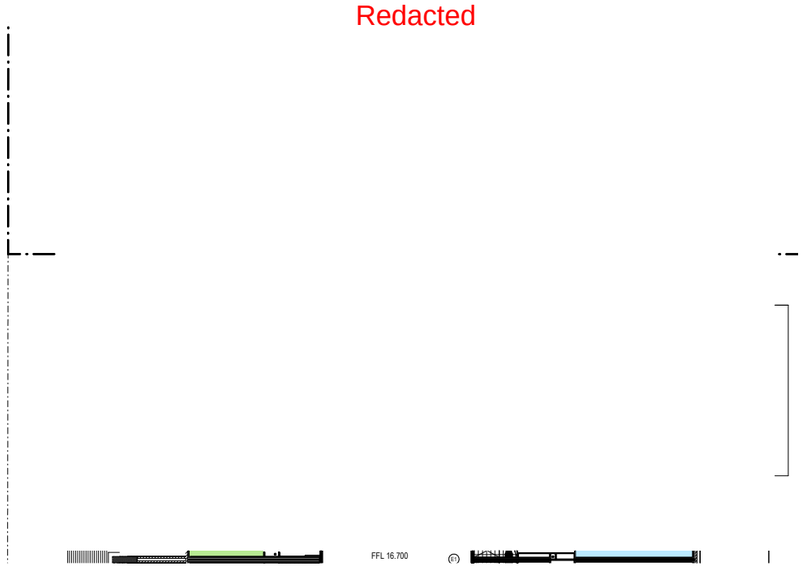
Redacted

PROPOSAL BALCONY
FFL = 14.65

PROPOSAL BALCONY
FFL = 13.7

POSSIBLE VIEW ANGLE
VIEW RESTRICTED BY
BLADE WALL

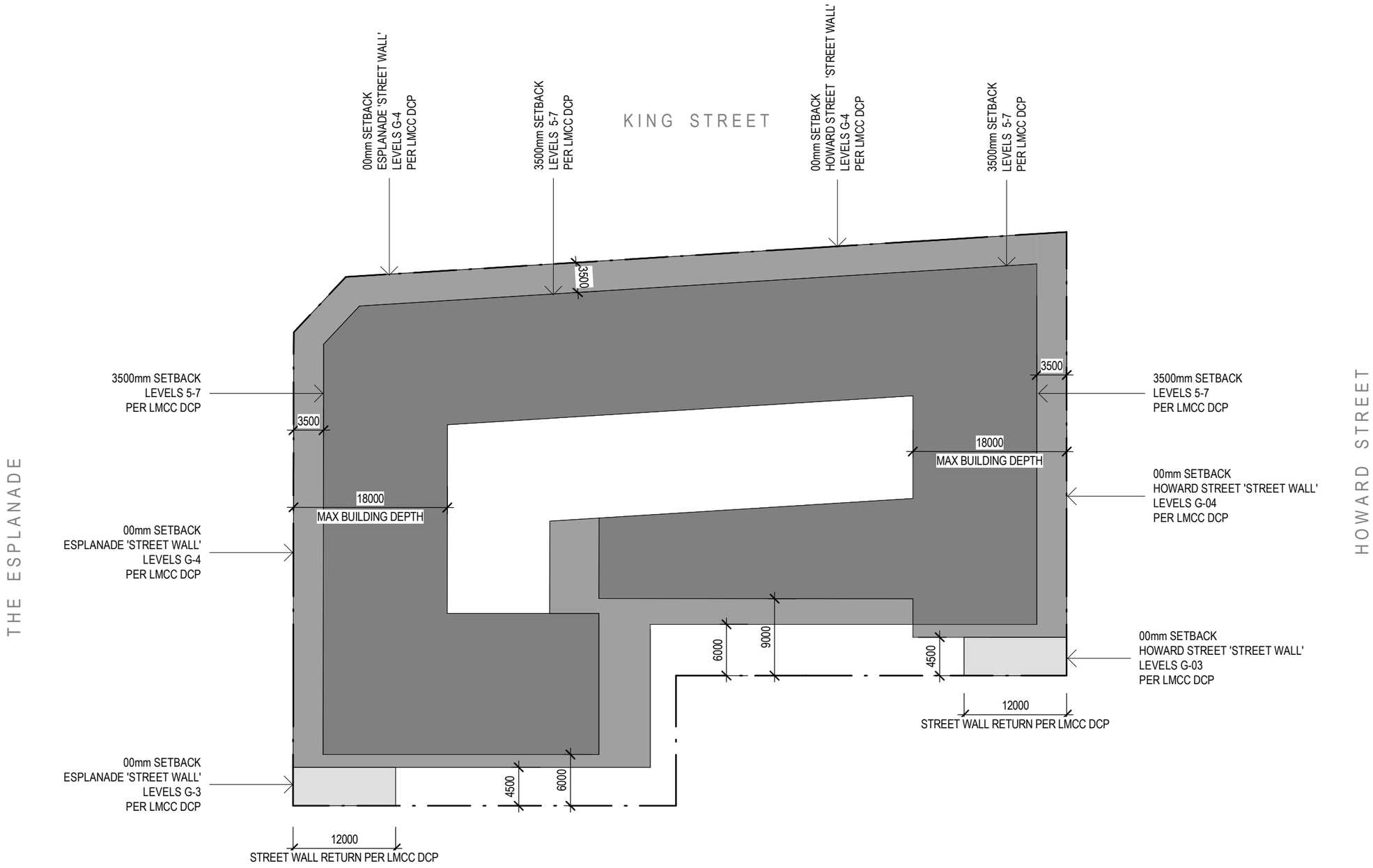
LE



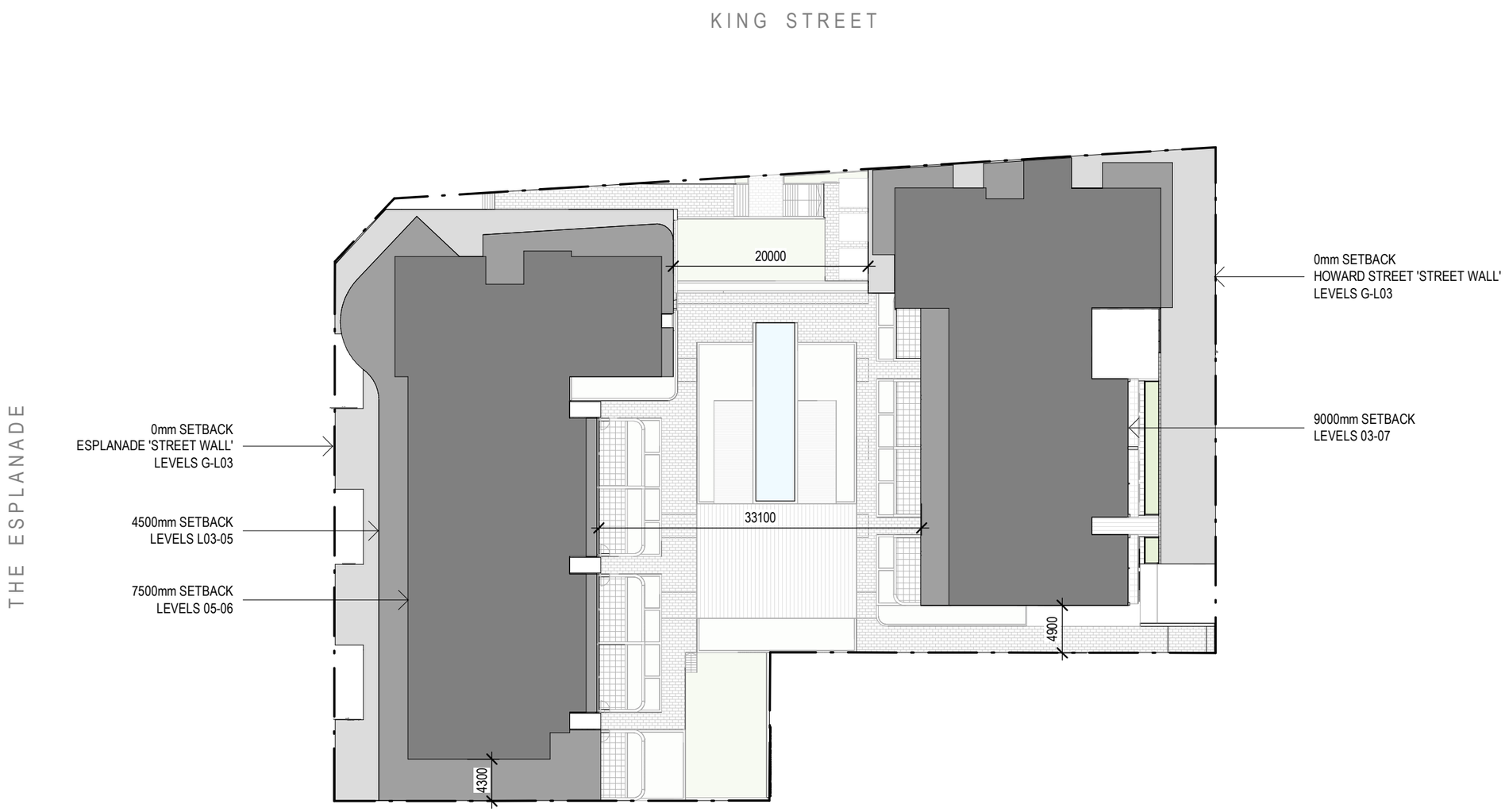
LEVEL 4

LAKEHOUSE VILLAGE | WARNERS BAY

ADG - PERMITTED FORM
SITE PLAN



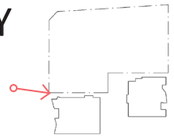
PROPOSED DESIGN
SITE PLAN



LAKEHOUSE VILLAGE | WARNERS BAY

THE ESPLANADE | VIEW A

WINTER SOLSTICE



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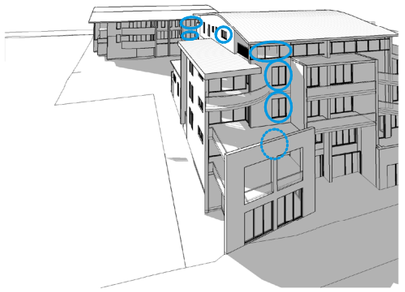

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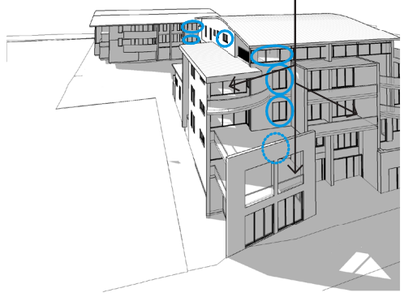

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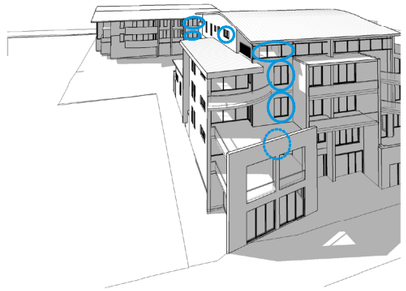

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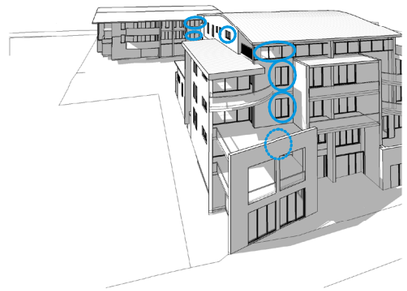
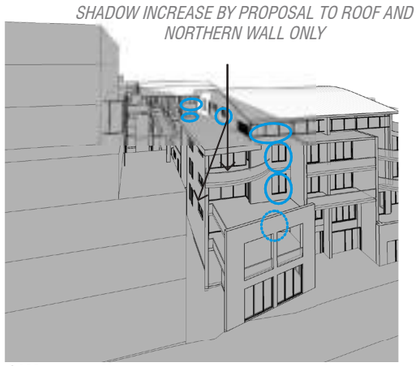


12PM

ADG PERMITTED FORM



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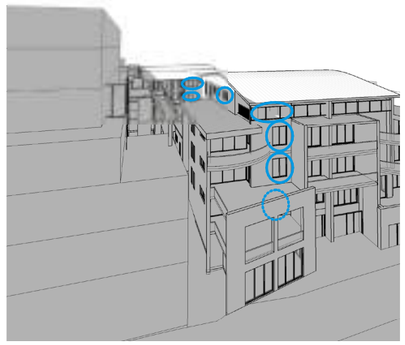

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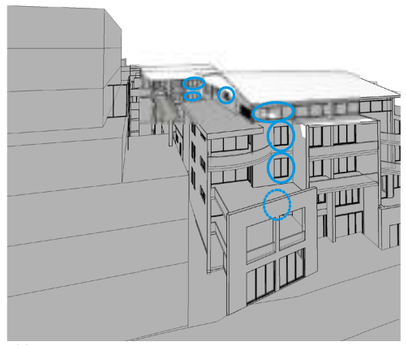

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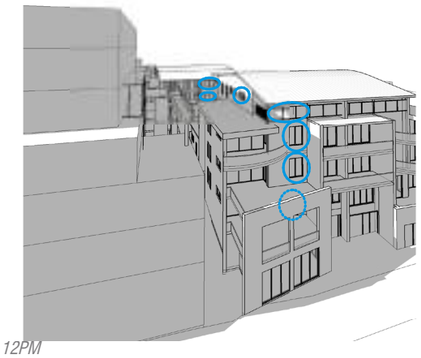
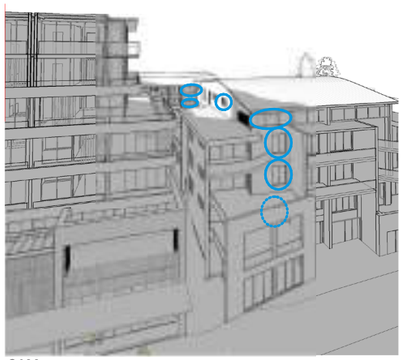


12PM

THE PROPOSAL



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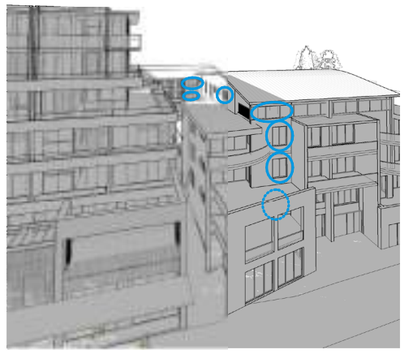

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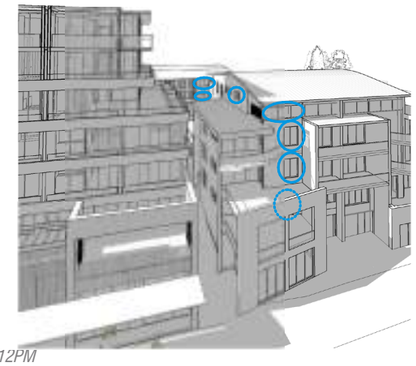

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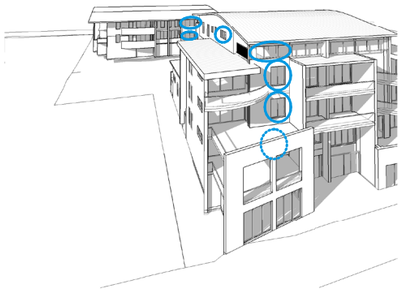

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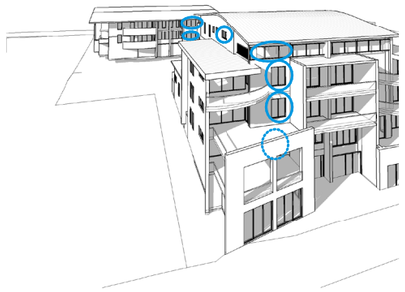

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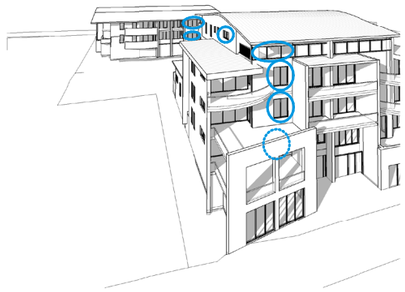

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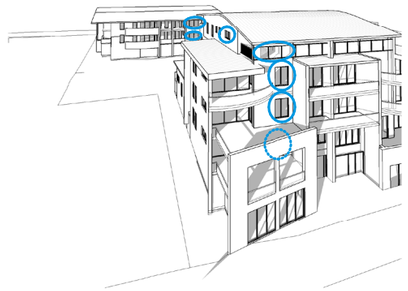
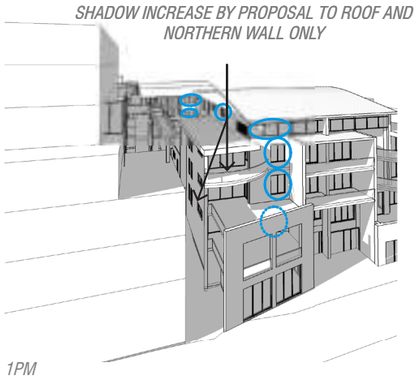


4PM

SHADOW INCREASE BY PROPOSAL TO ROOF AND NORTHERN WALL ONLY



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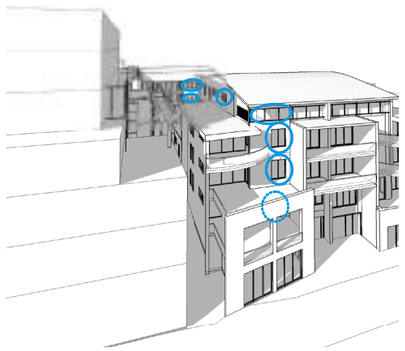

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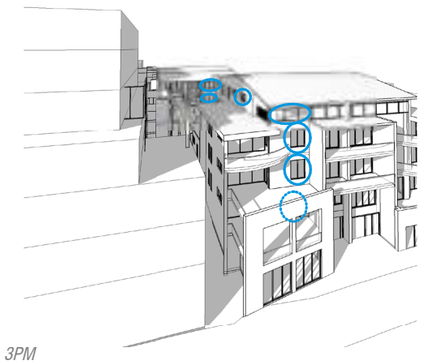

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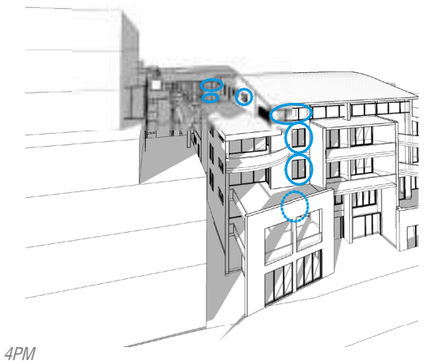

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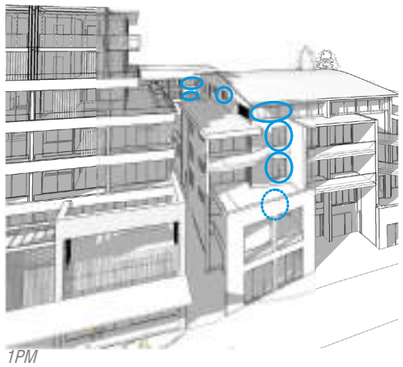

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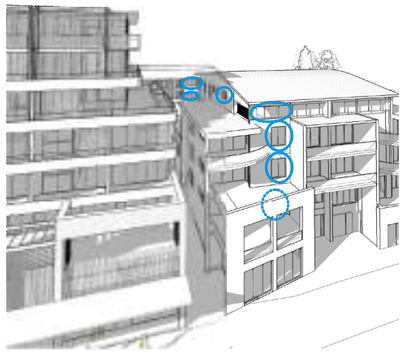

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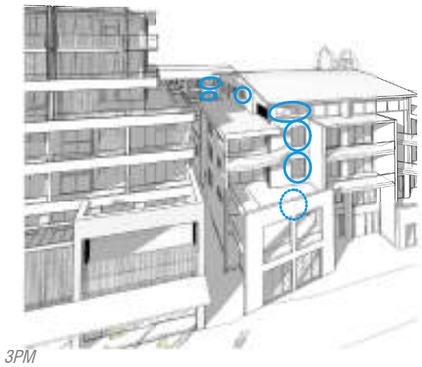

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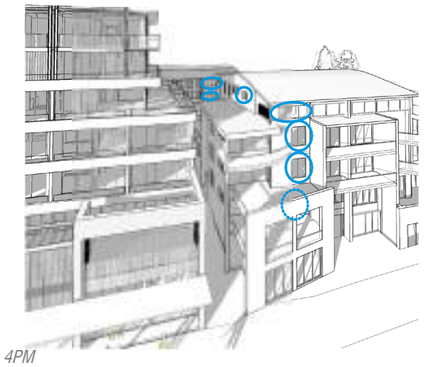


4PM

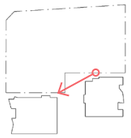
CONCLUSION

THE PROPOSAL HAS LESS AN OVERSHADOWING IMPACT TO THE LIVING SPACES (AND PRIVATE OPEN SPACES) OF THE NEIGHBOURNG DWELLING THAN THE ADG PERMITTED FORM

LAKEHOUSE VILLAGE | WARNERS BAY

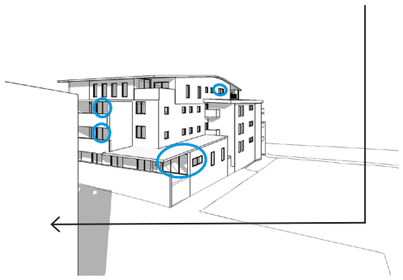
THE ESPLANADE | VIEW B

WINTER SOLSTICE



HOWARD ST NEIGHBOUR (ELEVATION)

EXISTING



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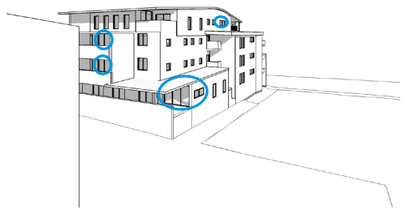

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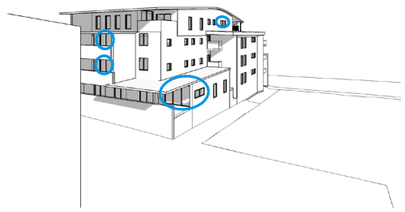

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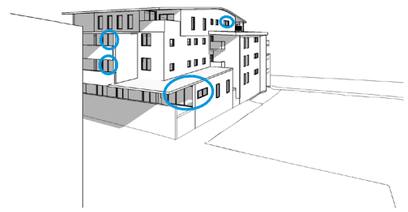
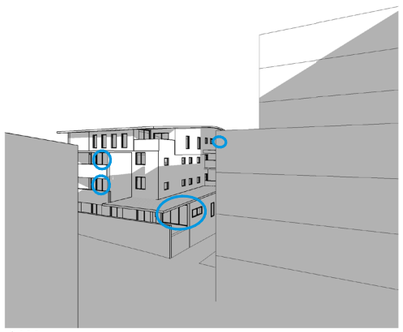


12PM

ADG PERMITTED FORM



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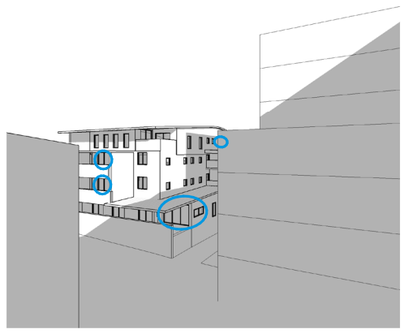

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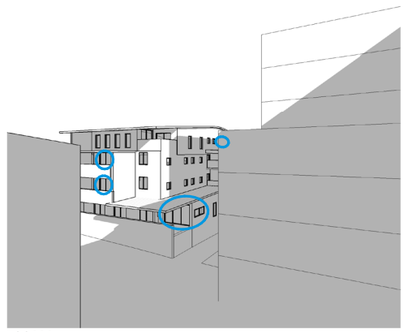

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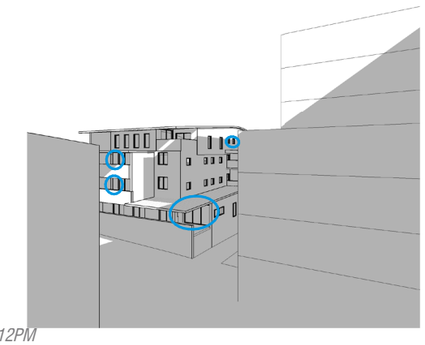
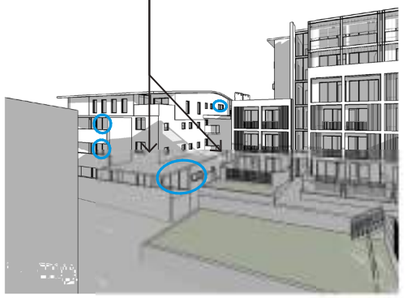


12PM

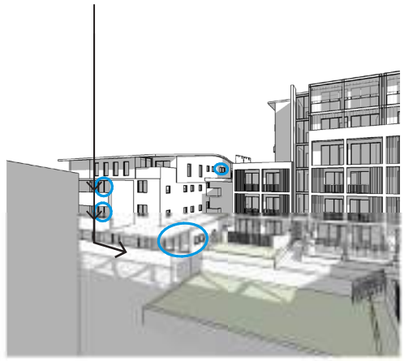
THE PROPOSAL

SHADOW FROM PROPOSAL



9AM

SELF-SHADING



10AM

11AM

12PM

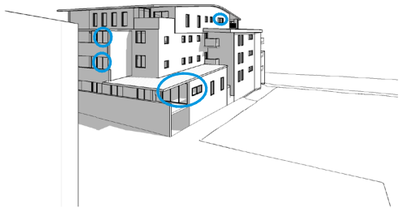
THEPROPOSAL MODIFIED TO CONFORM WITH ADG BUILDING ENVELOPE

9AM

10AM

11AM

12PM



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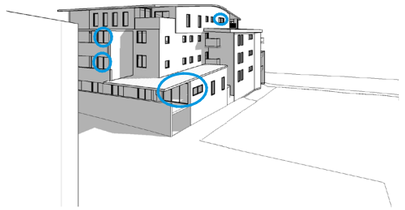

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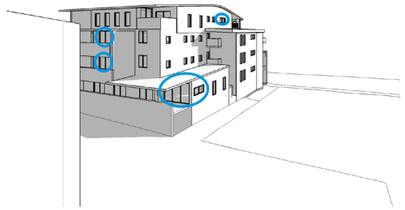

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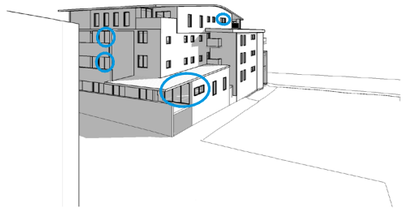

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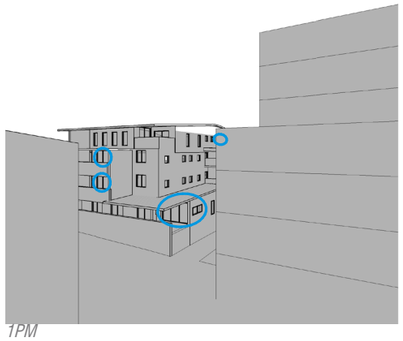

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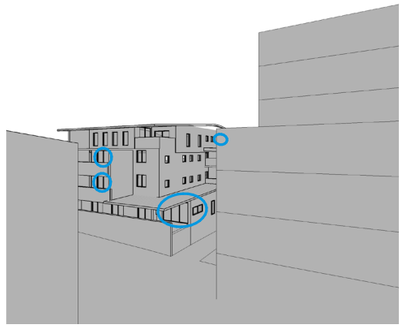

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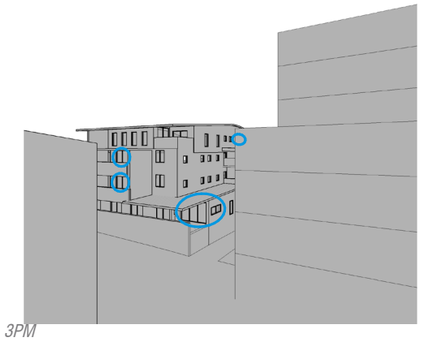

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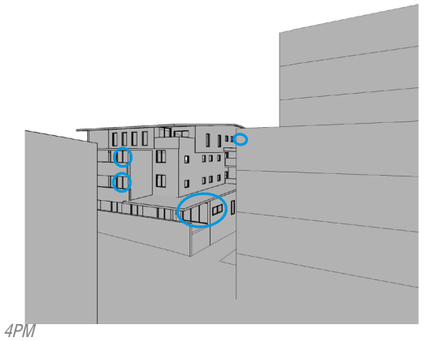
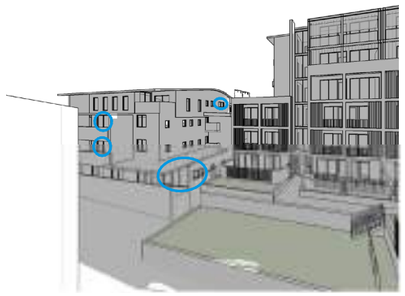


4PM

1PM



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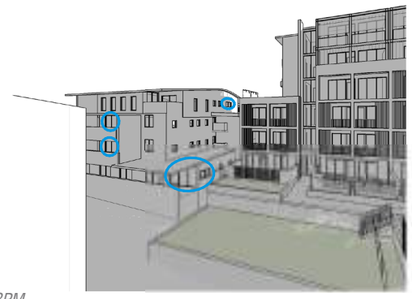

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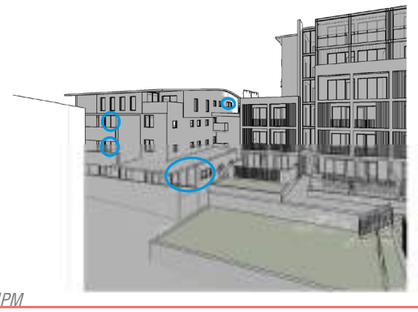


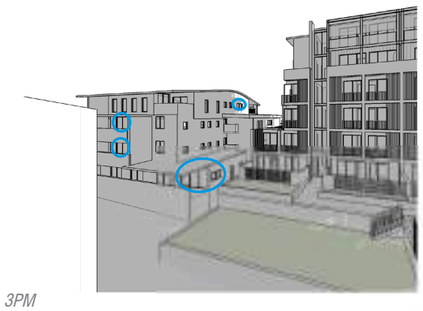
4PM

CONCLUSION

THE PROPOSAL HAS LESS AN OVERSHADOWING IMPACT TO THE LIVING SPACES (AND PRIVATE OPEN SPACES) OF THE NEIGHBOURNG DWELLING THAN THE ADG PERMITTED FORM

1PM

2PM



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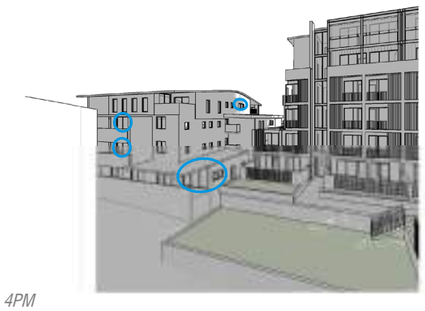


4PM

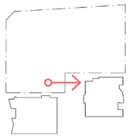
CONCLUSION

THERE IS VERY MINOR IMPROVEMENT TO OVERSHADOWING 9AM TO 11AM, BUT NOT TO HABITABLE ROOMS

LAKEHOUSE VILLAGE | WARNERS BAY

THE ESPLANADE | VIEW B

WINTER SOLSTICE



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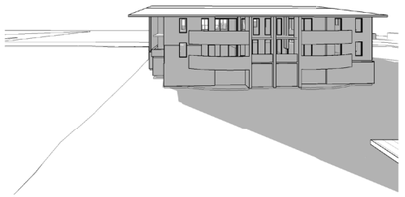
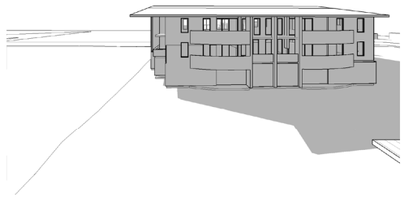


9AM



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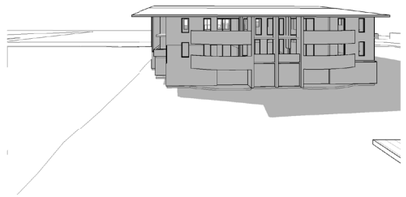

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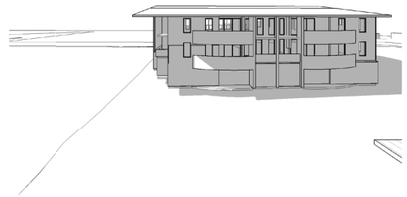

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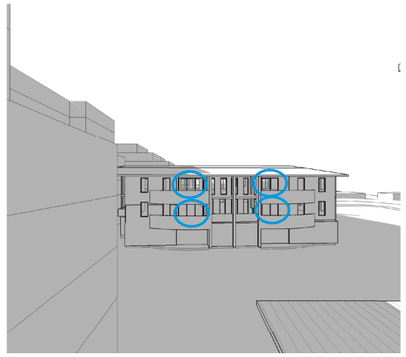

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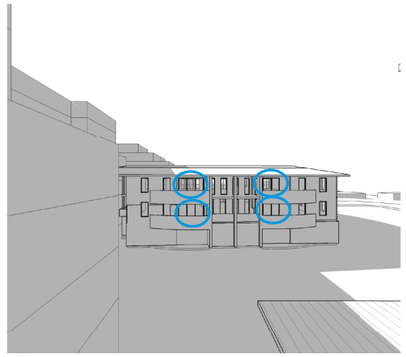

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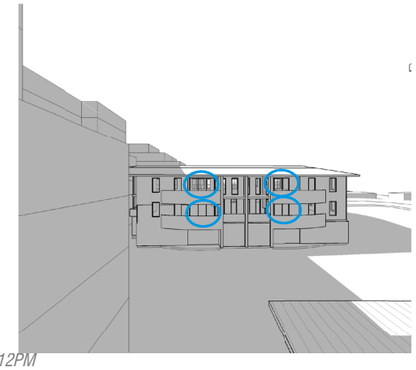

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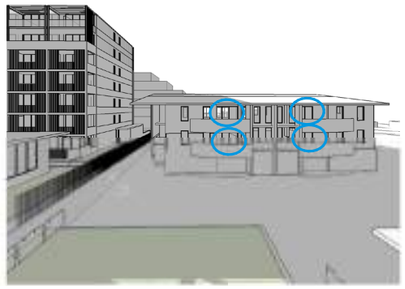

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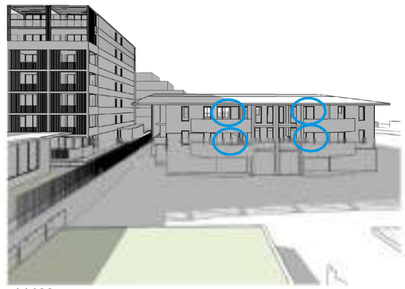

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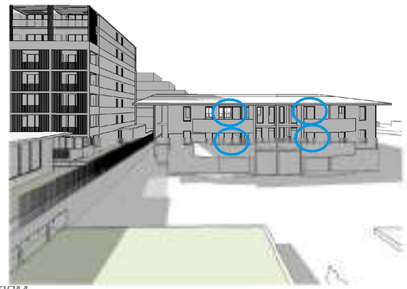

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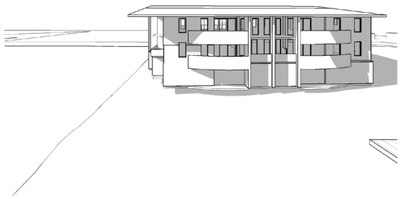

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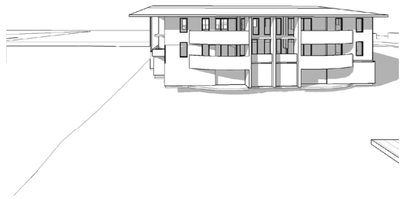

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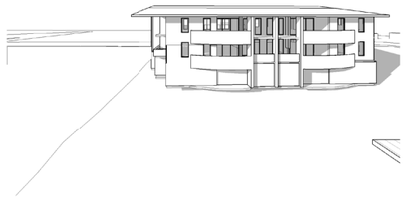

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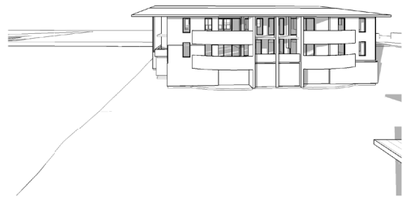

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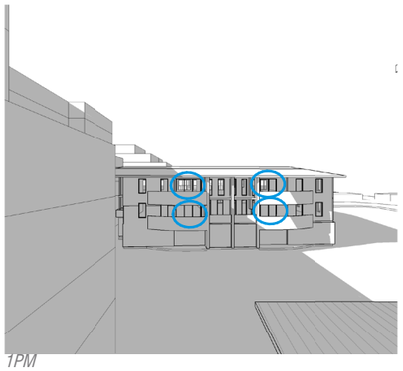

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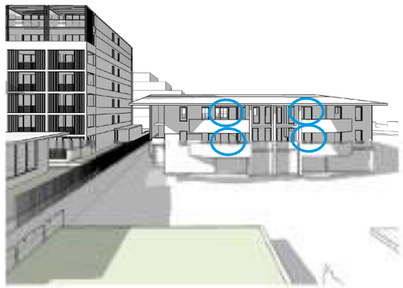

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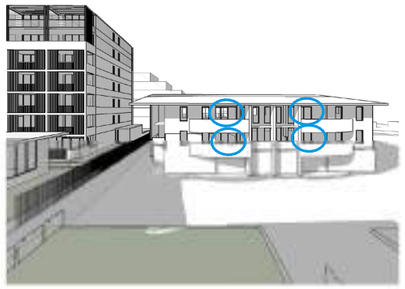

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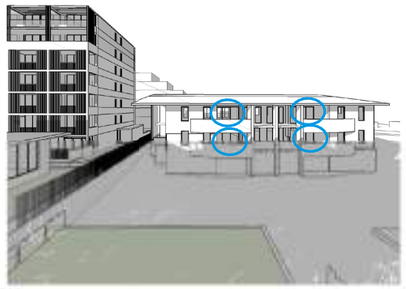

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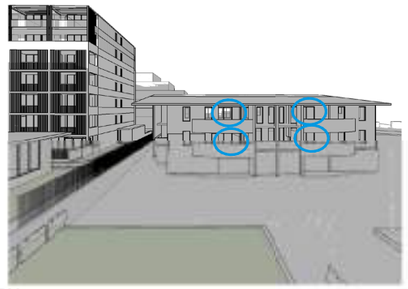

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CONCLUSION

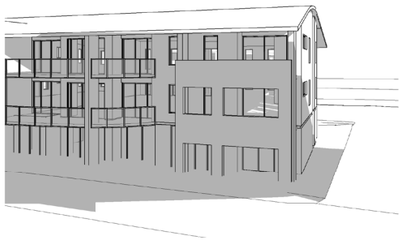
THE PROPOSAL HAS LESS AN OVERSHADOWING IMPACT TO THE LIVING SPACES (AND PRIVATE OPEN SPACES) OF THE NEIGHBOURNG DWELLING THAN THE ADG PERMITTED FORM

LAKEHOUSE VILLAGE | WARNERS BAY

THE ESPLANADE | VIEW B

WINTER SOLSTICE

EXISTING



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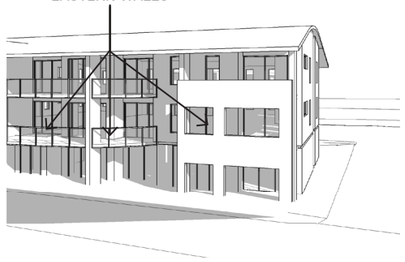

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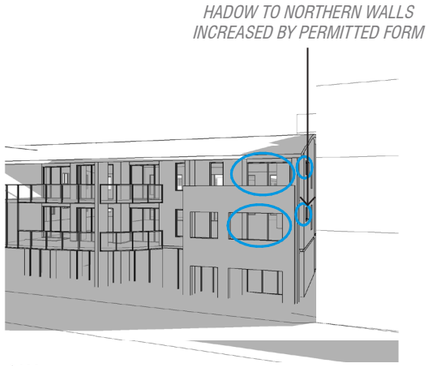

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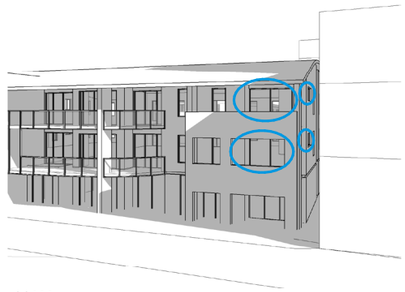

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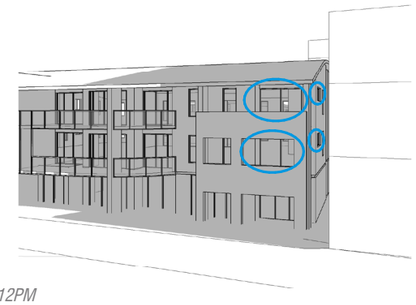

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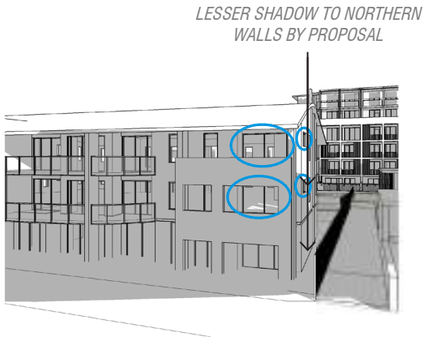

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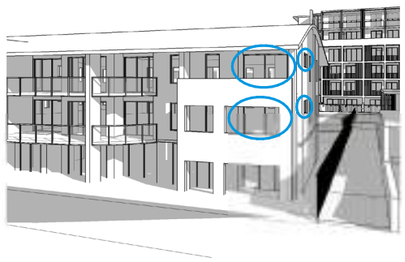

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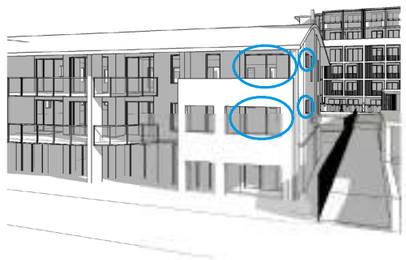

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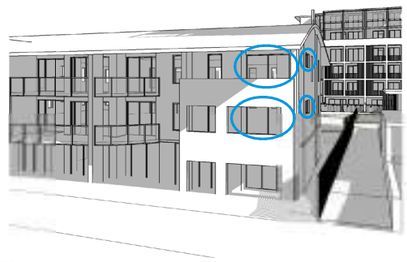

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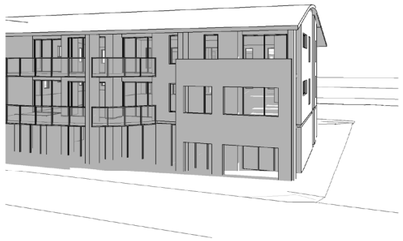

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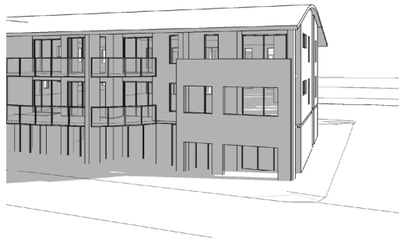

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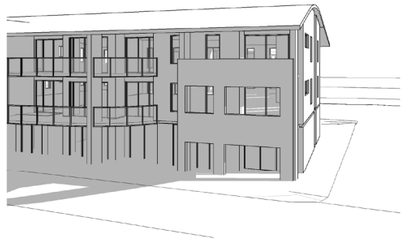

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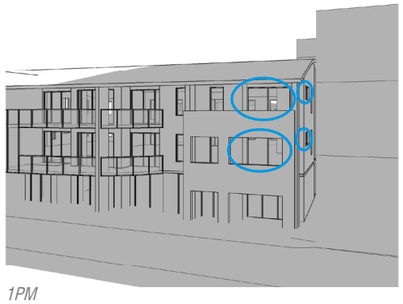

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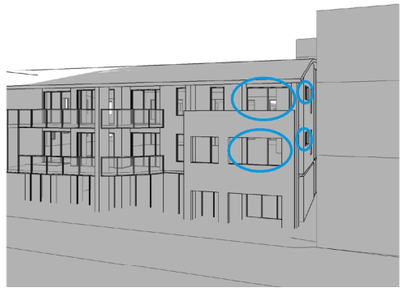

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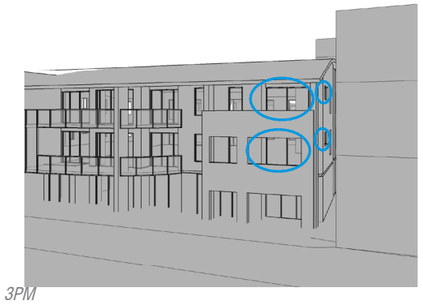

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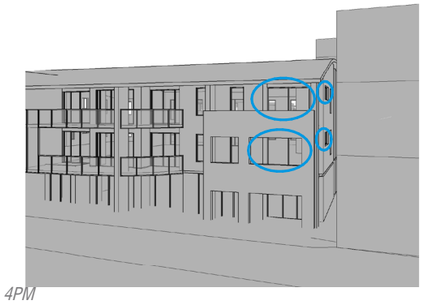

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CONCLUSION

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ANALYSIS

THE ESPLANADE NEIGHBOUR

	ADG ENVELOPE								
UNIT	0900	1000	1100	1200	1300	1400	1500	1600	TOTAL
1-1	N	N	N	N	N	N	N	N	0
1-2	N	N	N	N	N	N	N	N	0
2-1	N	N	N	N	N	Y	Y	Y	3 ✓
2-2	N	N	N	N	N	N	N	N	0
3-1	N	N	N	N	N	Y	Y	Y	3 ✓
3-2	N	N	N	N	N	N	N	N	0
4-1	N	Y	Y	Y	Y	Y	Y	Y	7 ✓

	PROPOSED DESIGN								
UNIT	0900	1000	1100	1200	1300	1400	1500	1600	TOT.
1-1	N	N	N	N	N	N	N	N	0
1-2	N	Y	Y	Y	N	N	N	N	3 ✓
2-1	N	N	N	N	Y	Y	Y	Y	4 ✓
2-2	N	N	N	N	N	N	N	N	0
3-1	N	N	N	N	Y	Y	Y	Y	4 ✓
3-2	N	N	N	N	N	N	N	N	0
4-1	N	N	N	N	Y	Y	Y	Y	4 ✓

HOWARD STREET NEIGHBOUR

	ADG ENVELOPE								
UNIT	0900	1000	1100	1200	1300	1400	1500	1600	TOT.
1-1	N	N	N	N	N	N	N	N	0
1-2	N	N	N	N	N	N	N	N	0
1-3	N	N	N	N	N	N	N	N	0
2-1	N	N	N	N	N	N	N	N	0
2-2	N	N	N	N	N	N	N	N	0
2-3	N	N	N	N	N	N	N	N	0

	PROPOSED DESIGN								
UNIT	0900	1000	1100	1200	1300	1400	1500	1600	TOT.
1-1	Y	Y	N	N	N	N	N	N	2 ✓
1-2	N	N	N	N	N	N	N	N	0
1-3	N	N	N	N	N	N	N	N	0
2-1	Y	Y	N	N	N	N	N	N	2 ✓
2-2	N	N	N	N	N	N	N	N	0
2-3	N	N	N	N	N	N	N	N	0

The following pages outline the comparative solar analysis of the proposed design ('Lakehouse Village') with the ADG's maximum permitted form.

In keeping with the solar requirements under the ADG, solar access to living rooms in particular are examined. For clarity, the windows to these rooms are circled in blue.

Four views ('Esplanade A', ' Esplanade B' and 'Howard A' and 'Howard B') are depicted to ensure all appropriate windows are captured. The results are tabulated to the left. For the purposes of this report, only those units neighbouring the site in question have been examined.

It should be noted that for many of the units, particularly those within the Howard Street Neighbour, solar amenity is not impacted as the design of the neighbouring buildings features deep balconies: self-shading the living areas of the units below. However, for units 1-2, 1-3, 2-2 and 2-3 of the Howard Street Apartment block, the proposal facilitates more sun to the balconies than the maximum permitted envelope under the ADG.

Further, extensive non-deciduous established planting in the neighbouring site has an impact on current shading levels and should be considered in relation to the proposed design's actual impact.

The result of this analysis shows that the Proposed Design only impacts upon 1x of the neighbouring dwellings' units. This impact; however, does not reduce the solar access of the unit in question below the requirement of the ADG.

The Proposed Design for 5x other adjoining units has a lesser overshadowing impact than that of the maximum permitted envelope under the ADG. The proposal increases solar access to the living spaces of these units in question by a range of 1-3 hours in total. Therefore, the proposed design facilitates greater solar access than the ADG permitted envelope in 5 instances.

Y SOLAR ACCESS AT THE SPECIFIED HOUR

N NO SOLAR ACCESS AT THE SPECIFIED HOUR

✓ GREATER THAN MINIMUM SOLAR ACCESS PER THE ADG

GREATER SOLAR ACCESS THAN THAT UNDER THE ADG ENVELOPE

LESSER SOLAR ACCESS THAN THAT UNDER THE ADG ENVELOPE

THE ESPLANADE - OVERLOOKING STUDY

WEST ELEVATION

The diagrams on the preceding page outline the extent of overlooking from the proposal to the existing neighbour's private open space.

The first level of residential units in the proposal do not have opportunty to overlook the neighbouring private open space due to the return of the street wall. The height of this wall limits views southward: instead opening to the West towards the Lake.

The second level of residential units in the proposal have limited opportunities to overlook the neighbouring private open space. This is mitigated by:

- The neighbouring 'blade wall' which removes overlooking to approximately a third of the balcony,
- The level difference between the two properties; whereby the level of units of the proposal is slightly higher than their neighbouring level causing the underside of slab of the upper level balcony to limit overlooking to some extent,

The third level of residential units in the proposal has minimal opportunties for overlooking, with much of the neighbouring balcony being shielded by the existing blade wall.

The result of this analysis is that it is considered that overlooking to the neighbouring private open space is therefore minimal in nature.

This is vastly due to the existing blade wall on the neighbouring building, which shields the existing balconies from most overlooking opportunities.

Tuesday 11 April 2017

Our Ref: MN9157

Stewart Architecture
36 Mildura Street
FYSHWICK ACT 2609

Attention: Hannah Walsh

Dear Hannah,

RE: Warners Bay Lake House Apartments
Section J Compliance

We have undertaken a review of the architectural documentation of the proposed development in terms of meeting compliance with Section J of the Building Code of Australia.

The building is capable of being detailed to meet compliance with the requirements of Section J.

A detailed report on glazing, insulation requirements and building sealing will be provided prior to Construction Certificate.

The building services will be designed to comply with Section J and will be certified by the relevant engineering services consultants.

Yours faithfully
Marline Newcastle Pty Limited

Brian Hunt
Managing Director

Managing Director Brian Hunt, BE, MBA MIEAust
Director Daniel White, BE (Hons), B.BUS, MIEAust
Director Brendan Maher
Associate Director Keld Hoyer
ABN / ACN 612 456 381

Unit 4 239 King Street
Newcastlle NSW 2300
P 02 4925 9300
mail@marline.com.au
www.marline.com.au

STEWART ARCHITECTURE

36 Mildura Street Fyshwick ACT 2609
PO Box 3469 Manuka ACT 2603
www.stewartarchitecture.com.au
T 02 6228 1200

Response to Council & SEPP Commentary

Prepared to accompany the Revised Development Application submitted to Lake Macquarie City Council. It outlines our response to comments made by the SEPP65 Urban Design Review Panel in December 2016 and June 2017 (SEPP65/16/2016) and Lake Macquarie City Council in July 2017 and October 2017 (DA/675/2017).

Project Address:
Comprising a number of lots of the following addresses;
482 – 488 the Esplanade, Warners Bay
12 – 16 King Street, Warners Bay
1 Howard Street, Warners Bay

COMMENT	REGARDING	RESPONSE
1ia) 1.	Do living areas of adjoining development achieve at least 2 hours direct sunlight	Yes. The proposed development does not reduce solar access below 2 hours direct sunlight for any unit. **Refer Shadow Analysis Report for further information**
1ia) 2.	If not, is shadow by the proposal worse than the 'complying development'	N/A Adjoining dwellings receive a minimum 2 hours direct sunlight
1ia) 3	Would removing setback breaching elements reduce the extent of overshadowing of living rooms to the south	No. Note: 1x breaching unit has been removed on Level 4 of the Esplanade in response to streetscape and interface comments. This has not impacted solar access to southern living units of the adjoining property.
1ib)	Further setback at Level 4 of the Esplanade building	The design team have considered this comment, and have proceeded with removing the non-complying unit on level 4 to improve interface between the developments
1ii)	a) Differentiation of public/private zones b) Carpark Exhaust c) Materials board	a) The design team are of the opinion that a re-design of the podium will not result in a clearer resolution to this issue. They are proposing the following to further differentiate the public/private domain; without detrimental impact to either the spaces or the inhabitants of those spaces: 1. The retaining wall and planter which separates the public/private spaces is proposed to be 1m in height. This will deter climbing opportunities particularly once planting is established, but still maintain appropriate views and interaction with the planting. 2. An increase in width to this planter will further deter climbing opportunities as well as increasing the zone of planting. b) The carpark exhaust has been carefully designed to ensure it complies with all Australian Standard and NCC Requirements. Furthermore, the design team believe the carpark exhaust is optimally located to avoid impacts to both the basement and podium levels. The exhaust will not be relocated. c) **Refer to materials board submitted**
2i)	Bar windows to the northern glazing of Tenancy 4	These have been incorporated. **Refer updated Architectural Elevations**
2ii)	Additional toilet to Tenancy 4	This tenancy is to be considered as one tenancy (not split) therefore an additional toilet will not be incorporated.
2iii)	'Safety' Comments	Refer to response to 1iia). Additionally, security gates are provided at key entrance locations to the podium level to differentiate the private and public domain. **Refer to updated Architectural Plans**
2iv)	Relocate Carpark Exhaust	Refer to response to 1iib)
2v)	Awning buildability	**Refer to accompanying awning report prepared by Stewart Architecture**
2vi)	Weatherproofing to zones behind awning	A glazed roof will connect from the proposed awning to the building to weatherproof entry zones. **Refer amended architectural documentation**
2vii)	Access to storage cages	Note: plans have been updated following more considered carpark allocation **Refer to updated Architectural Plans**
2viii)	Access Door	Note: plans have been updated following more considered carpark allocation **Refer to updated Architectural Plans**
2ix)	Wheel stops	Note: plans have been updated following more considered carpark allocation **Refer to updated Architectural Plans**
3	Fire Resisting Construction	The proposal will comply with the requirements of the NCC. This will be addressed at CC and Construction stage for sign off by a certifier.
	Type of Construction Required	The proposal will comply with the requirements of the NCC. This will be addressed at CC and Construction stage for sign off by a certifier.

STEWART ARCHITECTURE

36 Mildura Street Fyshwick ACT 2609
PO Box 3469 Manuka ACT 2603
www.stewartarchitecture.com.au
T 02 6228 1200

	Protection of Openings	The proposal will comply with the requirements of the NCC. This will be addressed at CC and Construction stage for sign off by a certifier.
	Number of exits required	Appropriate exits are provided from each storey
	Fire isolated stairways	The proposal will comply with the requirements of the NCC: all fire egress stairways will be fire isolated. This will be addressed at CC and Construction stage for sign off by a certifier. A review has been undertaken by Defire who have confirmed compliance with the current design, or that performance solutions are available. **Refer accompanying report prepared by Defire.**
	Exit Travel Distances	An alternate solution will be pursued to ensure sign off by a certifier is possible. Defire have reviewed the current proposal and have confirmed that a performance solution is possible for the current design. This will be addressed at CC and Construction stage. **Refer accompanying Fire report, by Defire**
	Travel via fire isolated Distances	An alternate solution will be pursued to ensure sign off by a certifier is possible. Defire have reviewed the current proposal and have confirmed that a performance solution is possible for the current design. This will be addressed at CC and Construction This will be addressed at CC and Construction stage. **Refer accompanying Fire report, by Defire**
	Access for People with Disability	1. Tenancies 4 and 5 will have on-grade access from the existing footpaths. Details will be addressed at CC and Construction stage. 2. An inclinator will be provided to ensure equal access. Further details will be addressed at CC and Construction stage. Furthermore, there is at-grade access from the existing footpath levels to both zones of Tenancy 4, allowing accessible access to all portions of the tenancy. Therefore, an additional means of access to the amenities facilities is provided. 3. Refer to updated architectural plans 4. Refer to updated architectural plans 5. Tactile indicators will be provided in compliance with the Australian Standards and the accessibility report. Further detail will be addressed at CC and Construction stage. 6. An accessible entry/exit will be provided. Further detail will be addressed at CC and Construction stage. 7. Refer to update architectural plans 8. Lift cars are be stretcher compliant. Current shaft dimensions exceed minimum requirements (refer amended architecturals for current dimensions). Further detail, including lift specification, will be addressed at CC and Construction stage. 9. Amendments will be made to ensure compliance. Further detail will be addressed at CC and Construction stage. 10. Refer updated architectural plans 11. Adaption of units per the submitted accessibility report is considered acceptable.
	E1.3	**Refer to accompanying design statement from RGH Consulting Group dated 05/04/2017**
	E3.2	Stretcher lifts will be provided – current lift shaft well exceeds the minimum dimensions for a stretcher compliant lift. Further detail will be addressed at CC and Construction stage.
	Section J and BASIX compliance	The proposal has had both a section J and BASIX assessment undertaken; to which is currently complies. The proposal will comply with both Section J and BASIX requirements. Further detail will be addressed at CC and Construction stage.
	Swimming Pool	**Refer amended landscape documentation prepared by Terras Landscape Architects for amended fencing strategy**
	Location of metering from Howard Street Tower	**Refer to accompanying design statement from Marline Building Services Engineers dated 07/04/2017 for metering locations**
4	Stormwater management	**Refer accompanying updated stormwater management plan prepared by RGH Consulting**
	Traffic and Vehicular Access	The proposal meets the requirements of AS2890.1. Refer to Figure 2.8 in AS1428.1
	Design of parking and service area	a) **Refer accompanying updated architectural and consultant plans** b) **Refer accompanying updated architectural plans.** All residential dwellings can be allocated at least 1x parking space. c) **Refer accompanying updated architectural plans**
	Parking	a) **Refer to accompanying traffic report prepared by Intersect Traffic** b) **Refer to accompanying traffic report prepared by Intersect Traffic**
5	Landscaping Species	**Refer amended landscape documentation**

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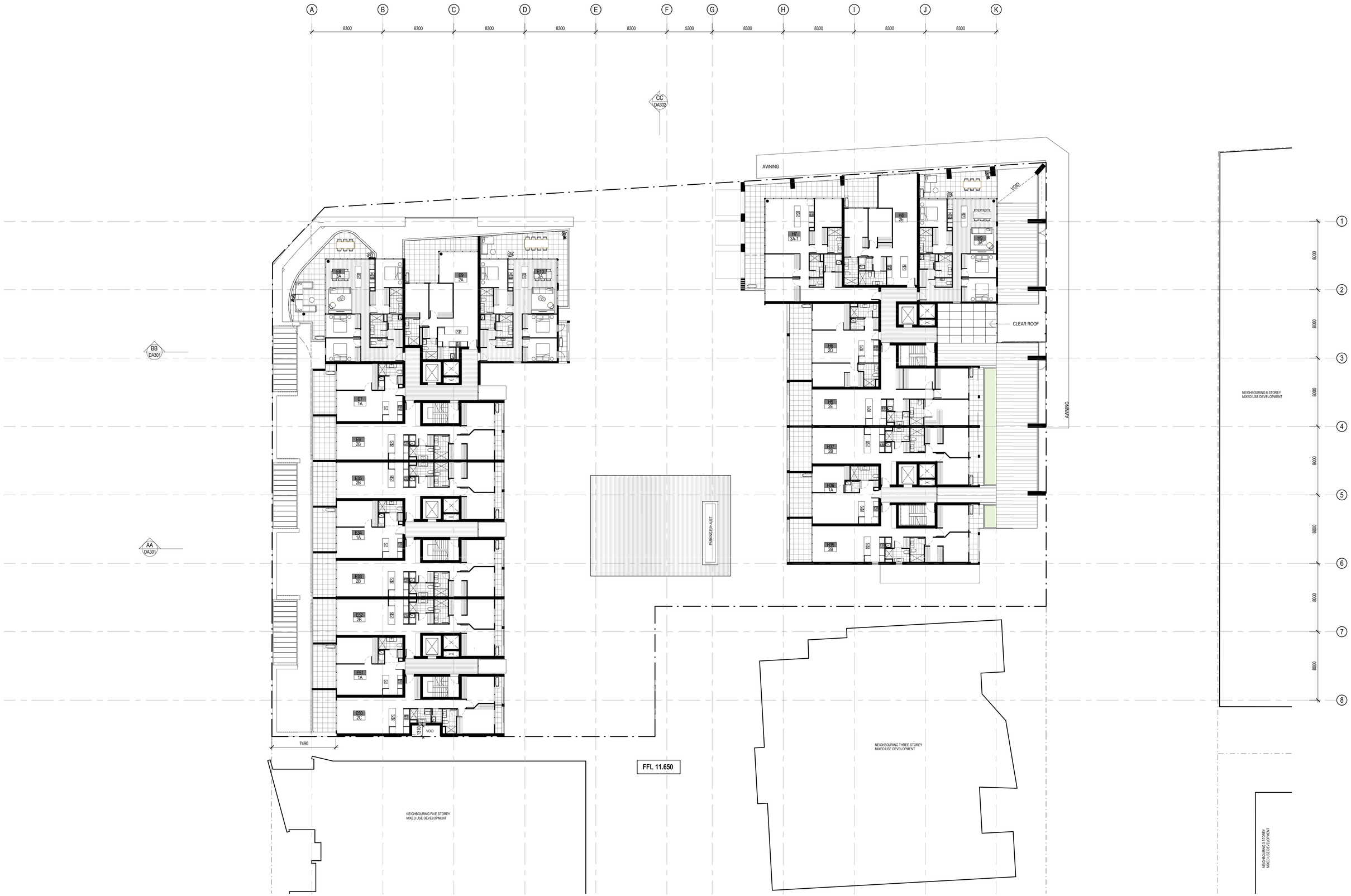
	Street Trees	**Refer amended landscape / architectural documentation**
	Street Trees to King Street	**Refer amended landscape documentation**
	Clarification of existing overhead power lines and interface	Existing overhead power lines to be removed and relocated
	Footpath extension in Howard Street	**Refer amended landscape documentation**
6	Erosion and Sediment Control	**Refer amended documentation prepared by RGH Consulting**
7	Accessibility to commercial areas	Refer Response to comment 3, accessibility. Will be addressed at CC and Construction stage.
	Accessibility to common areas	Accessible access will be provided to all common areas, including the pool as required under the NCC and Australian Standards. The pool has been reduced in size as a part of the design process. **Refer amended architectural documentation**. Further detail will be addressed at CC and Construction stage.
	Liveable Housing	**Refer to accompanying Access report.** Units nominated as 'liveable housing' dwellings within the access report meet all requirements under the Liveable Housing Guidelines (silver).
8	Central Courtyard	Refer to response against comment 1ii)
	Toilet/Janitor space	**Refer amended architectural documentation**
	Courtyard Access	**Refer amended architectural documentation**
9	Carwash Bay	**Refer amended architectural documentation.** A carwash bay has been incorporated.
10	Recycling/waste	It is expected a twice weekly collection of general waste will be required by a private contractor for general waste and a once weekly collection for recyclables. 660 litre bins 780mm x 1260 mm are proposed. Consultation with Veolia Environmental Services indicated that contractors would remove and replace bins from the waste storage room provided kerb side access was provided for collection.
11	RMS Comments	Noted
12	Ausgrid Comment	Noted Will be addressed at CC and Construction stage.



REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
B	ISSUE FOR DEVELOPMENT APPLICATION	13.04.2017
C	REVISED PLANS FOR COUNCIL MEETING	18.07.2017
D	FOR SEPP 65 MEETING	22.08.2017
E	FOR FURTHER INFORMATION	19.10.2017
F	FOR JRPP MEETING	08.11.2017

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PROJECT **LAKEHOUSE VILLAGE**

PROJECT No. **1635**

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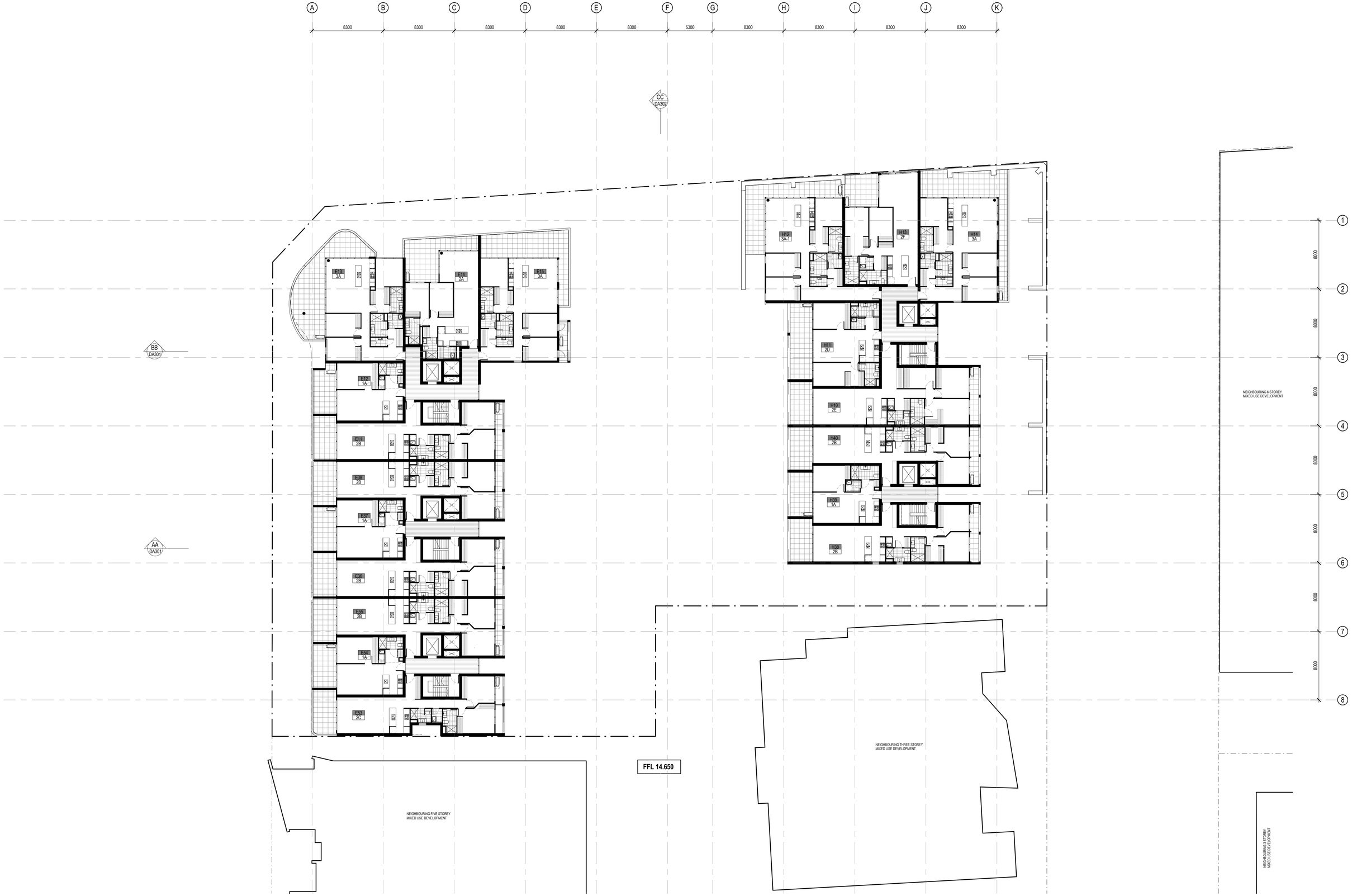
DRAWING No. **DA104**
DRAWING TITLE **PLAN - LEVEL 2**
SCALE **1 : 200 @ A1**
DATE **2017**



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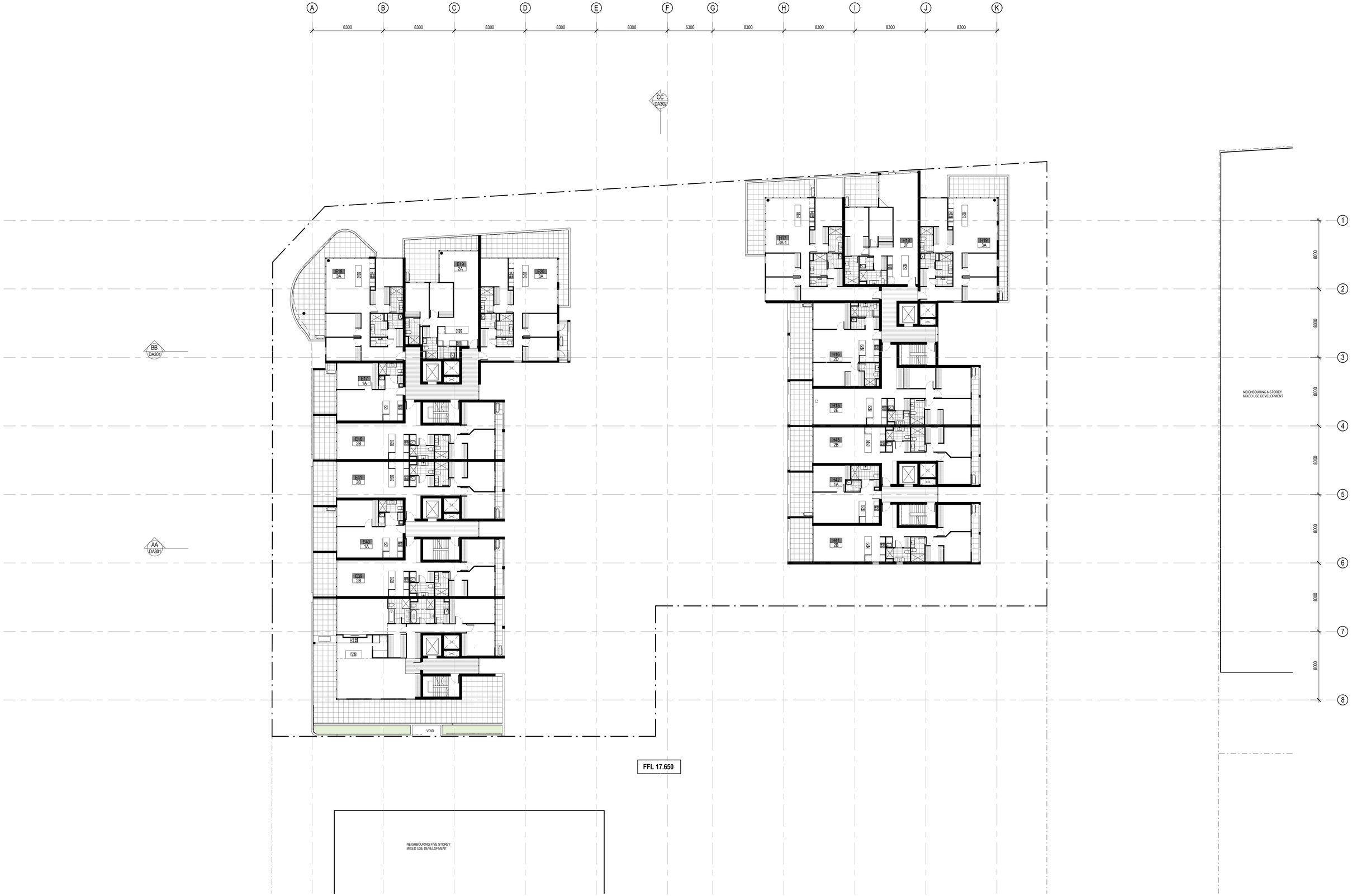
DRAWING No. **DA105**
DRAWING TITLE **PLAN - LEVEL 3**
SCALE **1 : 200 @ A1**
DATE **2017**



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DRAWING No. **DA106**
DRAWING TITLE **PLAN - LEVEL 4**
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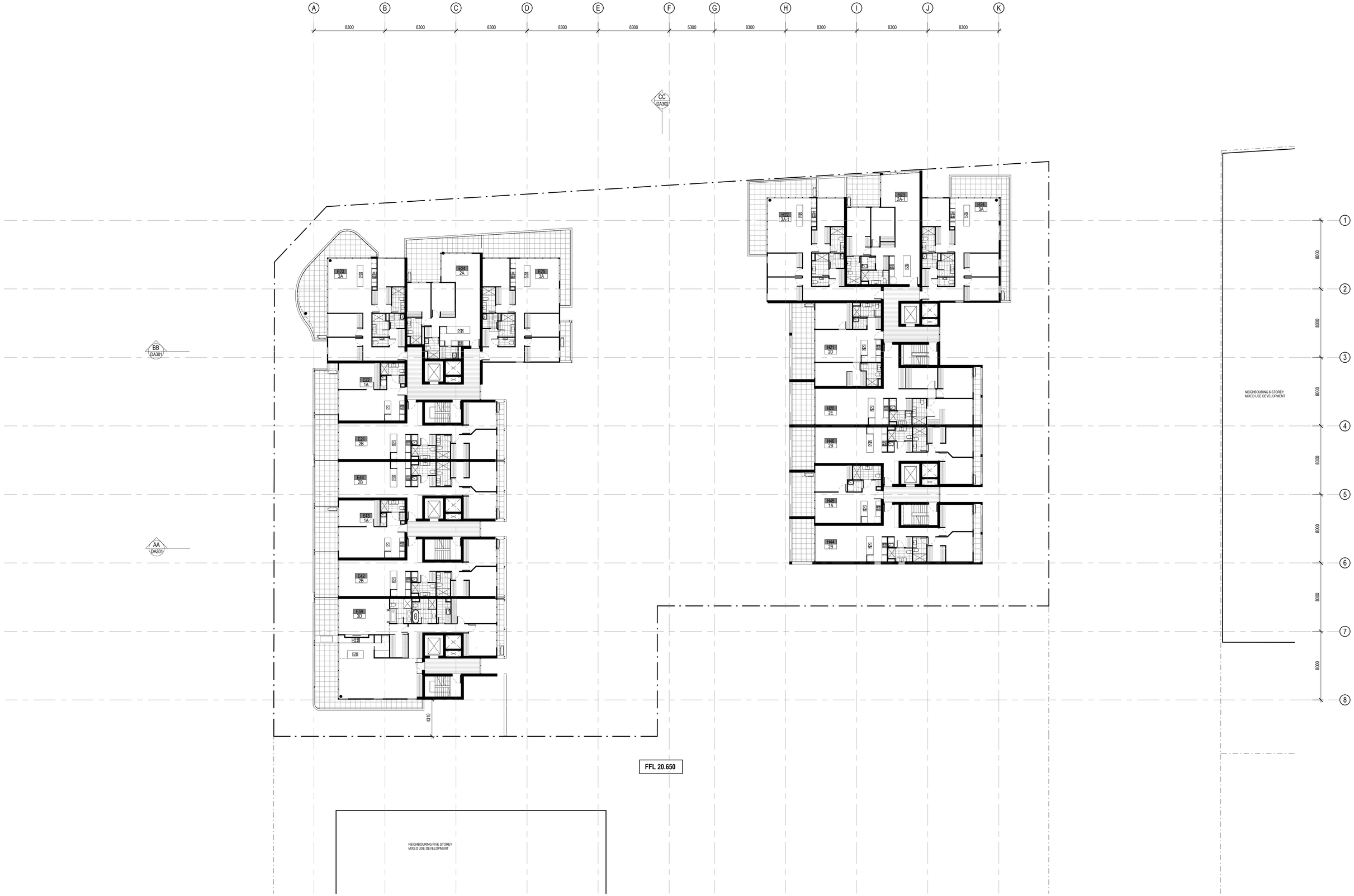
DATE **2017**



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DRAWING No. **DA107**
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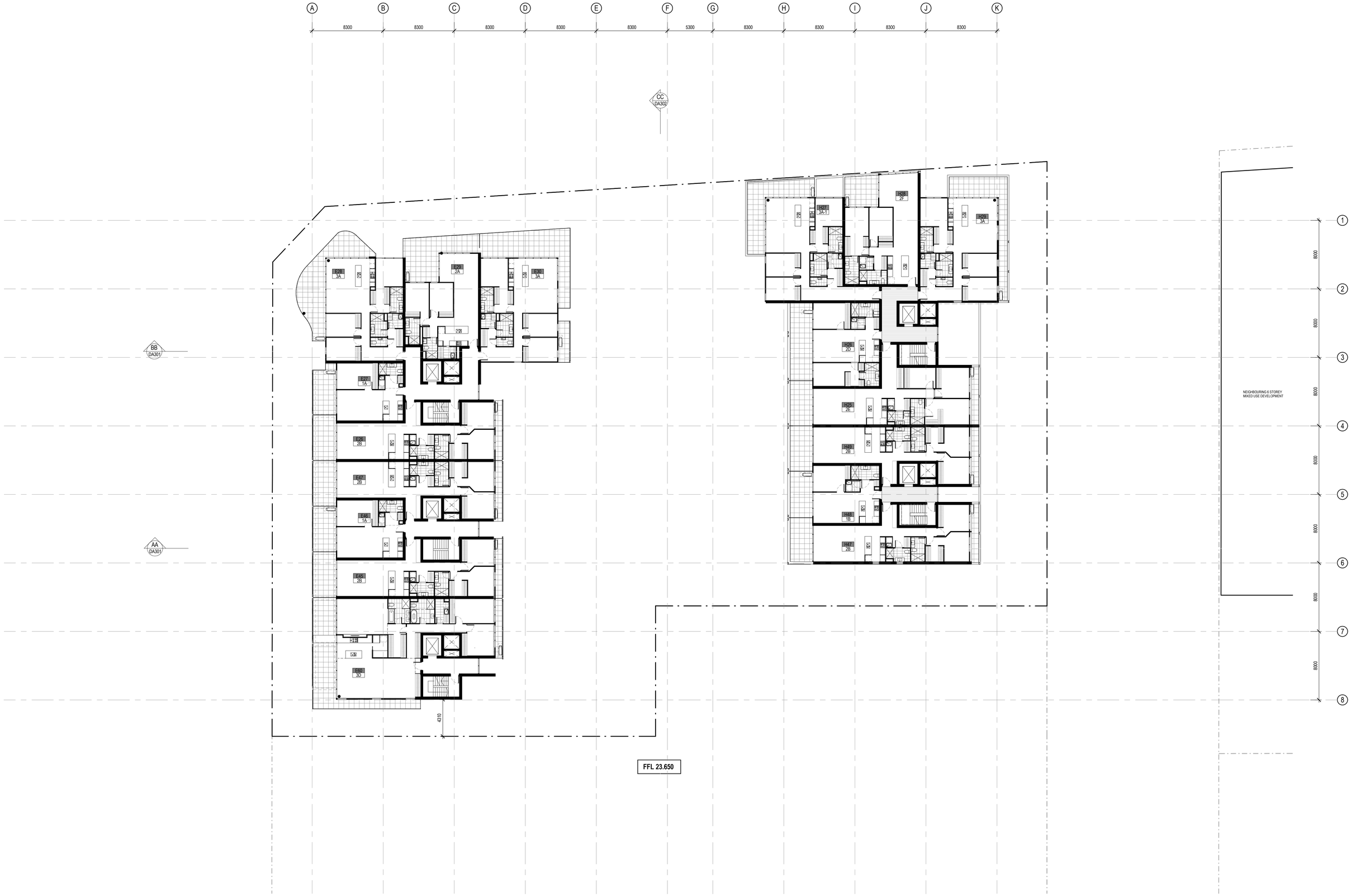

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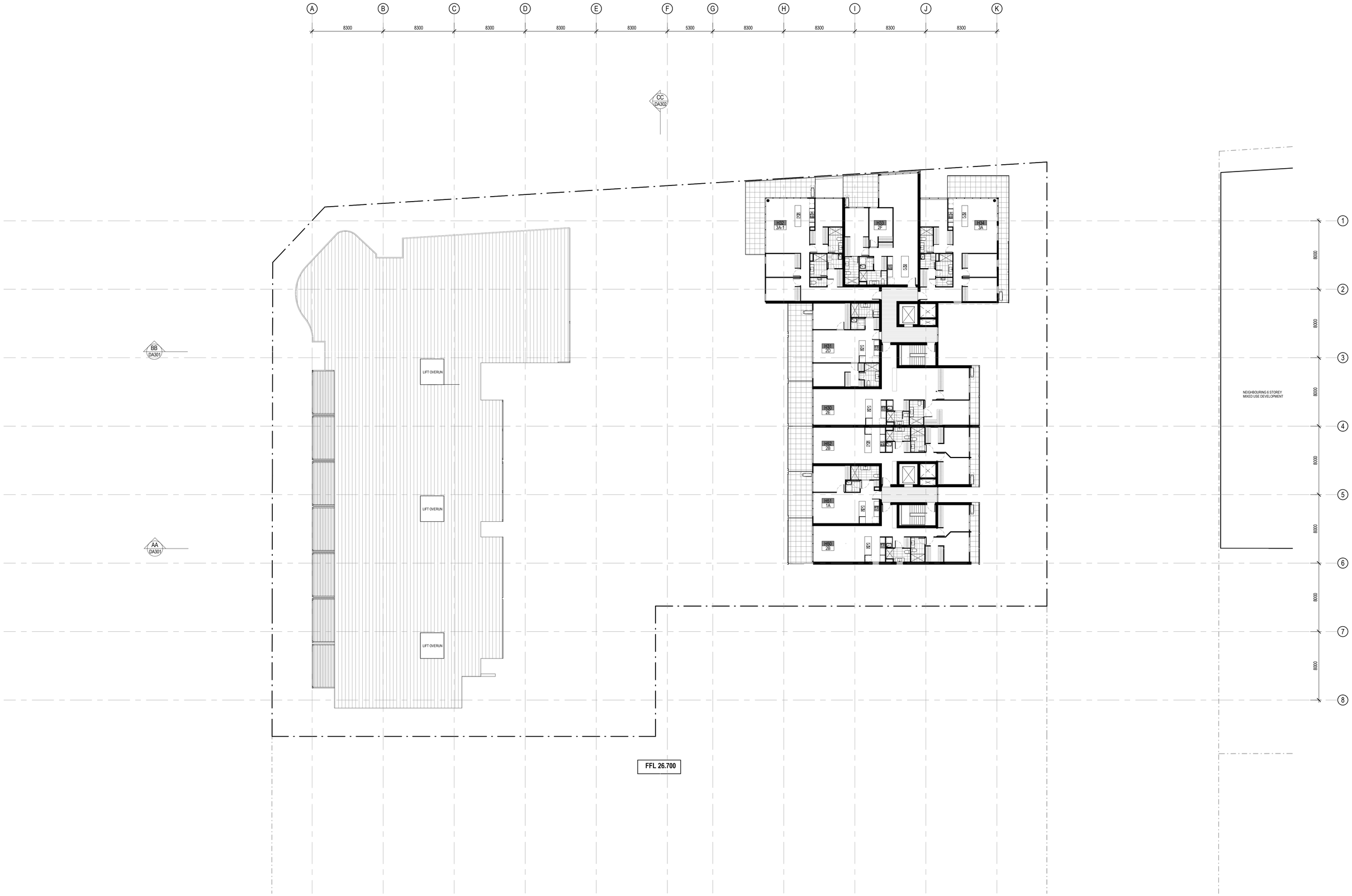
DRAWING No. **DA108**
DRAWING TITLE **PLAN - LEVEL 6**
SCALE **1 : 200 @ A1**
DATE **2017**



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DRAWING No. **DA109**
DRAWING TITLE **PLAN - LEVEL 7**
SCALE **1 : 200 @ A1**
DATE **2017**

Ref: 17/021

30th October 2017

ADW Johnson
Unit 7, 335 Hillsborough Road
WARNERS BAY NSW 2282

Attention: - Mr Brett Stein

Dear Brett,

RE: Parking Variation Justification – Mixed Use Development – 12 – 16 King Street, 482 – 488 The Esplanade & 1 Howard Street, Warners Bay.

Reference is made to our meeting with Lake Macquarie City Council officers on Wednesday 25th October 2017 regarding the on-site car parking supply and allocation for this project. At this meeting Council requested that the applicant must justify the provision of additional resident parking within the complex as well as the proposed allocation of visitor and commercial on-site car parking.

It is noted that the project provides more on-site car parking (212 car spaces in total) than required to satisfy the requirements of the Lake Macquarie DCP in respect of the Warners Bay Town Centre, which requires only (151 spaces).

The development proposes to provide 178 resident spaces to service the 111 units, 7 commercial only secure commercial tenant spaces and 28 shared visitor spaces for use by both the residential visitors and the commercial tenancy staff and customers. Notwithstanding the residential over supply, the DCP requirement that is being varied in this complex is that the DCP requires a total of 56 spaces for use by the commercial tenancies and the resident visitors while the development is only providing a total of 34 spaces for these purposes.

In seeking approval for the parking supply and allocation proposed the applicant is seeking to justify a variation to Council's DCP requirements. It is considered that due to the size of the development and the location of the development there are a number of valid arguments to support the variation which are described below.

1. Public Transport Usage

It would appear that the Lake Macquarie DCP through the parking rates adopted is trying to increase the use of public transport limiting the number of car parking spaces for residents within the development. However at this stage public transport usage for travel to and from work in the Lake Macquarie LGA is less than 3 % of trips due mainly to relatively poor public transport services in the area.

Whilst the site has convenient access to public transport unfortunately the services are currently not frequent enough nor do they provide an express service to the

major employment areas surrounding the site. Therefore there is little if any benefit in catching public transport to and from work from the site and it is highly likely that residents / tenants of the development will be travelling to and from work by private car. Many households are currently double income households it is also likely that more than one vehicle will be required for the travel to and from work from many of the apartments. Council suggested future residents may be retirees wishing to downsize. Marketing advice indicates many potential buyers particularly those at the higher end of the market will seek to maintain the independence of owning two cars and require parking even if the total number of kilometres travelled is reduced without needing to commute daily to work.

Therefore unless a suitable number of resident parks are provided within the development the proposal is likely to generate some on-street car parking demand in nearby streets. This would be detrimental to the surrounding road network which already exhibits a demand for on-street car parking demand.

2. Residential Parking Demand

As discussed above the nature and size of the development is likely to generate a peak parking demand for residents and tenants well in excess of the DCP parking requirement and probably on average in the order of 1.5 – 2 spaces per unit Compliance with the DCP parking requirement for resident parking would result in visitor car parking being utilised as resident overflow parking rather than for its true purpose of providing on-site car parking for guests of residents. It is considered that by providing additional residential parking to meet the likely true demand for residential parking this would support the use of the provided visitor car parking as short term parking for guests of the residents. Further, if parking spaces for those units with more than one space are not occupied they would be available for visitors at the owners discretion thereby reducing demand for visitor spaces. Marketing of the development has been underway for a number of weeks, without guarantees the agent has advised that all purchasers of 2 and 3 bedroom units are seeking a minimum of 2 car parking spaces.

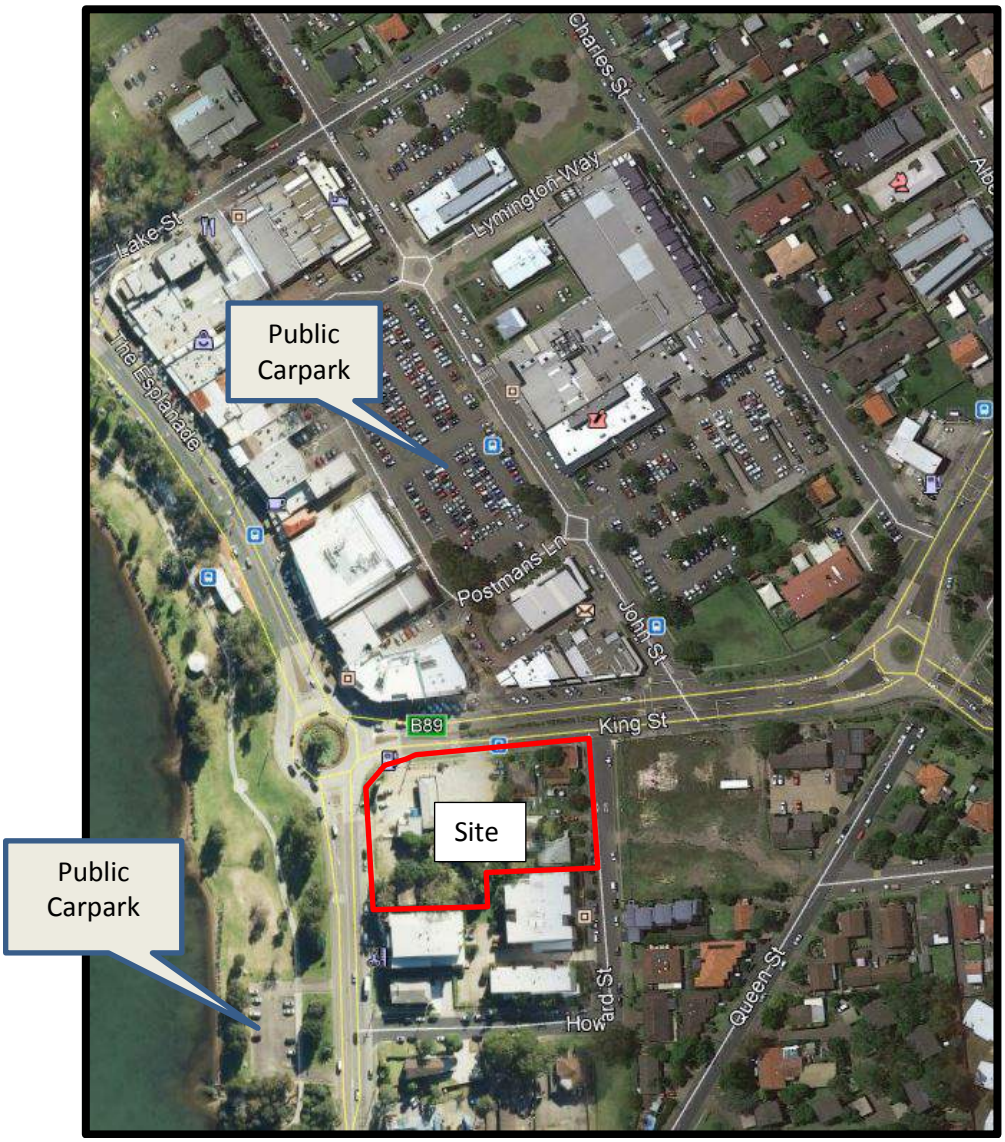
3. Cross-Use of Development Components

The argument in this respect is that the proposed development will have a significant number of residents and these residents are highly likely to use the commercial tenancy as both staff and customers of these tenancies. As such as a resident park is already assigned to the residents they are not going to require to use the commercial spaces therefore the peak parking demand for the commercial tenancies is likely to be less than for a stand-alone tenancy.

4. Location of site within the Warners Bay Town Centre Precinct

The location of the site within the Warners Bay Town Centre is likely to attract customers from outside the local area to the commercial tenancies however is also going to encourage multi-trip making for these customers. For instance people utilising the commercial tenancies may well be employees of other businesses in the area who have already parked in other areas of the Town Centre and walk to the proposed development or are customers of other businesses in the area who are

likely to park in the open public parking areas to visit more than the one commercial premises including those within the development. The following plan shows the location of parking relative to the development.



Warners Bay Town Centre

The site is also within convenient walking distance of numerous residential areas and residential developments therefore the commercial tenancies are likely to encourage nearby residents to walk to the commercial tenancy.

Visitors to caffes and restaurants also have the potential to use taxis or alternative means of travel.

5. Different peak parking demand periods – visitor v's commercial parking

The main argument in the supply and allocation of on-site parking in this development revolves around the different peak parking demand periods for the

commercial tenancies and the visitor car parking. The peak parking demand period for visitor parking i.e. 5 pm to 9 am is generally outside general business hours which will be the peak parking demand period for the commercial tenancies and as such there should be scope to share visitor and commercial parking. This allows for a more efficient use of on-site car parking rather than have blocks of parking vacant for long periods of time within the development.

It is acknowledged that some of the commercial tenancies may have trading hours beyond 5 pm until later in the evening however in this period the available and convenient public parking areas within the Warners Bay Town Centre are underutilised. This is a key consideration as the highest demand for the shared visitor and commercial spaces is likely to be after residents have returned home in the evening and any caffee or businesses is still open.

6. Reduced visitor car parking rates.

To evidence the advantages of reduced visitor car parking it is noted that Newcastle City Council has recently been approving major residential flat buildings and mixed use developments with both reduced visitor car parking requirements (25% of DCP requirement) and shared visitor / commercial car parking (Verve Apartments – King Street and Herald Apartments - Bolton Street). As previously mentioned this results in a more efficient and effective use of on-site car parking as a result of the different peak parking demand periods (point 5) and also is seen as a suitable strategy for encouraging public transport use.

Restricting the visitor parking spaces means that visitors travelling by cars may need to seek an alternative parking space whether on-street or in a nearby public car park. This impact will generally be short term and if difficult to obtain an alternative parking space may encourage a change of trip making mode i.e. public transport. Whilst probably more appropriate for a major metropolitan area it may be a more appropriate public transport strategy with less adverse impact than restricting residential parking in a residential flat building in Warners Bay.

Overall it is considered that the cumulative impacts of the above 6 points would justify the proposed on-site car parking supply and allocation within the proposed mixed –use development at 12 – 16 King Street, 482 – 488 The Esplanade & 1 Howard Street, Warners Bay.

For further information please do not hesitate to contact me on 02 4936 6200 or 0423 324 188.

Yours sincerely

Jeff Garry
Director
Intersect Traffic

landscape design application

warners bay apartments

proposal:
design application
council:
lake macquarie city council
project no:
11159.5
drawn:
yy
date:
31.07.2017
revision:
c

A

design report

01 design report

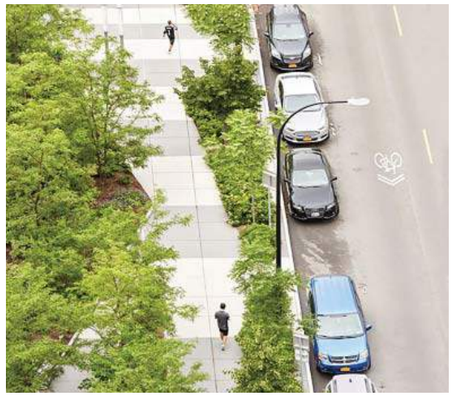
B

design analysis

02 site analysis
03 tree removal plan
04 sunlight analysis

C

streetscape



05 concept plan
06 perspective
08 design elements
09 plant palette

D

courtyard garden

10 concept plan - upper ground
11 concept plan - level 02
12 perspective
16 sections
17 design elements
19 plant palette

designreport

A

landscape design report

warners bay apartments

01

July 2017

GENERAL SITE DESCRIPTION

The following landscape design report has been prepared in accordance with the requirements of Lake Macquarie City Council Development Control Plan.

The site is located on the corner of King Street, The Esplanade and Howard Street in Warners Bay town centre area. The existing site consists of a BP station on the corner of King Street and The Esplanade, one café on the corner of King Street and Howard Street, and three 1-2 storey residential lots. The project site is facing Lake Macquarie, and across the road from the Warners Bay Village Shopping Centre. Adjacent the site there is a 3 storey residential apartments to the south-east, with some existing trees and shrubs buffer along the boundary. There is a 5 storey residential and commercial building adjacent to the south-west project site, which faces The Esplanade.

Soil

According to LMCC DCP (2014), the project area is on acid sulphate soil (class 3 and class 5). To prevent negative impact on water quality and the receiving waters of the lake, the development must ensure minimise the disturbance of acid sulphate soil. For the project, the whole site will be disturbed, and all landscape soils shall be imported.

LANDSCAPE CHARACTER

There are excellent views from The Esplanade at Warners bay to the south and west across the lake. The foreshore park plays an important role for social and culture activities both on and off shore. It is a recreational hub for water sports, walking and cycling. The Esplanade commercial strip is popular day and night gathering place, with range of cafes and restaurants facing the lake.

PROPOSED DEVELOPMENT

The proposed development involves the demolition of all existing structures and the construction of two 7 storey towers which includes commercial area at ground level and residential apartments above. The proposed development shall also include streetscape along King Street and The Esplanade, and a recreational courtyard which will be located between two towers.

The key issues of the proposed development

1. The visual impact to the neighbours on southern side of the project site.
2. Tree removal on the southern side of the project site, and there are not enough spaces for new trees. The deep soil zone area is the chance to plant some decent size trees/shrubs, also the courtyard entry area.

Proposed landscape works and objectives

The landscape objectives include several key elements:

1. Meet the requirements of Warners Bay Streetscape Masterplan (May, 2015)
2. Provide feature/visual attraction at the courtyard entry to enhance the statement;
3. Provide stronger pedestrian linkage into the courtyard from western side;
4. Lower the deep soil zone level to soften visual impact to the neighbours, and keep the activity area at the same level of courtyard to encourage usage;
5. Provide certain level of privacy to the courtyard from apartments above by installing feature shelters to resting area, also increasing shade and amenity to residents;
6. Aim to reduce the impact of activities in the courtyard to 1st level residents, by installing feature screen and screening plants to the front of residential balcony.

Considering future maintenance, we provide prefabricated lightweight planters, and all pavers laid on pedestal to make the maintenance easier.

REFERENCES

Lake Macquarie City Council, 2014, *Lake Macquarie City Development Control Plan, Part 10 – Town Centre Area Plans – Warners Bay – Revision 12.*

Lake Macquarie City Council, 2015, *Warners Bay Streetscape Master Plan.*

site details:
warners bay
date:
31.07.2017
job number:
11159.5
scale:
n/a
drawn:
yy
revision:
d

terras
landscape architects
412 king street newcastle nsw2300
ph:49 294 926
fax: 49 263 069
www.terras.com.au

design anaylysis

B

site analysis

warners bay apartments

02

July 2017

N

legend

- pedestrian footpath
- crossing point
- pedestrian crossing
- footpath/cycleway
- project site
- main street
- important view
- open space
- bus stop
- parking

site details:
warners bay
date:
31.07.2017
job number:
11159.5
scale:
1:2000 @ a3
drawn:
yy
revision:
d

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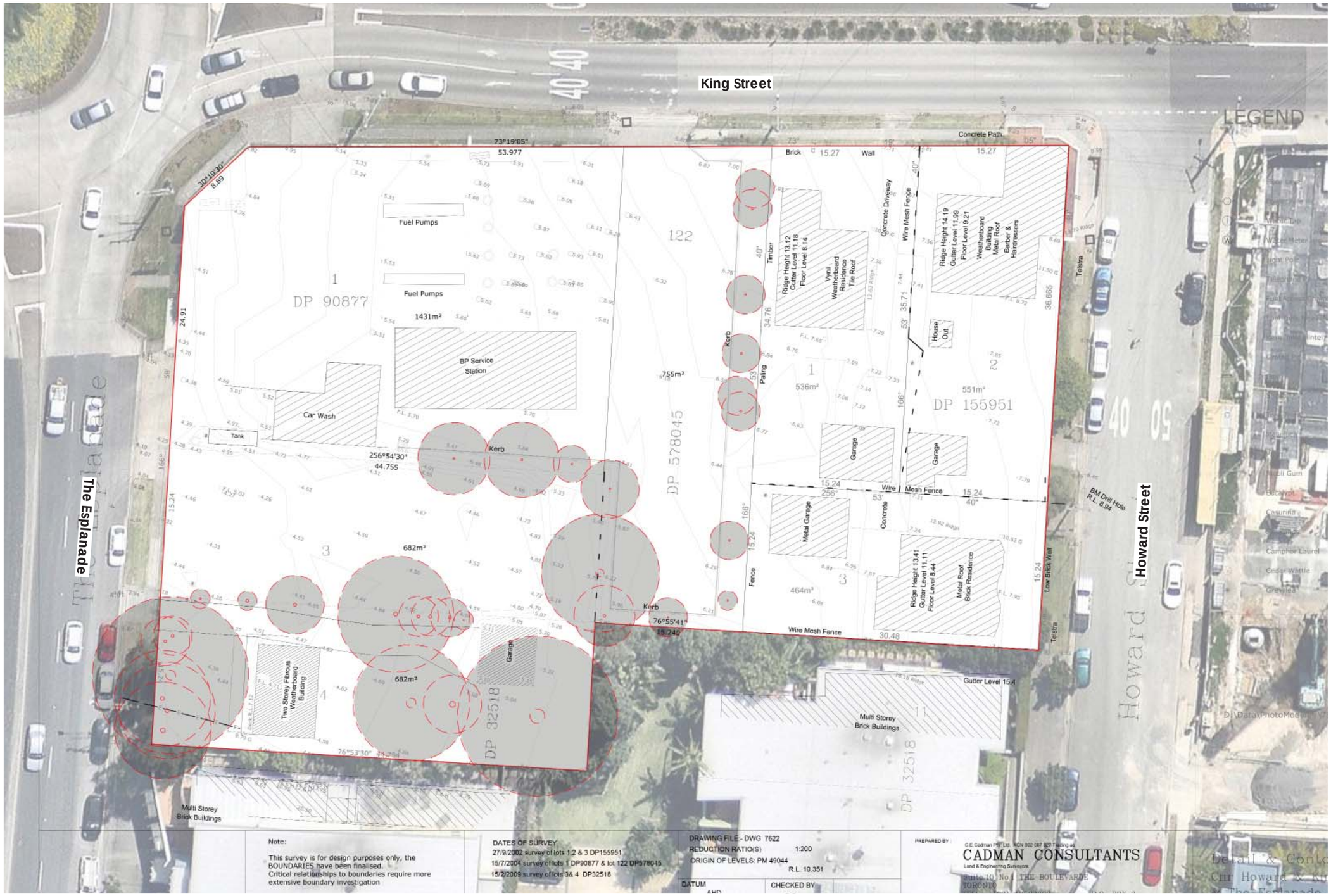
trees removal

warners bay apartments

03

July 2017



N

legend

existing trees to be removed.
(tree canopies are taken from survey plan)

site boundary

site details:
warners bay
date:
31.07.2017
job number:
11159.5
scale:
1:400 @ a3
drawn:
yy
revision:
d

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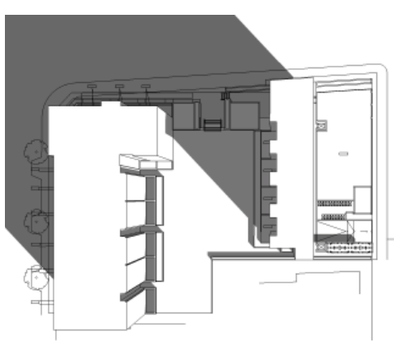
courtyard sunlight analysis

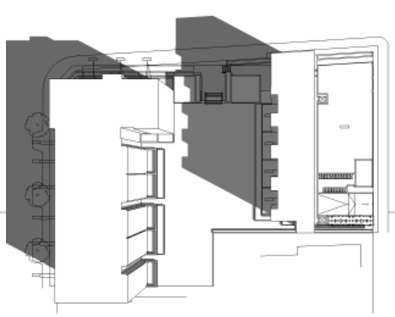
warners bay apartments

04

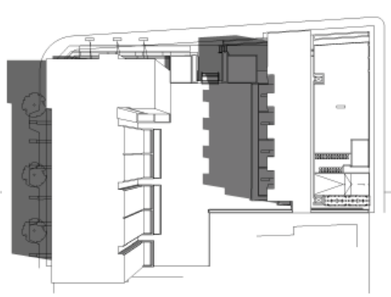
July 2017



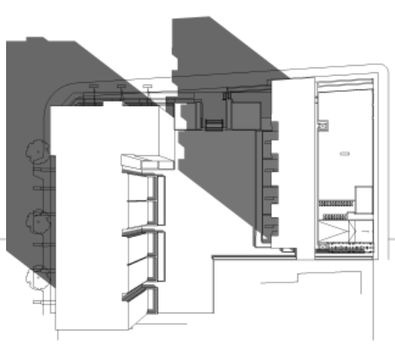
January 9am



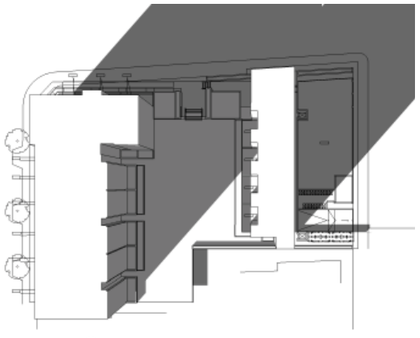
April 9am



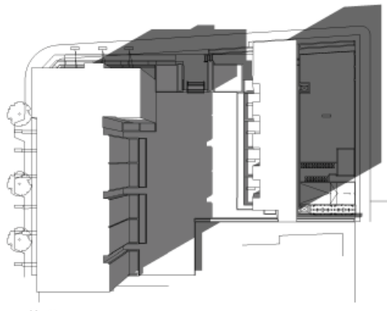
July 9am



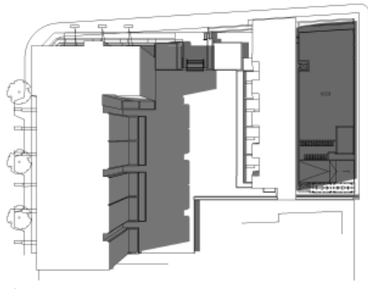
October 9am



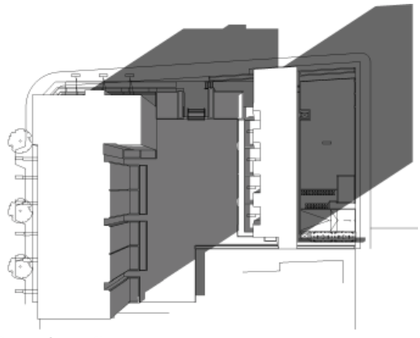
January 3pm



April 3pm



July 3pm



October 3pm

shadow overlay

the north-east corner has more shade than other parts of the courtyard.

site details:
warners bay
date:
31.07.2017
job number:
11159.5
scale:
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drawn:
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revision:
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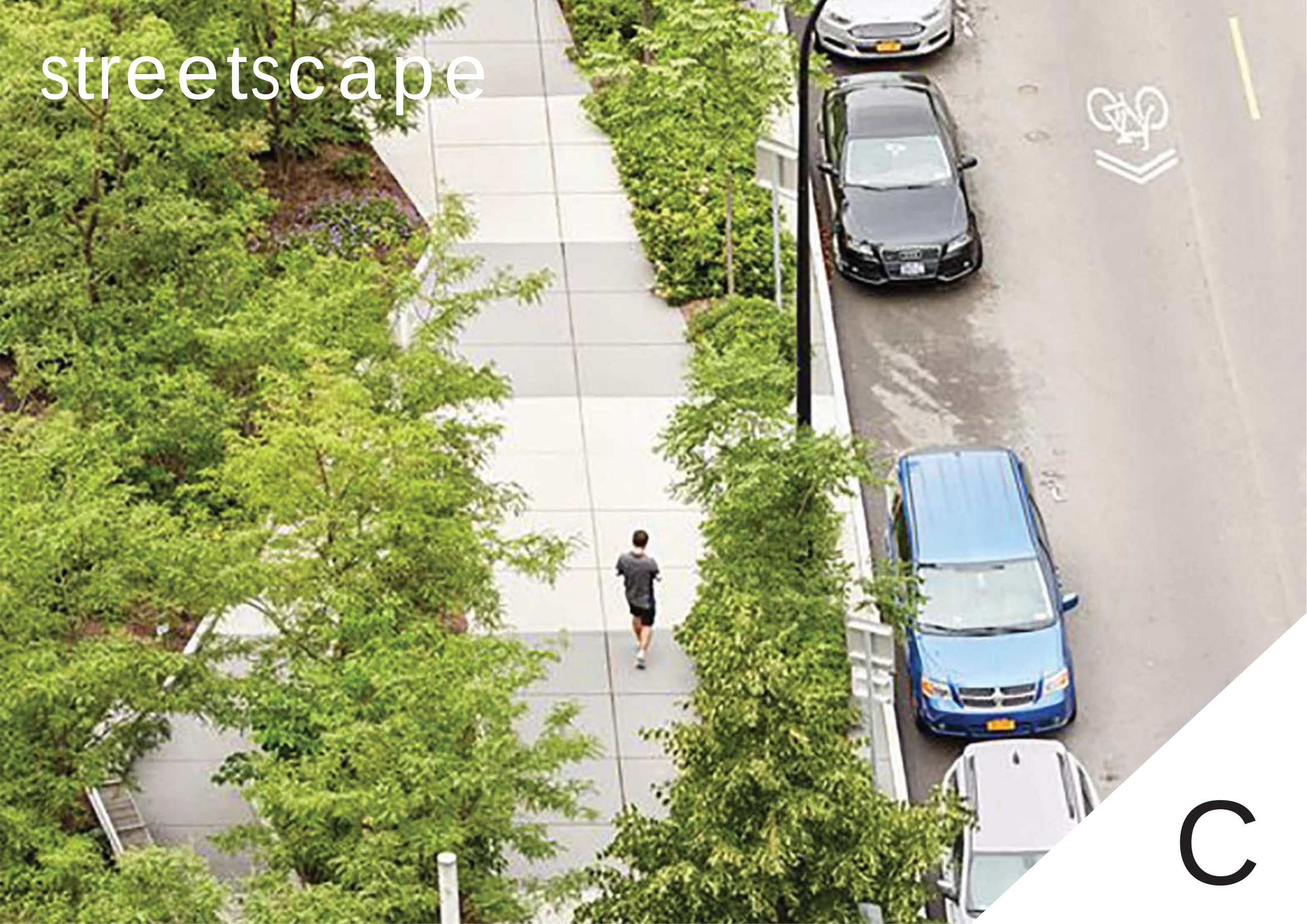
streetscape



C

concept plan

warners bay apartments

05

July 2017

mass planting in raised garden bed to provide buffer between pedestrian footpath and outdoor sitting area

cupaniopsis street tree planting in blisters

green trellis (*Parthenocissus tricuspidata*)

paving as per LMCC Warners Bay Streetscape Master Plan (refer to drawing 09 for details)

warm colour paving (Granite 'Honey Jasper') to the apartment entrance

street tree planting in blisters

tree (*Elaeocarpus eumundii*) + groundcovers + green trellis to the apartment entrance

grey colour paving (Granite 'Sesame Grey') to the commercial entrance

N

LEGEND

- tree (refer to plant palette)
- garden bed with shrubs and groundcovers (refer to plant palette)
- pavers (refer to paving detail)
- green trellis

Refer to Warners Bay Streetscape Master Plan (13.02.2012)

site details:
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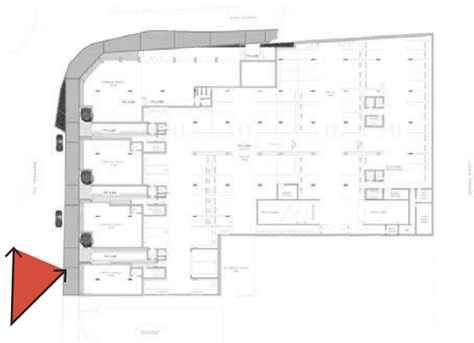

perspective 1

warners bay apartments

06

July 2017

site details:
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date:
31.07.2017
job number:
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revision:
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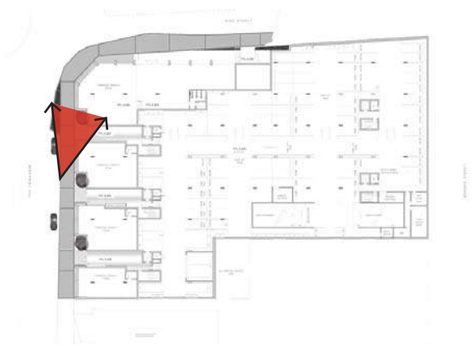

perspective 2

warners bay apartments

07

July 2017

tree *(Elaeocarpus eumundii)* + groundcovers + green trellis (*Parthenocissus tricuspidata)* to the apartment entrance

site details:
warners bay
date:
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scale:

drawn:
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revision:
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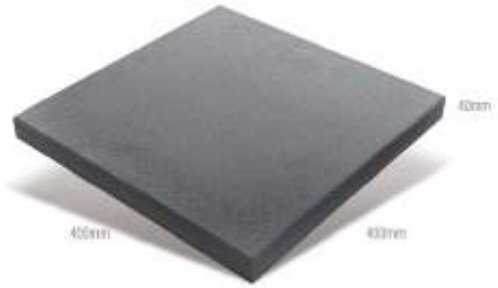
design elements

warners bay apartments

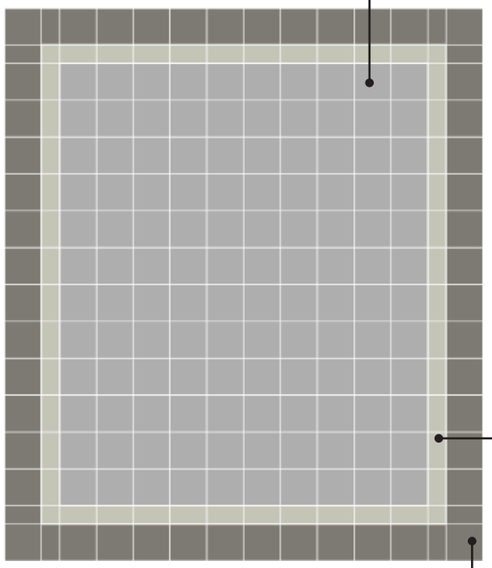
08

July 2017

Refer to Warners Bay Streetscape Master Plan (13.02.2012)



Main Body Paving
Adbri Euro Classic 300 x 300 x 50 in Prague (Charcoal colour). Lay in stackbond pattern.



1 LMCC paving detail and materials

scale 1:20 @ A3

Header-course
(single row between border, banding and main body paving)
Adbri Euro Honed in Natural (a steel grey with black aggregate) 300x150x50mm.

Borders and Banding- single row
Adbri Euro Honed in Prague (a dark Charcoal colour with black aggregate) 300x300x50mm.

site details:
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plant palette

warners bay apartments

09

July 2017

tree

Elaeocarpus eumundii

climber

Parthenocissus tricuspidata

shrubs & groundcovers & climber

Agave attenuata

Calathea zebrina

Liriope muscari 'Isabella'

Myoporum parvifolium 'Yareena'

Trachelospermum jasminoides 'Tricolor'

Viola hederacea

BOTANICAL NAME	COMMON NAME	POT SIZE	MATURE HEIGHT x WIDTH
Trees			
Elaeocarpus eumundii	Smooth Quandong	200L	8-15m x 8m
Shrubs & Groundcovers			
Agave attenuata	Century Plant	300mm	1-1.5m x 1m
Ctenanthe 'Grey Star'	Grey Star	300mm	1-1.5m x 1.5m
Liriope muscari 'Isabella'	Liriope Isabella	200mm	0.3-0.4m x 0.4m
Myoporum parvifolium 'Yareena'	Yareena	200mm	0.1-0.15m x 1m
Philodendron 'Xanadu'	Xanadu	300mm	0.75-1m x 1m
Trachelospermum jasminoides 'Tricolor'	Tricolour Star Jasmine	300mm	0.5m x 2m
Viola hederacea	Native Violet	200mm	0.2m x 0.3m
Climber			
Parthenocissus tricuspidata	Boston Ivy	200mm	20m x 1m

site details:
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date:
31.07.2017
job number:
11159.5
scale:

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revision:
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courtyard garden

D

concept plan - upper ground

warners bay apartments

10

July 2017

NOTES

1. deep soil zone (with large trees, shrubs and groundcovers)
2. swimming pool (18m long, 4m wide, 1.2m deep)
3. gym (with decking to over look the swimming pool)
4. ramp with handrails
5. feature screen (applys to exhaust riser and service vents)
6. green trellis
7. commercial area pavement (using granite 'Sesame Grey' to separate commercial area with residential warm colour paving theme)

site details: warners bay
date: 31.07.2017
job number: 11159.5
scale: 1:400 @ a3
drawn: yy
revision: d

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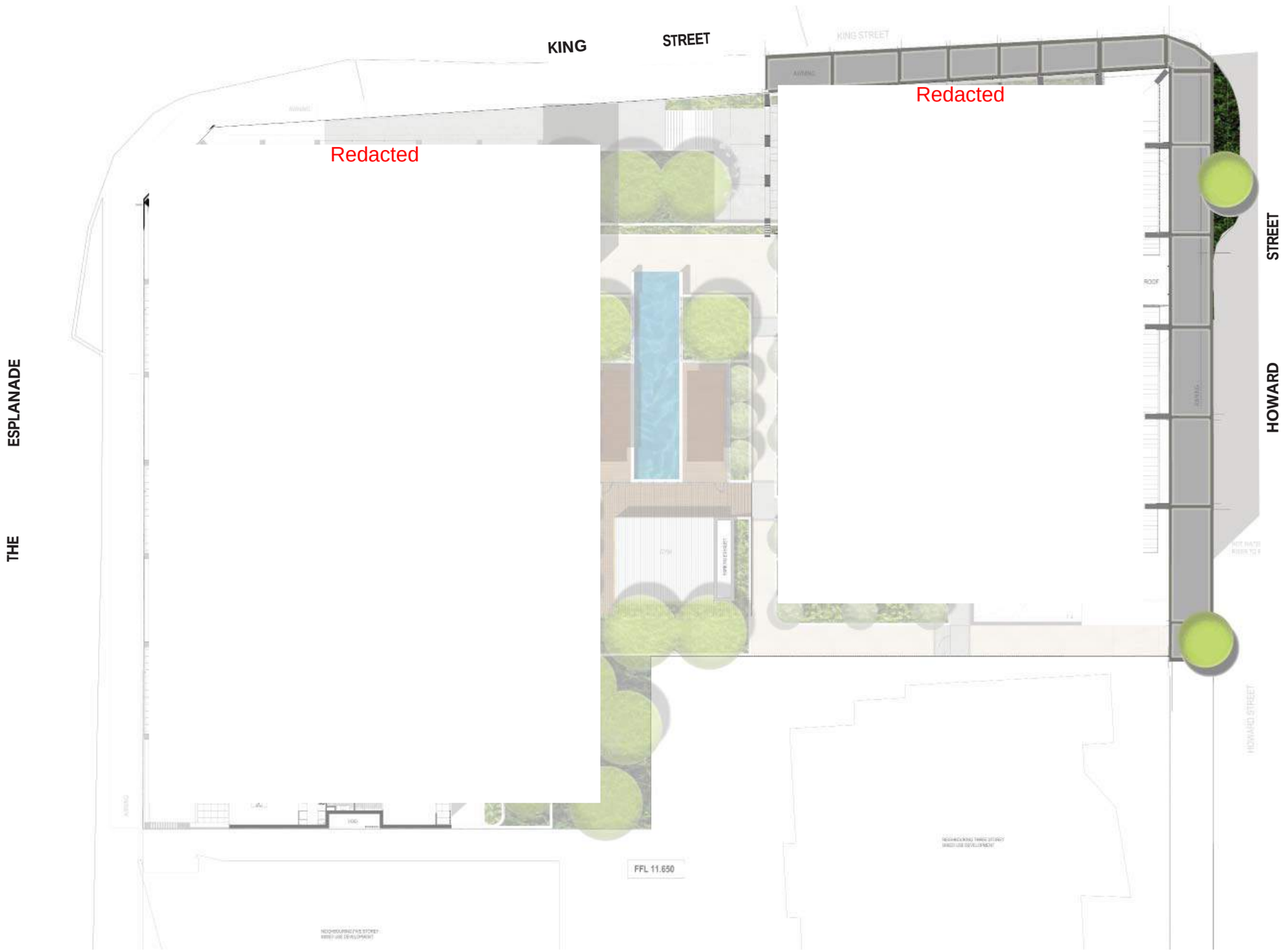
concept plan - level 02

warners bay apartments

11

July 2017



N

LEGEND

garden beds
(refer to plant palette)

shrubs
(refer to plant palette)

0 5m 10m

site details:
warners bay
date:
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scale:
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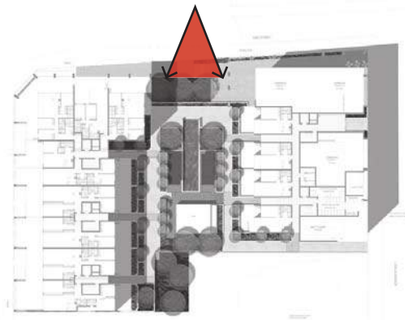
perspective 1

warners bay apartments



bamboo (*Bambusa textillis "Gracilis"*) to separate residential and commercial areas, and to increase privacy to the courtyard.

deep soil zone to provide opportunity for larger size trees *(Glochidion ferdinandi)* and shrusbs to reduce visual impact from neighbours.

small/mid size trees *(Magnolia grandiflora "Little Gem", Syzygium "Resilience")* to planters to provide privacy and amenity to lower level residents, also with suitable spacing between trees to allow sunlight into the apartments.

Waterhousea floribunda to the front garden.

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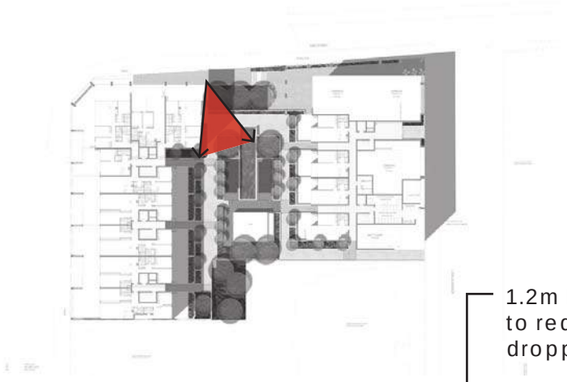
perspective 2

warners bay apartments



1.2m high frameless pool fence to reduce the chance of leaf dropping from shrubs into the pool.

palm trees *(Howea forsteriana)* to provide vertical sense and character to the courtyard, also have less chance of leaf dropping.

feature shelter to provide shade and privacy to the pool users.

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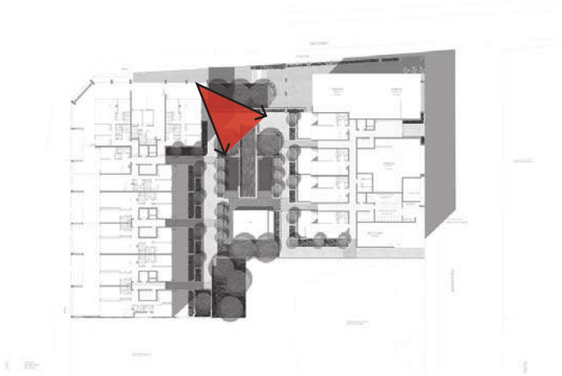
perspective 3

warners bay apartments



glass to the front of pool to create visual feature of the courtyard.

mixed shrubs with palm trees to the garden.

glass pool barrier separate to waterfall edge of pool

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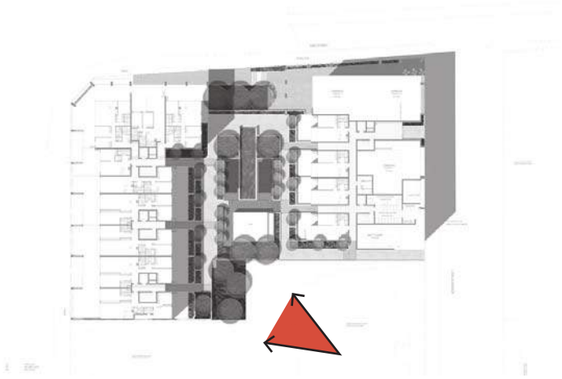

perspective 4

warners bay apartments

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deep soil zone to provide opportunity for larger size trees *(Glochidion ferdinandi)* and shrusbs to reduce visual impact from neighbours.

green trellis (*Parthenocissus tricuspidata)* to two sides of the gym wall to provide more green to the courtyard and reduce visual impact.

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sections

warners bay apartments

16

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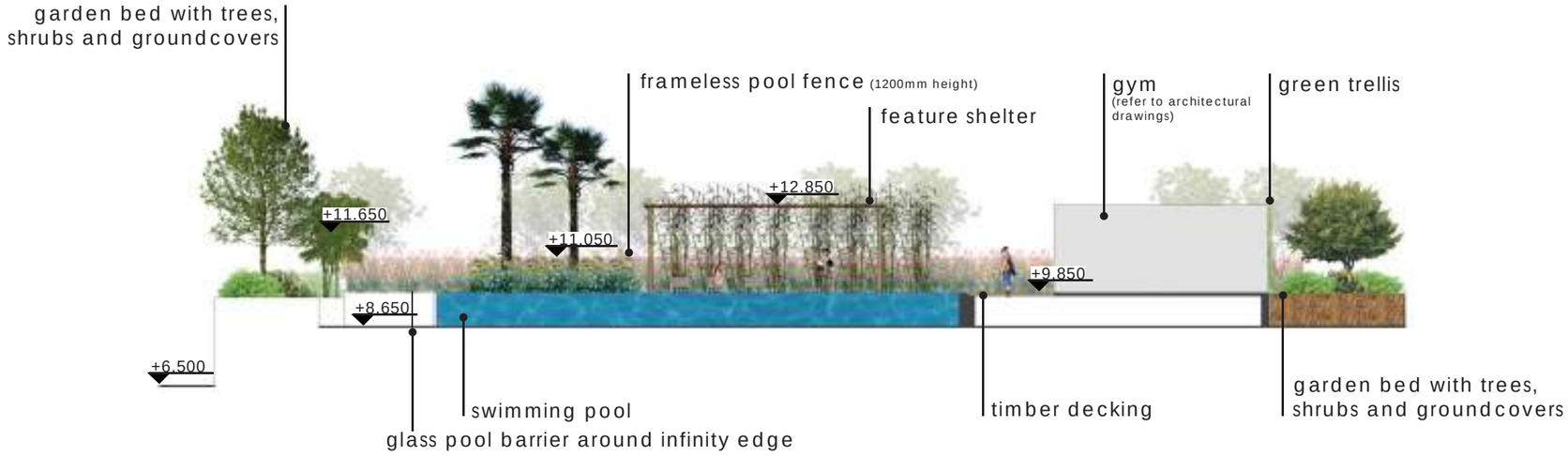
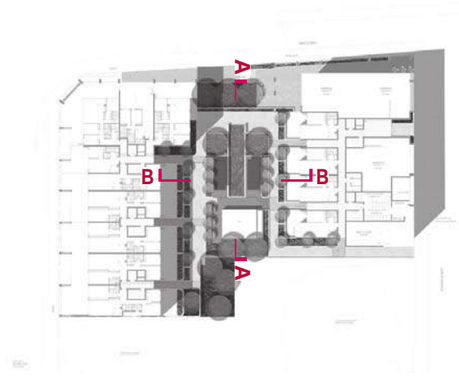
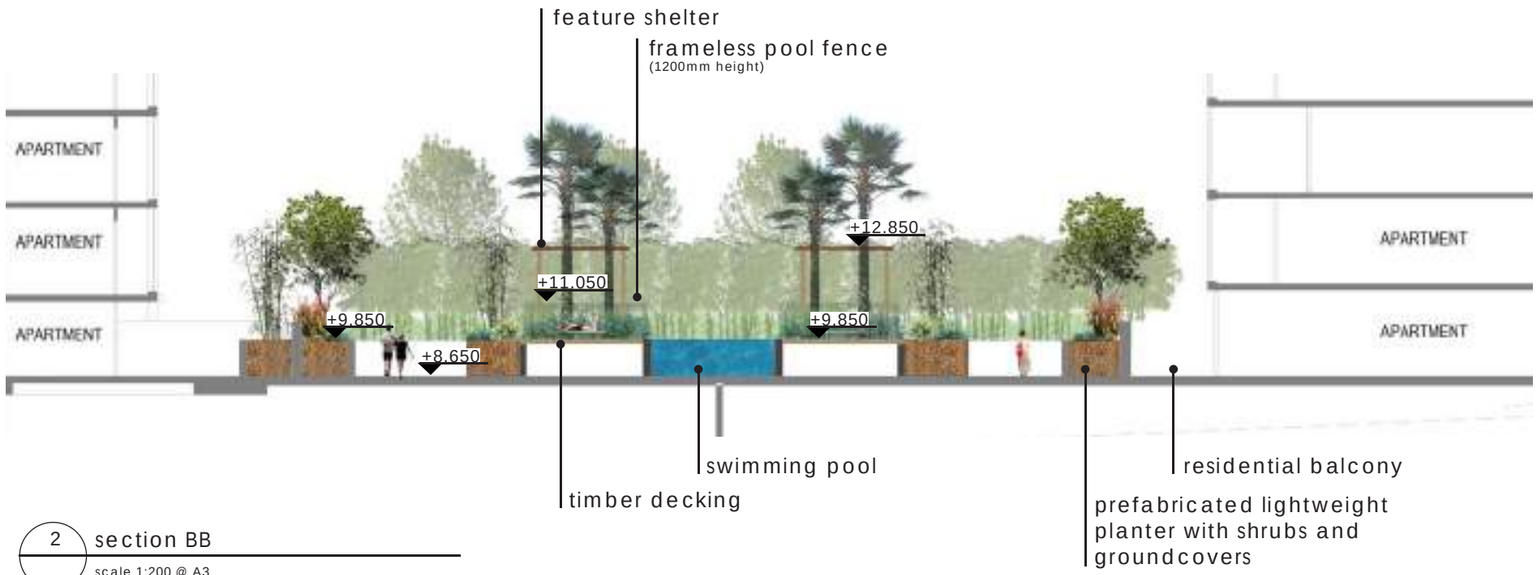


1 section AA

scale 1:200 @ A3





2 section BB

scale 1:200 @ A3

site details:
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job number:
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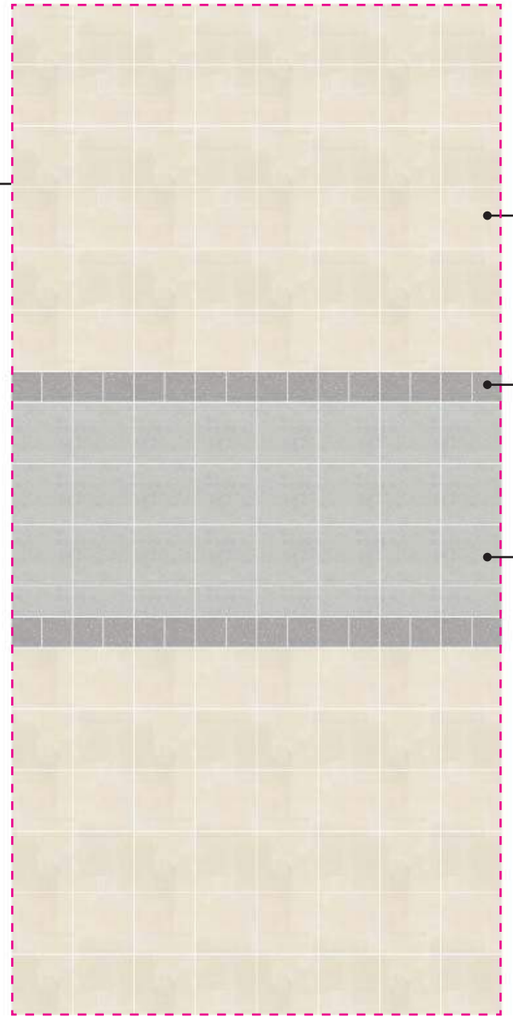
design elements - pavement

warners bay apartments

all pavers laid
on pedestal

1 paving design key plan

scale 1:100 @ A3



Main Body Paving
- Granite 'Honey Jasper'
exfoliated finish
400x400x20mm.

Banding
- Granite 'Raven Black'
exfoliated finish
200x200x20mm.

Feature Paving
- Granite 'Sesame Grey'
exfoliated finish
400x400x20mm.

2 paving detail and materials

scale 1:20 @ A3

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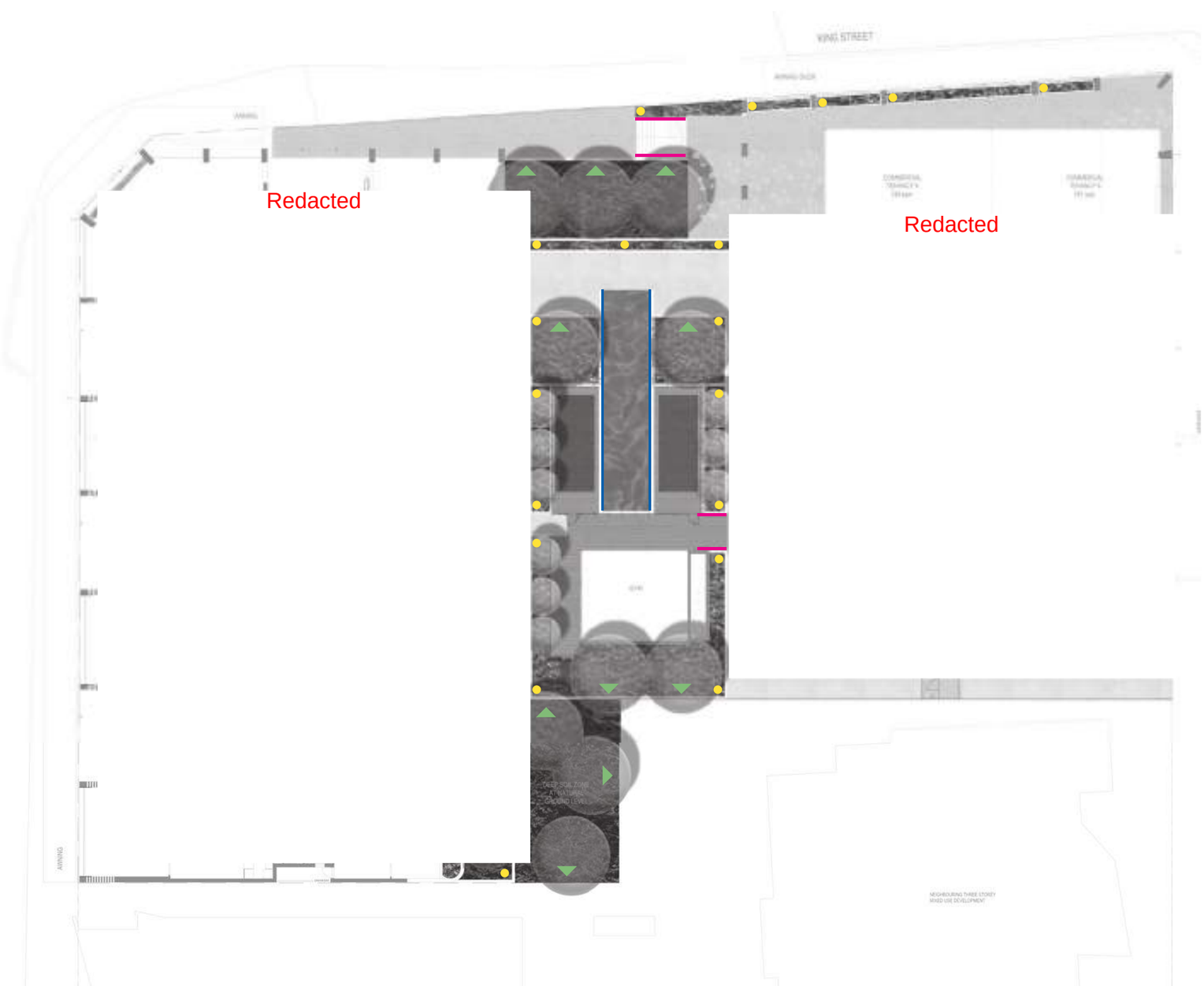
design elements - lighting

warners bay apartments

July 2017



N

LANDSCAPE
LIGHTING DESIGN
- INDICATIVE ONLY

Pool lighting

Step lighting

Tree uplight

Garden lighting

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plant palette

19

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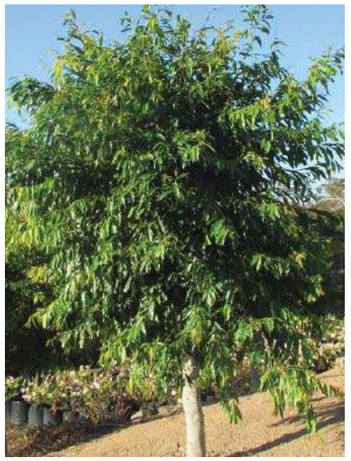
BOTANICAL NAME	COMMON NAME	POT SIZE	MATURE HEIGHT x WIDTH
Trees & Palms			
Glochidion ferdinandi	Cheese Tree	200L	8-12m x 5-10m
Magnolia grandiflora 'Little Gem'	Little Gem Southern Magnolia	200L	3-5m x 2-3.5m
Waterhousea floribunda	Weeping Lilly Pilly	200L	8-10m x 8m
Howea forsteriana	Kentia Palm	200L	4-15m x 2-5m
Shrubs & Groundcovers			
Agave attenuata	Century Plant	300mm	1-1.5m x 1m
Aspidistra elatior	Cast Iron Plant	300mm	0.5-1.2m x 1.5m
Banksia spinulosa 'Birthday Candles'	Birthday Candles	200mm	0.6m x 1.2m
Beschorneria yuccoldes	Maxican Lily	25L	1.5-3m x 1.2-2.0m
Ctenanthe 'Grey Star'	Grey Star	300mm	1-1.5m x 1.5m
Dianella 'Silver Streak'	Flax Lily	200mm	0.5m x 0.4m
Dichondra repens 'Silver Falls'	Silver Falls	300mm	0.3m x 0.9-1.2m
Philodendron 'Xanadu'	Xanadu	300mm	0.75-1m x 1m
Liriope muscari 'Isabella'	Liriope Isabella	200mm	0.3-0.4m x 0.4m
Liriope muscari 'Just Right'	Just Right Liriope	200mm	0.5m x 0.5m
Myoporum parvifolium 'Yareena'	Yareena	200mm	0.1-0.15m x 1m
Rhaphiolepis indica 'Snow White'	Indian Hawthorne	25L	0.75-1m x 0.5m
Russelia equisetiformis	Firecracker Plant	200mm	1-1.75m x 4m
Strelitzia juncea	Narrow Leaved Bird of Paradise	25L	1-1.2m x 1m
Syzygium australe 'Resilience'	Lilly Pilly	100L	3-4m x 1-2m
Viola hederacea	Native Violet	200mm	0.2m x 0.3m
Bamboo			
Bambusa textillis "Gracilis"	Weaver's Bamboo	45L	3-5m x 0.9-1.2m
Climber			
Trachelospermum jasminmioides	Star Jasmine	200mm	20m x 1m

trees & palms

Howea forsteriana


Waterhousea floribunda

Glochidion ferdinandi

shrubs & groundcovers & climber

Agave attenuata

Aspidistra elatior

Beschorneria yuccoldes

Ctenanthe 'Grey Star'

Russelia equisetiformis

Liriope muscari 'Isabella'

Banksia spinulosa 'Birthday Candles'

Myoporum parvifolium 'Yareena'

Dianella 'Silver Streak'

Trachelospermum jasminioides

Dichondra repens 'Silver Falls'

Strelitzia juncea

site details:
warners bay
date:
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scale:

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revision:
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RGH CONSULTING GROUP
Multi-discipline Engineering

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Ph 02 4962 4414
Email admin@rghconsulting.com.au
Web www.rghconsulting.com.au
ABN 93 143 169 724

05 April 2017
Our Ref: 20160518 R02 Rev A

Hannah Walsh
Stewart Architecture
36 Mildura St.
FYSHWICK ACT 2609

Re: Hydraulic DA Report
Lake House Village at No.6 King Street, Warners Bay NSW 2282

Dear Hannah,

RGH Consulting Group Pty Ltd (RGH) was engaged by Stewart Architecture to outline and report on the preliminary building concept strategies in relation to the hydraulic services for the above proposed project.

This report has been prepared, together with the associated Authority Services schematics, Architectural drawings, schedules and attached sketches to achieve the following;

- To define the scope and intent of the services to support the project.
- To provide a basis upon which conceptual services can be assessed.
- To define general operation or function of the plant and systems
- To support the head contract and client requirements

This Report has been prepared on the understanding that the above will be confirmed during DA submission, Hunter Water Corporation (HWC) & Jemena applications and further coordination and clarification necessary to complete the design works.

Yours Faithfully,

Sean Tynan
Senior Hydraulic Consultant
RGH Consulting Group Pty Ltd

1. Sanitary Plumbing & Drainage

It is intended that the project will be drained via gravity to an approved authority sewer tie point. The assumed connection will be via a new DN225 property junction and dead end provided from the existing DN150 UPVC-SN8 sewer main located along the western boundary of site within The Esplanade pending the invert levels of the existing sewer and Hunter Water requirements arising from the Notice of Formal Requirements and Section 50 application process. It is believed there will be a portion of the existing DN150 sewer main to be made redundant due to structure of this development.

This assessment on the proposed development is based on an initial Dial Before You Dig (DBYD) application. Further cooperation with HWC will be required.

2. Trade Water Drainage

It is envisioned two food tenancies (shops 4 & 6) will be allocated in the commercial tenancies located on lower ground and ground floor levels.

It is an offence under Section 31 of the Hunter Water Act 1991 to discharge any substance into a sewer or other networks owned by Hunter Water without its prior written.

It is anticipated due to food cooking operations, a grease arrestor shall be provided for the commercial cooking facilities to achieve the minimum pre-treatment required to discharge to HWC networks. The intended grease arrestors are to be contained in chamber rooms proposed in lower ground floor and basement carparks and adequately ventilated to local council requirements.

In all circumstances HWC reserves the right to apply any requirements it deems necessary to control, limit or prohibit discharge of trade wastewater to its sewer system. Further negotiations with HWC are required and exact requirements to be determined upon the receipt of a trade waste agreement.

3. Stormwater Drainage & Rainwater harvesting

It is intended for all non-trafficable stormwater catchments to be drained via a dedicated stormwater system with downpipes and outlet structures connecting to above ground site rainwater harvesting tanks via a first flush system. It is anticipated the rainwater tanks will be located in the lower ground floor carpark with pumps and filter pipe reticulation intended for re-use to the site irrigation system only.

All trafficable stormwater catchments including balconies, external plant areas and rainwater harvesting tank overflows shall be drained via a dedicated stormwater system with downpipes and outlet structures connecting to an agreed location with the civil works. External and in-ground works by Civil.

4. Potable Cold Water

The existing DN100 water main surrounding the proposed development is deemed insufficient in accordance with Hunter Waters design manual. High density residential developments of

more than 4 levels are to be serviced by DN150 water mains. The nearest DN150 watermain is located on the northern side of King Street.

The planned connection/assemblies for the development is on the Eastern boundary of site fronting Howard Street. It is optimistic to utilise the surrounding DN100 water main being within Howard Street fronting the property, constructed in ring formation and having a maximum flow of 35l/sec available as a possible site connection.

Further negotiations with HWC are proceeding and exact requirements to be determined upon the receipt of HWC Notice of Formal Requirements.

5. Fire Services

Fire hydrant coverage is required and shall be via internal hydrants located in fire stairs and include a fire booster assembly in accordance with AS2419. It is intended for fire hose reels to provide coverage to lower carpark levels only supplied from the potable cold water metered service.

After receiving the flow and pressure results from HWC it is evident that the project will need to utilise a fire pump set to achieve the required design flows and pressures for firefighting purposes due to the height of the building and low pressures in the main. The intended pumproom will be located in lower ground floor carpark and accessed via a fire isolated stair with direct egress to road or open space pending local authority and fire brigade approval.

6. Potable Hot Water

The hot water generation for the project shall consist of a gas centralised hot water plant. The intended plant room will be located in the lower ground floor level carpark with the gas flue termination external at ground level.

It is anticipated to utilise an 'Origin' serviced type system for the plant and associated reticulation requirements. It is acknowledged Origin Energy supply and install the hot water plant, supply all hot water meters complete with wireless read out system and assist in liaising with gas authorities for the supply of the volume boundary meter and regulator.

7. Natural Gas

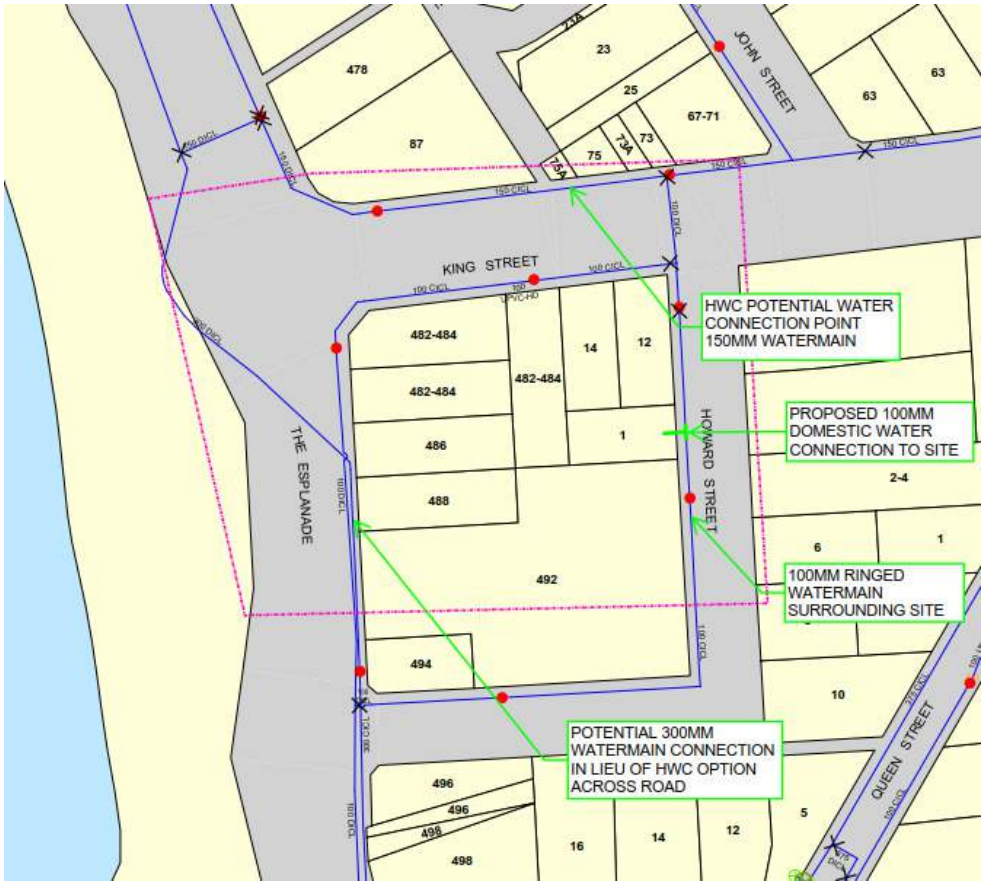
It is intended to utilise natural gas for a centralised hot water plant and gas cooktops and heating in the apartments. A high pressure (210kPa) natural gas main is available, located on along the Eastern boundary of site on the opposite side of Howard St.

It is anticipated a connection offer from Jemena will be applied for by Origin requesting a boundary meter and set-down regulator installation at the site boundary.

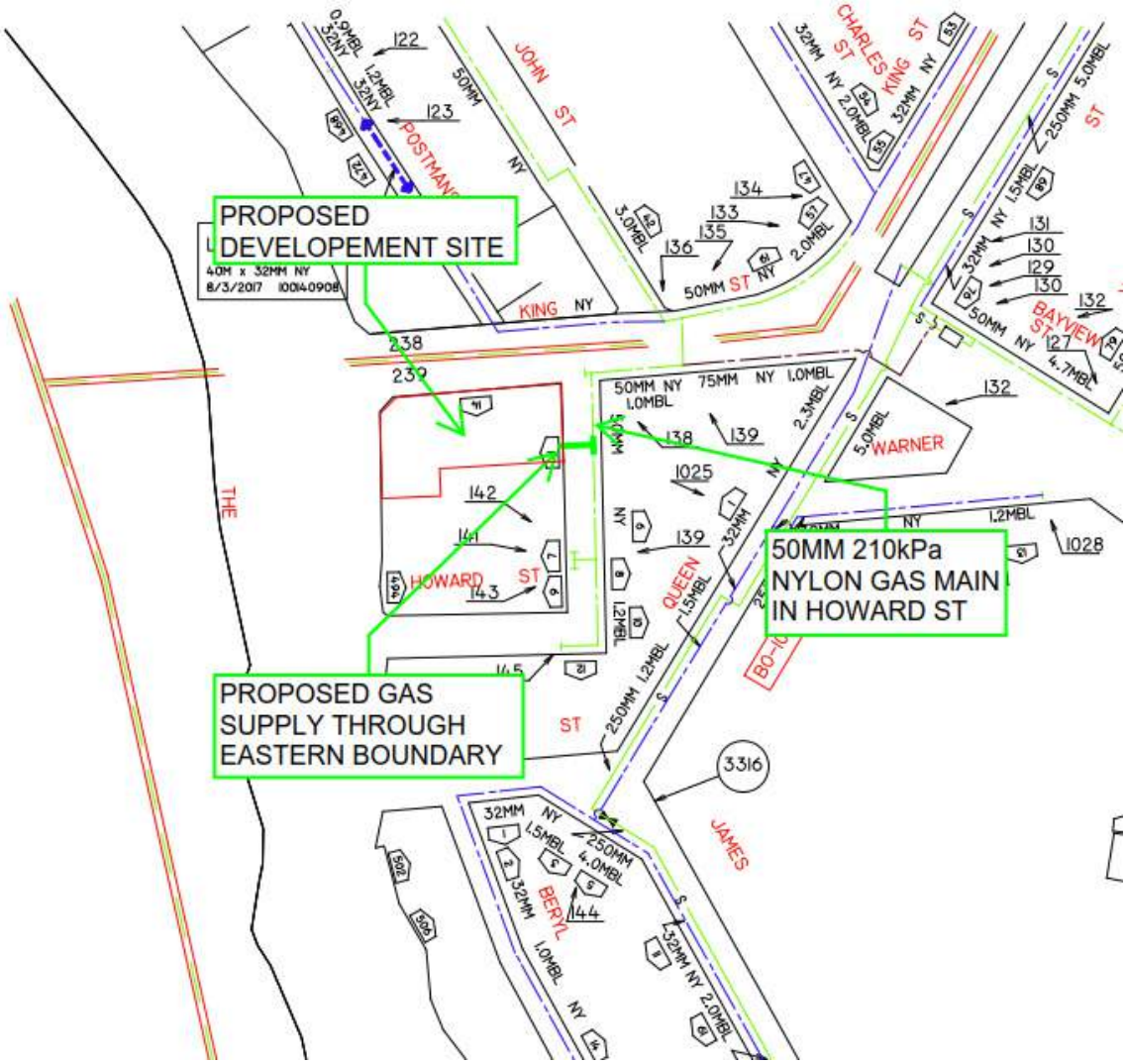
From here the gas system will continue as a low pressure reticulation through the building to serve the hot water plant and apartments. It is anticipated all gas installations after the boundary meter and regulator are to Origin installation requirements. No gas meters are required at the apartments.

This indicative philosophy shall be subject to the approval of Jemena, Origin and the local authority during the gas application process.

HUNTER WATER CORPORATION SEWERMAIN INFRASTRUCTURE

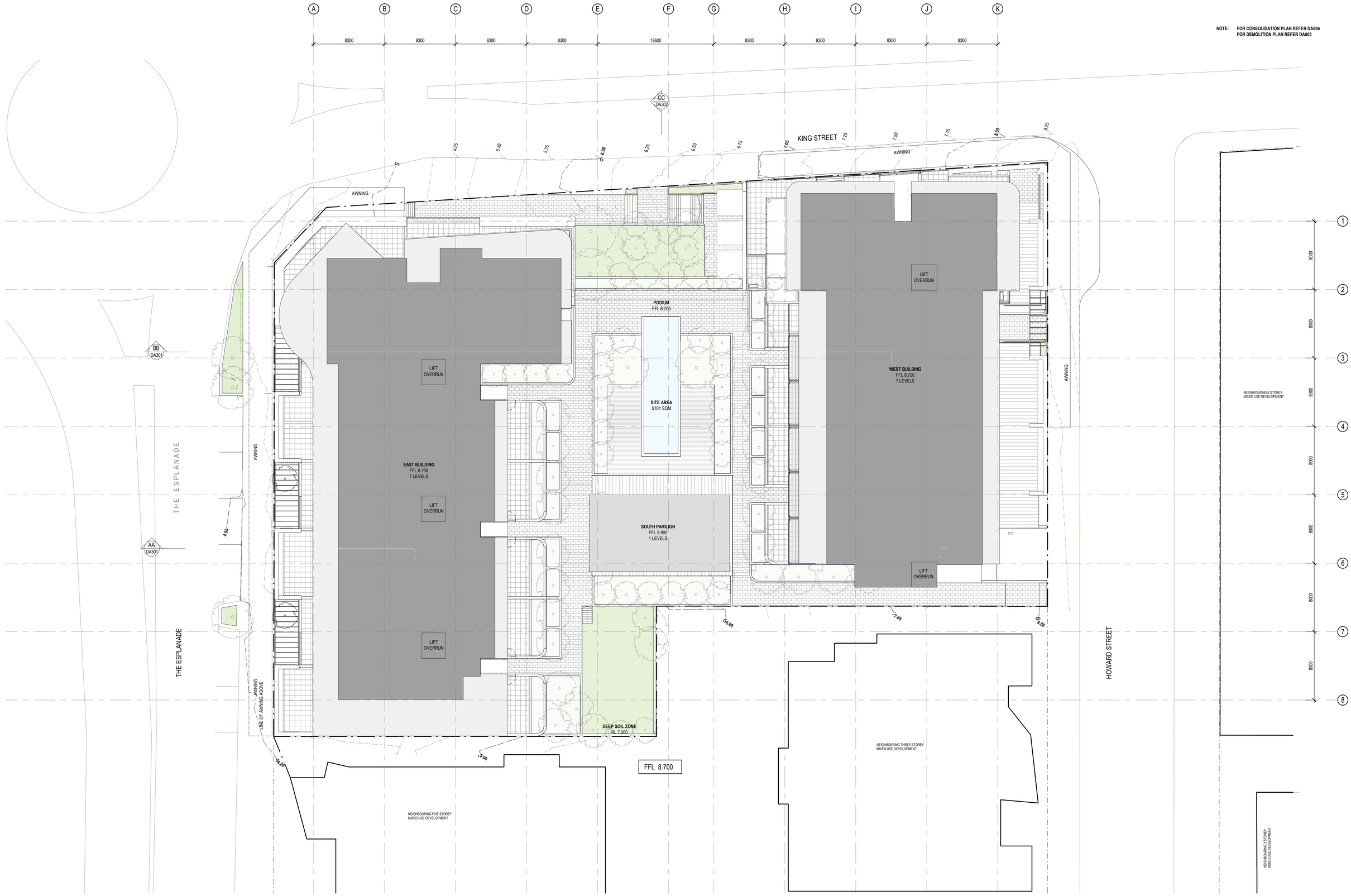


HUNTER WATER CORPORATION WATERMAIN INFRASTRUCTURE



JEMENA NATURAL GAS INFRASTRUCTURE

NOTE: FOR CONSOLIDATION PLAN REFER DA006
FOR DEMOLITION PLAN REFER DA005



REV	DESCRIPTION	DATE
A	SEPP 65 DESIGN REVIEW PANEL	23.11.2016
B	DRAFT SUBMISSION	03.04.2017
C	ISSUE FOR DEVELOPMENT APPLICATION	13.04.2017
D	FOR JRPP MEETING	08.11.2017

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PROJECT **LAKEHOUSE VILLAGE**

PROJECT No. **1635**

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DRAWING No. **DA007**
DRAWING TITLE **PLAN - SITE**
SCALE **1 : 200 @ A1**
DATE **2017**

REV	DESCRIPTION	DATE
A	REVISED PLANS FOR COUNCIL MEETING	18.07.2017
B	FOR SEPP 65 MEETING	22.08.2017
C	FOR JRPP MEETING	08.11.2017

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DRAWING No. **DA401**
DRAWING TITLE **PERSPECTIVE**
SCALE **@ A1**
DATE **2017**

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
B	ISSUE FOR DEVELOPMENT APPLICATION	13.04.2017
C	REVISED PLANS FOR COUNCIL MEETING	18.07.2017
D	REVISED DA DOCUMENTATION	27.07.2017
E	FOR SEPP 65 MEETING	22.08.2017

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DRAWING No. **DA402**
DRAWING TITLE **PERSPECTIVE**
SCALE
DATE **2017**

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
B	ISSUE FOR DEVELOPMENT APPLICATION	13.04.2017
C	REVISED PLANS FOR COUNCIL MEETING	18.07.2017
D	FOR SEPP 65 MEETING	22.08.2017
E	FOR JRPP MEETING	08.11.2017

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DRAWING No. **DA403**
DRAWING TITLE **PERSPECTIVE**
SCALE **@ A1**
DATE **2017**

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
B	ISSUE FOR DEVELOPMENT APPLICATION	13.04.2017
C	REVISED PLANS FOR COUNCIL MEETING	18.07.2017
D	FOR SEPP 65 MEETING	22.08.2017
E	FOR JRPP MEETING	08.11.2017

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PROJECT **LAKEHOUSE VILLAGE**

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DRAWING No. **DA404**
DRAWING TITLE **PERSPECTIVE**
SCALE
DATE **2017**

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
B	ISSUE FOR DEVELOPMENT APPLICATION	13.04.2017
C	REVISED PLANS FOR COUNCIL MEETING	18.07.2017
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DRAWING No. **DA405**
DRAWING TITLE **PERSPECTIVE**
SCALE **@ A1**
DATE **2017**

1 SOUTH PERSPECTIVE

REV	DESCRIPTION	DATE
A	ISSUE FOR DEVELOPMENT APPLICATION	13.04.2017
B	FOR JRPP MEETING	08.11.2017

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DRAWING No. **DA406**
DRAWING TITLE **PERSPECTIVE**
SCALE **@ A1**
DATE **2017**

LAKEHOUSE VILLAGE

DEVELOPMENT APPLICATION SHEET LIST

DA000	LOCATION & DRAWING SCHEDULE	D
DA001	PLAN - CONTEXT	B
DA002	PLAN - SITE ANALYSIS	C
DA005	PLAN - DEMOLITION	C
DA006	PLAN - CONSOLIDATION	B
DA007	PLAN - SITE	D
DA008	SHADOW DIAGRAMS	C
DA009	SHADOW DIAGRAMS	C
DA101	PLAN - BASEMENT 1	F
DA102	PLAN - LOWER GROUND	F
DA103	PLAN - UPPER GROUND	F
DA104	PLAN - LEVEL 2	F
DA105	PLAN - LEVEL 3	F
DA106	PLAN - LEVEL 4	F
DA107	PLAN - LEVEL 5	F
DA108	PLAN - LEVEL 6	F
DA109	PLAN - LEVEL 7	F
DA110	PLAN - ROOF	F
DA201	ELEVATIONS - WEST / NORTH	F
DA202	ELEVATIONS - EAST / SOUTH	E
DA203	ELEVATIONS - INTERNAL	F
DA301	SECTIONS	F
DA302	SECTIONS	F
DA401	PERSPECTIVE	C
DA402	PERSPECTIVE	E
DA403	PERSPECTIVE	E
DA404	PERSPECTIVE	E
DA405	PERSPECTIVE	E
DA 407	PERSPECTIVE - SOUTH	B

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
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DRAWING No. **DA000**
DRAWING TITLE **LOCATION & DRAWING SCHEDULE**
SCALE **1 : 8 @ A1**
DATE **2017**

1 PERSPECTIVE - SOUTH WITHOUT NEIGHBOUR

BRICK STREET WALL
MOTTLED CREAMS

BALUSTRADE
GLASS - GREEN TONE

BLACK BATTEN BALUSTRADE AND SCREEN
SIMILAR TO COLOUR MONUMENT

CONCRETE
WHITE

METAL PANELLING
SIMILAR TO COLOUR MONUMENT

BLACK BATTEN FENCE
SIMILAR TO COLOUR MONUMENT

CONCRETE
WHITE

METAL PANELLING
SIMILAR TO COLOUR 'MONUMENT'

BALUSTRADE
GLASS - GREEN TONE

2 PERSPECTIVE - SOUTH WITH NEIGHBOUR

REV	DESCRIPTION	DATE
A	FOR FURTHER INFORMATION	01.09.2017
B	FOR JRPP MEETING	08.11.2017

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PROJECT **LAKEHOUSE VILLAGE**

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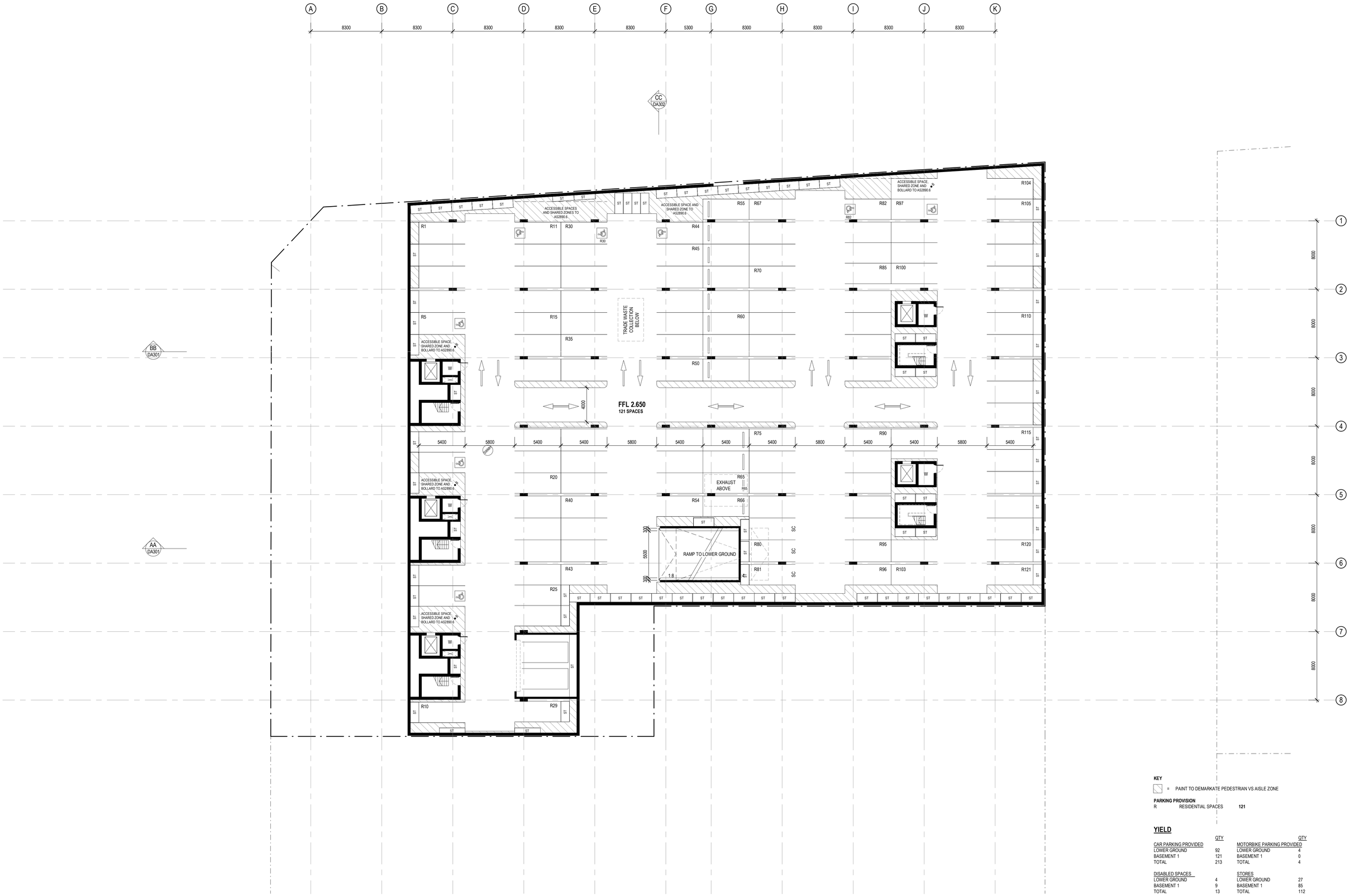
DRAWING No. **DA 407**
DRAWING TITLE **PERSPECTIVE - SOUTH**
SCALE **1 : 200 @ A1**
DATE **2017**



KEY

= PAINT TO DEMARKATE PEDESTRIAN VS AISLE ZONE

PARKING PROVISION

R	RESIDENTIAL SPACES	**121**

YIELD

CAR PARKING PROVIDED	QTY
LOWER GROUND	92
BASEMENT 1	121
TOTAL	213

DISABLED SPACES	
LOWER GROUND	4
BASEMENT 1	9
TOTAL	13

MOTORBIKE PARKING PROVIDED	QTY
LOWER GROUND	4
BASEMENT 1	0
TOTAL	4

STORES	
LOWER GROUND	27
BASEMENT 1	85
TOTAL	112

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DRAWING No. **DA101**
DRAWING TITLE **PLAN - BASEMENT 1**
SCALE **1 : 200 @ A1**
DATE **2017**

KEY

= PAINT TO DEMARKATE PEDESTRIAN VS AISLE ZONE

PARKING PROVISION

R	RESIDENTIAL SPACES	57
C	COMMERCIAL SPACES	7 + 6 ON STREET
S	SHARED COMMERCIAL /VISITOR SPACES	28
		92

KEY

VISITOR	RESIDENTIAL VISITOR PARKING SPACE
COMM	COMMERCIAL PARKING SPACE
COMM TNCY	COMMERCIAL TENANCY ALLOCATED PARKING SPACE
MB	MAIL BOXES
MC	MOTORCYLE PARKING SPACE
ST	STORE

REV	DESCRIPTION	DATE
A	SEPP 65 DESIGN REVIEW PANEL	23.11.2016
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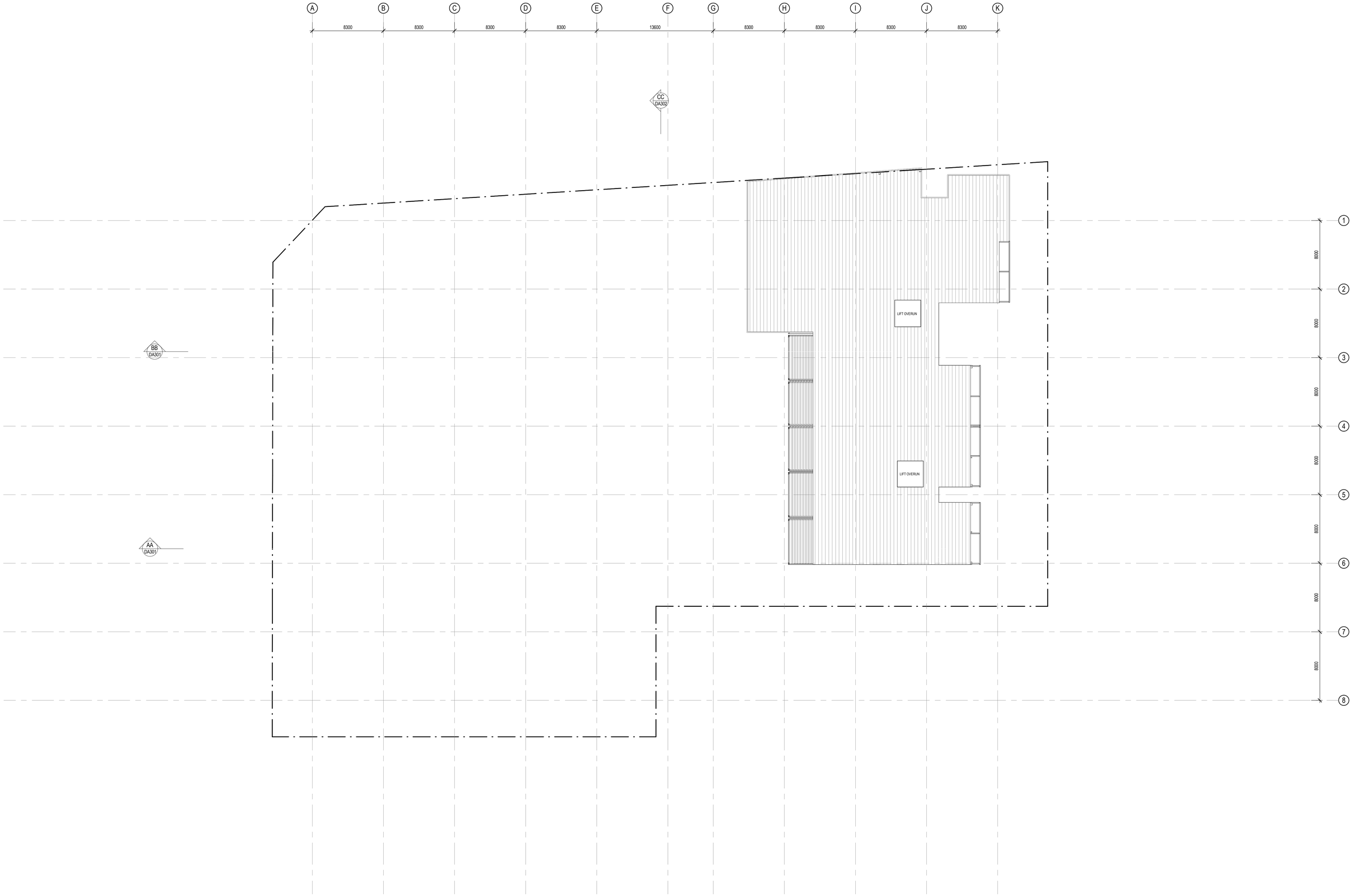
DRAWING No. **DA102**
DRAWING TITLE **PLAN - LOWER GROUND**
SCALE **1 : 200 @ A1**
DATE **2017**



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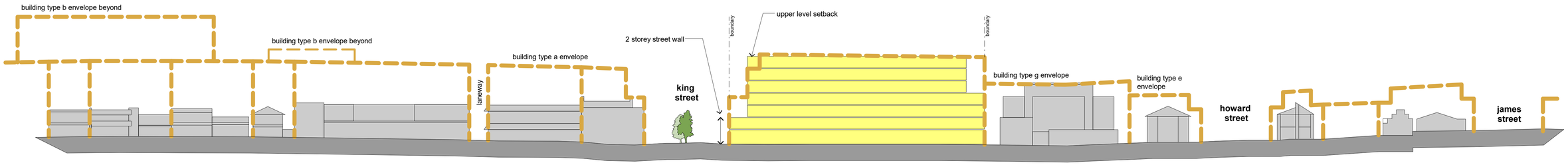
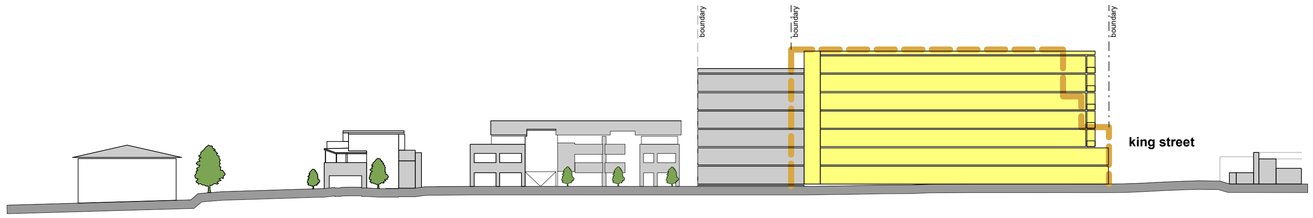
DRAWING No. **DA110**
DRAWING TITLE **PLAN - ROOF**
SCALE **1 : 200 @ A1**
DATE **2017**



THE ESPLANADE

KING STREET



HOWARD STREET

KEY

- EXISTING BUILT CONTEXT
- PROPOSED BUILDING ENVELOPE
- WARNERS BAY TOWN CENTRE PLAN BUILDING ENVELOPES

view west along king street

view of site from roundabout

view of site from foreshore

view of site from foreshore - existing 5 storey neighbour to right

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
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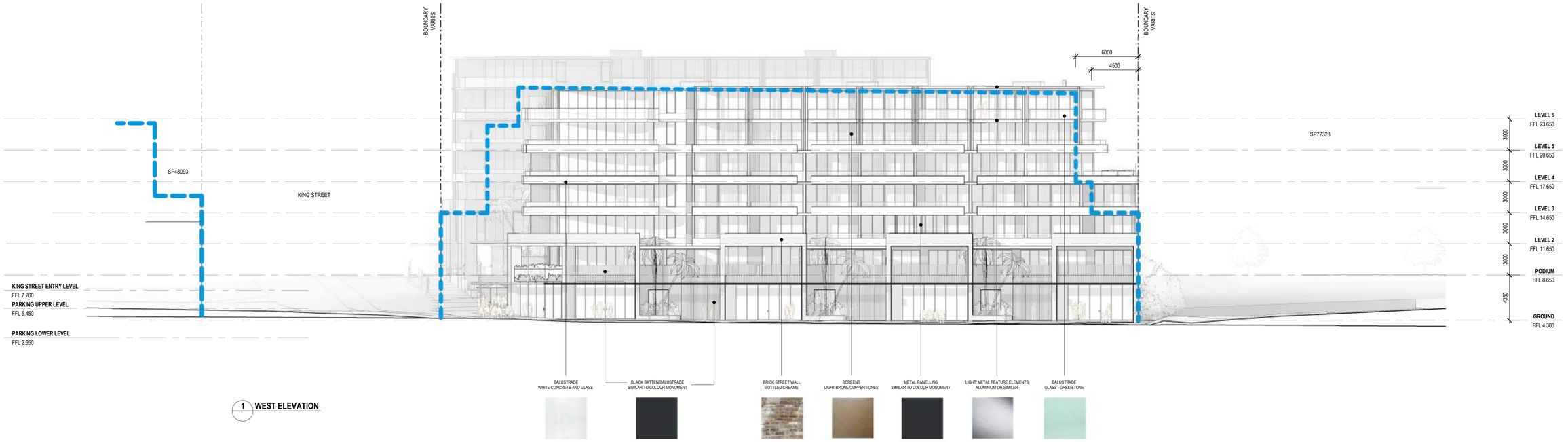
DRAWING No. **DA200**
DRAWING TITLE **STREETSCAPE ELEVATIONS**
SCALE
DATE **2017**



1 **WEST ELEVATION**

2 **NORTH ELEVATION**

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
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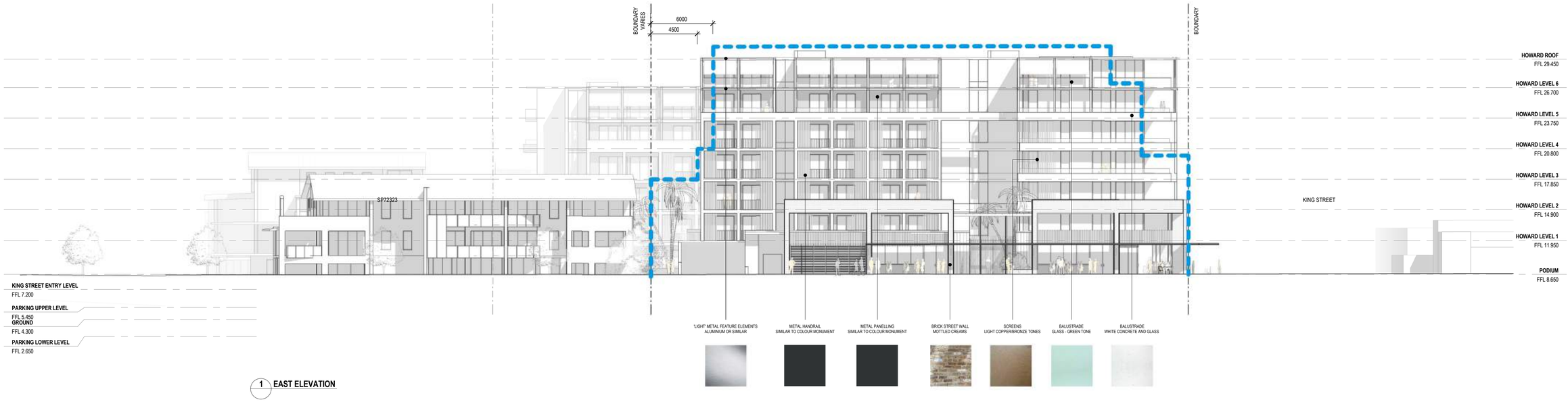
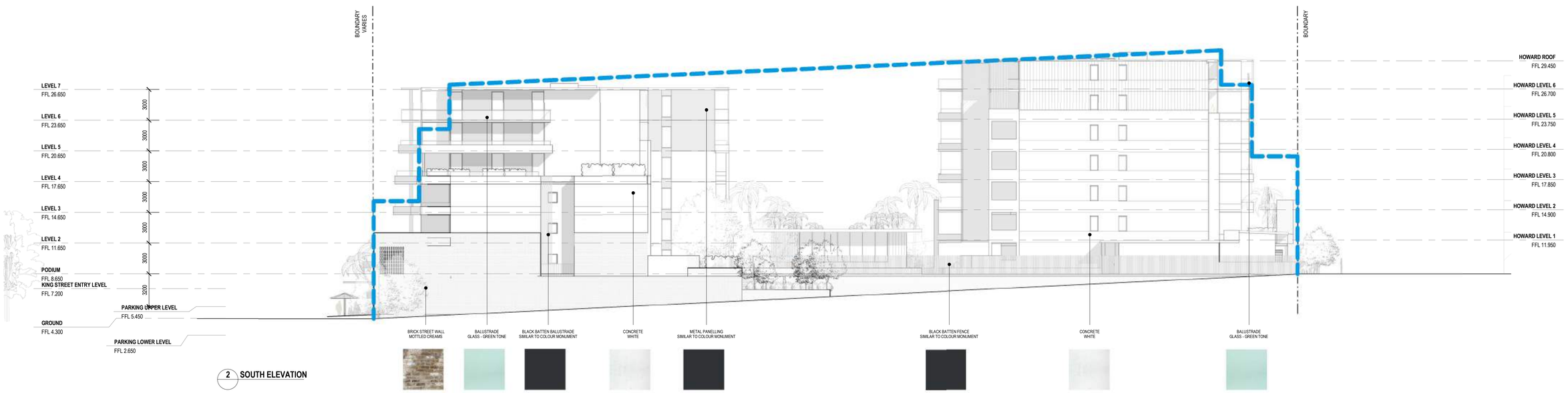
DRAWING No. **DA201**
DRAWING TITLE **ELEVATIONS - WEST / NORTH**
SCALE **1 : 200 @ A1**
DATE **2017**



1 EAST ELEVATION



2 SOUTH ELEVATION

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
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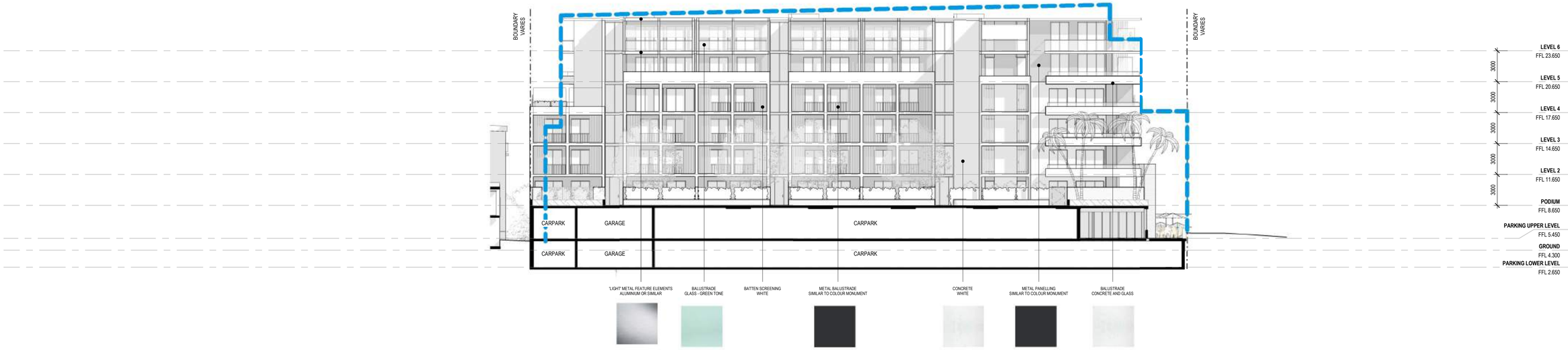
DRAWING No. **DA202**
DRAWING TITLE **ELEVATIONS - EAST / SOUTH**
SCALE **1 : 200 @ A1**
DATE **2017**



1 **INTERNAL - ESPLANADE BUILDING**

2 **INTERNAL - HOWARD ST BUILDING**

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
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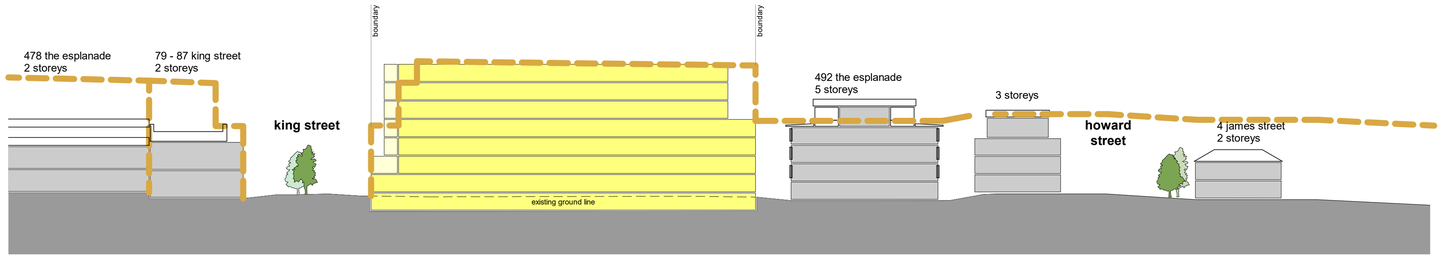
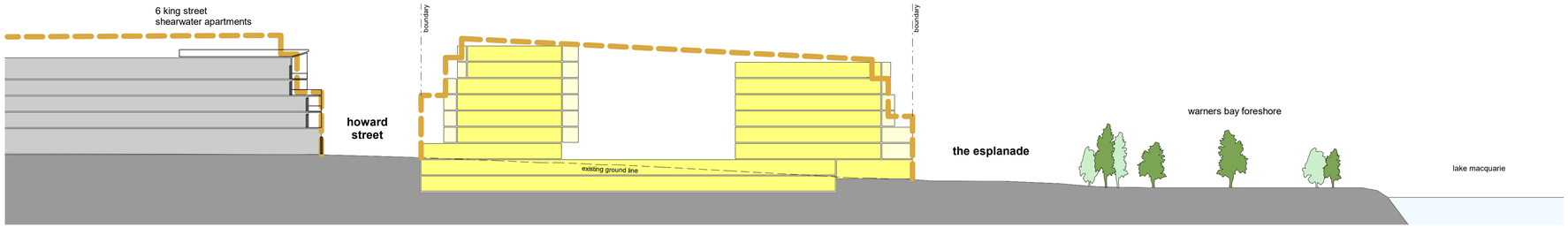
DRAWING No. **DA203**
DRAWING TITLE **ELEVATIONS - INTERNAL**
SCALE **1 : 200 @ A1**
DATE **2017**



SECTION NORTH/SOUTH



SECTION EAST/WEST

KEY

- EXISTING BUILT CONTEXT
- PROPOSED BUILDING ENVELOPE
- WARNERS BAY TOWN CENTRE PLAN BUILDING ENVELOPES

view of site corner on howard + king streets

view across king street to site

view across king street to site

REV	DESCRIPTION	DATE
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PROJECT **LAKEHOUSE VILLAGE**

PROJECT No. **1635**

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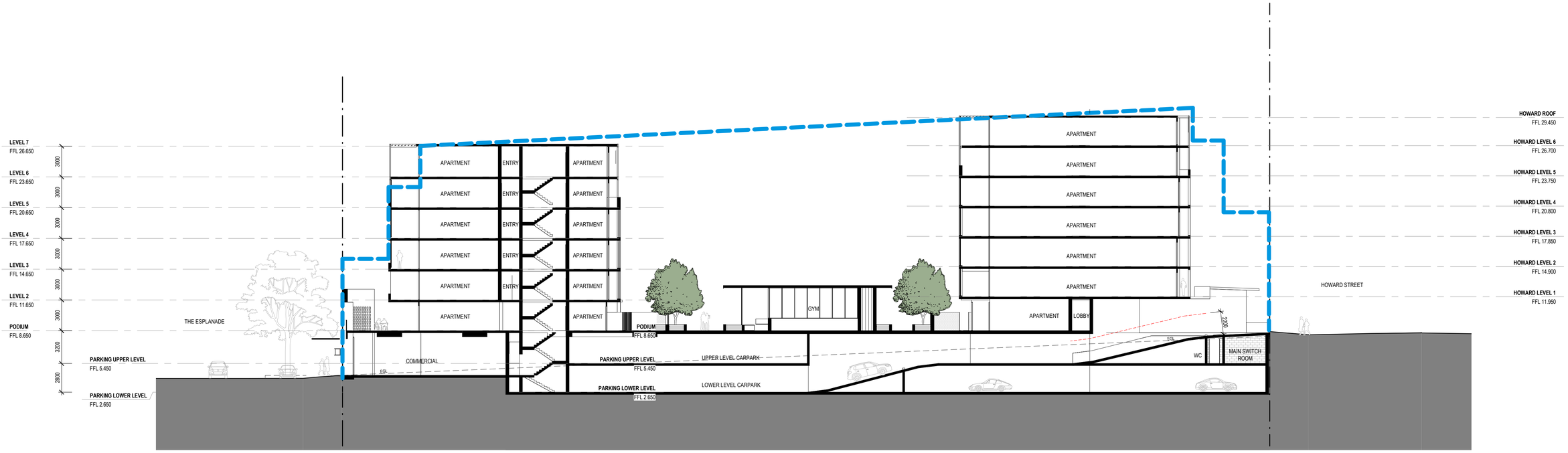
DRAWING No. **DA300**
DRAWING TITLE **SITE SECTIONS**
SCALE **1 : 500 @ A1**
DATE **2017**



AA SECTION AA

BB SECTION BB

REV	DESCRIPTION	DATE
A	SEPP 65 DESIGN REVIEW PANEL	23.11.2016
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D	FOR SEPP 65 MEETING	22.08.2017
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F	FOR JRPP MEETING	08.11.2017

SHAC

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PROJECT **LAKEHOUSE VILLAGE**

PROJECT No. **1635**

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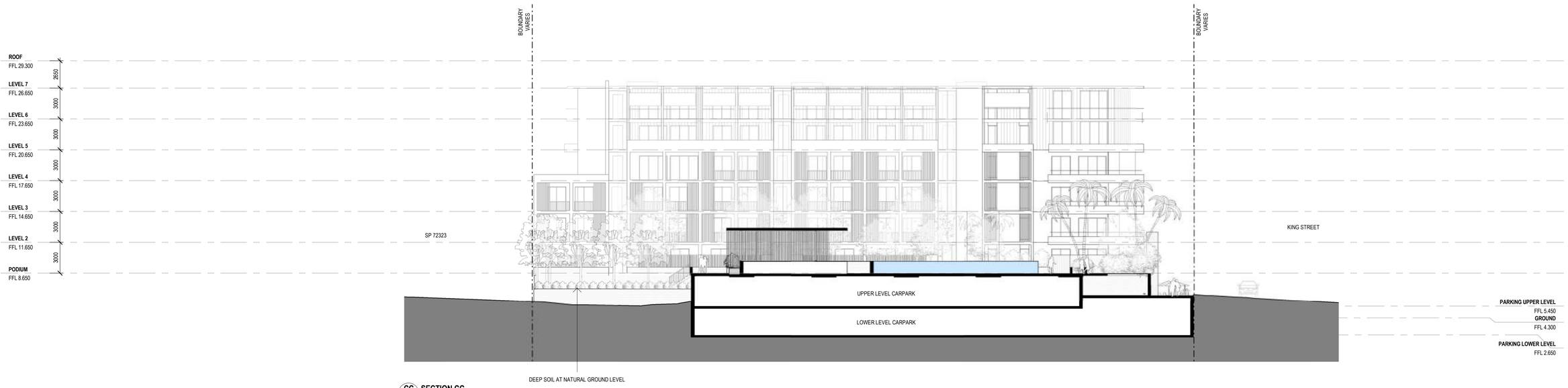
This drawings is for development application purposes and not for construction.

DRAWING No. **DA301**
DRAWING TITLE **SECTIONS**
SCALE **1 : 200 @ A1**
DATE **2017**



CC SECTION CC

REV	DESCRIPTION	DATE
A	DRAFT SUBMISSION	03.04.2017
B	ISSUE FOR DEVELOPMENT APPLICATION	13.04.2017
C	REVISED PLANS FOR COUNCIL MEETING	18.07.2017
D	FOR SEPP 65 MEETING	22.08.2017
E	FOR FURTHER INFORMATION	19.10.2017
F	FOR JRPP MEETING	08.11.2017

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DRAWING No. **DA302**
DRAWING TITLE **SECTIONS**
SCALE **1 : 200 @ A1**
DATE **2017**

LAKEHOUSE VILLAGE | WARNERS BAY

AWNING BUILDABILITY

NOVEMBER 2017

SHAC | STEWART ARCHITECTURE

FYSHWICK MARKETS

GREEN SQUARE LIBRARY PLAZA

FYSHWICK MARKETS

Awning Precedents

The design of the awning for the proposal is envisaged as a fine steel plate awning.

There are numerous examples of this awning design being achieved and constructed successfully: including a range of projects which Stewart Architecture have previously designed.

To primary examples are the Fyshwick Markets, Canberra (completed 2012) and the Green Square Library Plaza, Sydney (currently under construction). Both these projects demonstrate the buildability of the fine steel plate awning which is considered the most appropriate design outcome for the proposal.

Therefore, significant changes will be able to be avoided during the Construction Certificate state. This stage will instead be used to refine the awning design to ensure the best design outcome is achieved.

Friday, 7 April 2017

Our Ref: MN9157

Stewart Architecture
36 Mildura Street
FYSHWICK ACT 2609

Attention: Hannah Walsh

Dear Hannah,

RE: Warners Bay Lake House Apartments

The summary below outlines the philosophy in relation to the mechanical services and electrical services for the proposed development.

Yours faithfully
Marline Newcastle Pty Limited

Brian Hunt
Managing Director

Managing Director Brian Hunt, BE, MBA MIEAust
Director Daniel White, BE (Hons), B.BUS, MIEAust
Director Brendan Maher
Associate Director Keld Hoyer
ABN / ACN 612 456 381

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ELECTRICAL SERVICES

INCOMING SUPPLY

The required power for the building is 1200 Amps per phase. Ausgird have been notified of the load and have provided a design information package for the project. A level 3 design is required for the project which will include for a chamber substation on site. The chamber substation will be located on the Eastern side of the development facing Howard Street.

MAIN SWITCH BOARD

The main switchboard will be located in a dedicated room in the lower ground level adjacent and below the substation.

The main switchboard will include fire safety services including fire pumps. It will also include non-essential power to air conditioning, apartments and commercial premises.

POWER METERING

Electrical power will be metered in two locations. The meters for the east side of the building will be located in the main switch room. The meters for the western side of the building will located in a cupboard in a hallway on the lower ground floor.

All power meters would be “Authority” meters billable directly to the consumer. All power consumed in the common areas would be billed to house meters.

FIRE DETECTION AND OCCUPANCY WARNING

The building is to be provided with an AS1670 fire detection system to all common areas and commercial area.
The apartments will be provided with smoke alarms to AS3786.

MASTER ANTENNA TELEVISION SYSTEMS MATV

The building will be provided a free to air and PAY-TV cabled to all apartments and commercial areas. The final connection to the PAY-TV will be at the customer’s discretion.

SECURITY-ACCESS

Security will consist of video intercom call points at main entries connected to each apartment. The apartments will have an answer station with a main door open button interfaced to the lift which will control the level stop point. the security system would also control access to the non visitor section of the car park.

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COMMUNICATION

The communication system will include provision of NBN throughout the building with each tenant/apartment having a connection point.

LIGHTING

Lighting will be energy efficient throughout the project will recessed LED downlights provided in apartments.

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MECHANICAL SERVICES

CAR PARK VENTILATION

The car park will be ventilated using a combination of exhaust fans, jet fans and make up air openings/systems. The system will utilise an engineered solution.

The exhaust will discharge at ground level with the discharge being a minimum 6 m from the boundary and any operable doors and windows.

GENERAL VENTILATION

Exhaust systems will be provided for areas requiring exhaust such as garbage rooms and amenities with discharge above roof level.

Supply air system will introduce fresh air to corridors and foyers where there is inadequate natural ventilating to meet Building Code Requirements.

COMMERCIAL KITCHEN VENTILATION

Provision will be made for future commercial Kitchen ventilation including supply and exhaust.
Any future kitchen ventilation would be subject to a separate approval process.

COMMERCIAL AREA AIR CONDITIONING

Commercial areas will be provided with ducted air conditioning that introduce outdoor air in accordance with the BCA. The condensers are located discretely at ground level away from apartments and boundaries.

APARTMENT AIR CONDITIONING AND VENTILATION

Apartments will be provided with a combination of wall mounted and split ducted air conditioning with condensers located on the balcony.
The kitchen range hood will be of the recirculating type and not require ducting to the outside.
The laundry and toilet of each apartment will be ducted to the outside via the ceiling space/bulkhead.

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