STORMWATER MANAGEMENT REPORT

Project Horizons Imaging and Pathology Centre

14 Highfields Circuit, Port Macquarie NSW 2444

November 2017

Rev B

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ISSUE AND REVISION RECORD

Issue	Date	Purpose	Prepared By	Checked By	Approved By
A	15/11/2017	Preliminary Issue for Review	KL	JRH	JRH
B	16/11/2017	Issue for Review	KL	JRH	JRH

1 INTRODUCTION

1.1 Project Description

ACOR Consultants has been engaged to prepare the stormwater design, including an On-Site Stormwater Management Plan for the proposed development at 14 Highfields Circuit, Port Macquarie. The development comprises the establishment of a medical imaging facility along with associated external carpark.

This report documents the methodology involved in determining the design of the proposed stormwater drainage system for the proposed development, including the stormwater quantity and quality management.

1.2 Guidelines and Standards

The stormwater system and the Water Sensitive Urban Design (WSUD) design is based on notes taken from the Development Application Pre-Lodgement Meeting held on Tuesday 24 October 2017 (Pre-lodgement Reference 210.2017.175). Of importance is part 'Engineering 1)', where reference is made to stormwater management plan and associated requirements.

To that end the proposed design meets the following requirements:

- Port Macquarie-Hastings Council Development Control Plan 2013
- Port Macquarie-Hastings Council AUS-SPEC D5 and D7
- AS3500.3-2015

2 EXISTING SITE

The site occupies approximately 3500 square metres, falling from a south-west to north-east direction at between 2 and 11 percent. Currently occupying the site is a single storey brick residence with associated carport, garage and in-ground swimming pool. There is a mixture of paved and grassed areas, along with a retaining wall on the western side of the site. Trees are scattered around the site.

The site currently drains via overland flow north to Highland Circuit kerb and gutter. There is no existing underground drainage at the frontage of the site, with the nearest downstream Council stormwater pit in front of Number 20 Highfields Circuit. Approximately 1km east of the site is Kooloonbung Creek, which ultimately receives the stormwater runoff.

3 PROPOSED DEVELOPMENT

3.1 Proposed Stormwater Drainage Layout

Stormwater from the proposed development is to be directed into an underground pit and pipe system and discharged to the Council stormwater network (which is to be extended from 20 Highfields Circuit to the site frontage). We note that on-site detention is required to attenuate post development flows.

3.2 Proposed Post-Development Flow

The proposed stormwater system is to store and release stormwater so that the post-developed flows coming off the site do not exceed the pre-developed flows for all storm events up to the 100 year ARI (in accordance with the Pre-DA minutes). In addition, the pre-developed site was assumed to be 'green field' as per AUS-SPEC D5.

Flows were modelled in the computer software package Drains, and the tank configuration and orifice size were obtained correspondingly. The model can be provided on request, however results are summarised in Table 3.1. A screenshot of the Drains model is shown in Appendix C, with outputs for the 5, 20 and 100 year storm events.

Table 3.1

Storm events	Flows (L/s)
Q5 Pre-development	45
Q5 Post-development with OSD	43
Q20 Pre-development	129
Q20 Post-development with OSD	110
Q100 Pre-development	219
Q100 Post-development with OSD	216

It was found that 72m^3 of storage was sufficient, with 1.0m of head above an orifice of diameter 115mm.

Based off these figures, we have decided to provide 72m^3 of storage for the proposed development.

The details of the proposed layout will be as shown in Appendix A.

4 STORMWATER QUALITY MANAGEMENT

The proposed drainage system has been designed in accordance with AUS-SPEC D7, Section D7.11 Table D7.7.

The following water quality targets are to be achieved:

- 80% reduction in the post development mean annual load of Total Suspended Solids (TSS).
- 45% reduction in the post development mean annual load of Total Phosphorus (TP).
- 45% reduction in the post development mean annual load of Total Nitrogen (TN).
- 100% reduction in the post development mean annual load of total gross pollutants.
- No visible oils for flows up to the 3 month ARI peak flow

4.1.1 Stormwater Quality Treatment Train

It is proposed that proprietary stormwater quality treatment devices be used. Runoff from paved and landscaped areas enter stormwater pits fitted with Stormwater360 Enviropod filter baskets. This provides removal of most of the gross pollutants coming off the site. From there, stormwater enters into a filtration chamber containing 3 SPELFilter cartridges, which provide secondary and tertiary treatment. The treated water than discharges into a boundary pit, and from there to the Council stormwater system. The MUSIC model of the setup is shown in Appendix B.

4.1.2 MUSIC Modelling

The MUSIC software package has been used to model the water quality treatment train for the post-developed site to calculate the pollutant loads from the development and the effectiveness of the treatment train. The perviousness of catchment areas is based on the design as detailed in Appendix A.

The model was run to calculate the reduction in the mean annual loads for the proposed development. The model can be provided on request however a summary of the results is shown below in Table 4.1. Full MUSIC results are attached in Appendix B.

Table 4.1 – MUSIC Output – Post Developed Mean Annual Loads

Parameter	In	Out	% Removal Required	% Removal Achieved
Total Suspended Solids (kg/yr)	1070	69.6	80%	93.5%
Total Nitrogen (kg/yr)	12.4	6.19	45%	49.9%
Total Phosphorous (kg/yr)	2.16	0.728	45%	66.3%
Gross Pollutants (kg/yr)	110	0.0134	100%	100%

As can be seen in Table 3.1 above, the Suspended Solids, Nitrogen, Phosphorus and Gross Pollutants are all reduced by the treatment train proposed for this development. These results exceed the required percentage reductions set by the Port Macquarie-Hastings Council Development Control Plan.

5 CONCLUSION

The proposed site at 14 Highfields Crescent, Port Macquarie incorporates measures to address both stormwater quality and quantity requirements stipulated by Port Macquarie-Hastings Council.

Proprietary devices will be used as part of the water quality treatment train. Pit inserts will be provided to enable removal of gross pollutants, whilst secondary and tertiary treatment is performed through filter cartridges placed within the OSD tank.

The proposed stormwater system will store and release stormwater within the on-site detention tank so that the post development runoff from the site does not result in flows greater than the pre-development runoff for all events up to the 100 year ARI storm event.

The above measures achieve the requirements set out by the following documents:

- Port Macquarie-Hastings Council Development Control Plan 2013
- Port Macquarie-Hastings Council AUS-SPEC D5 and D7
- AS3500.3-2015

APPENDIX A – ACOR Consultants Drawings

ACOR Consultants Drawings:

- C1.01 – Cover Sheet, Notes and Legends
- C1.05 – Details Sheet 1
- C1.06 – Details Sheet 2
- C2.01 – Storm Water Management Plan
- C4.01 – Soil Erosion and Sediment Control Plan

PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
14 HIGHFIELD CIRCUIT, PORT MACQUARIE NSW 2444
CIVIL SERVICES

PAVEMENT LEGEND

PAVEMENT TYPE 1
DESIGN ESA = 5 x10⁵ ASSUMED
DESIGN HVAG = 2.5 x 10⁷ ASSUMED
CBR = 1%
- 180mm THICK CONCRETE (32MPa) WITH SL82 MESH (MIN 50 TOP COVER)
- 150mm LEAN MIX CONCRETE (5MPa)
- COMPACTED SUBGRADE

PAVEMENT TYPE 2
CONCRETE VEHICLE CROSSING
- 200mm THICK CONCRETE (20MPa) WITH SL82 MESH PLACED TOP AND BOTTOM (MIN 50mm COVER)
- 75mm DGB20
- COMPACTED SUBGRADE

PAVEMENT TYPE 3
OSD LID COVER
REFER TO DETAIL DRAWING C1.06

PAVEMENT TYPE 3
PUBLIC DOMAIN FOOTPATH

PAVEMENT MARKING & SIGNAGE LEGEND

- PROPOSED TRAFFIC SIGN
- PARKING BAY LINE (100)
- ACCESSIBLE PARKING SYMBOL
- TURN ARROW
- DIRECTIONAL ARROW
- DISABLED PARKING BAY LINE (100)

NOTES
1. ALL PAVEMENT MARKING AND SIGNAGE SHALL BE IN ACCORDANCE WITH AS1742, 1743 & 2890 AND RMS

SIGNAGE LEGEND

- R5-400 (R) — NO STOPPING / RIGHT
- R5-400 (L) — NO STOPPING / LEFT
- R5-1-3 (R) — DISABILITY PARKING TO THE RIGHT
- R5-40 (R) — NO PARKING / RIGHT
- R5-40 (L) — NO PARKING / LEFT
- R5-1-3 (L) — DISABILITY PARKING TO THE LEFT
- AMBULANCE PARKING ONLY

CIVIL LEGEND

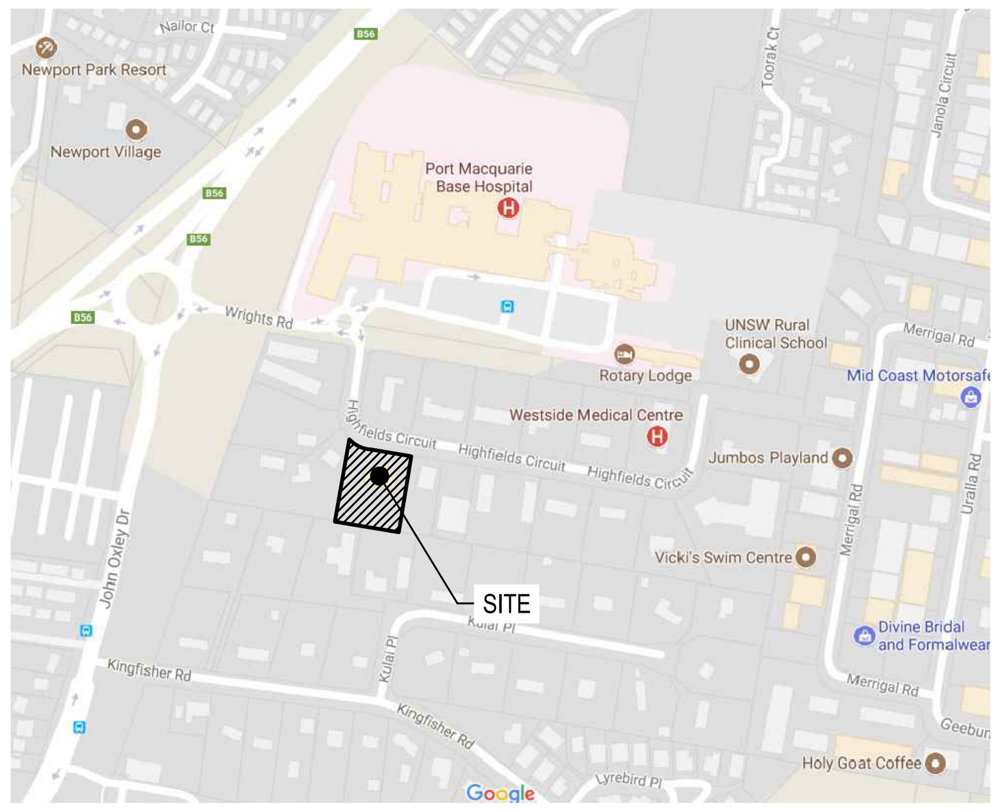
- • P56.20 .... FINISHED PAVEMENT SURFACE LEVEL
- SW .... STORMWATER
- .... STORMWATER PITS
- .... GRATED DRAIN
- KO .... KERB ONLY
- K&G .... KERB AND GUTTER

SOIL EROSION AND SEDIMENT CONTROL LEGEND

- SEDIMENT FENCE
- FILTER FABRIC DROP INLET PIT. PROVIDE AT ALL EXISTING SURFACE STORMWATER PITS.
- SAND BAG SEDIMENT TRAP
- STABILISED CONSTRUCTION EXIT

DRAWING LIST

DWG No.	DESCRIPTION
C1.01	COVER SHEET AND NOTES
C1.05	DETAILS - SHEET 1
C1.06	DETAILS - SHEET 2
C1.07	DETAILS - SHEET 3
C1.50	PAVEMENT PLAN
C2.01	STORMWATER MANAGEMENT PLAN
C3.01	SIGNS AND LINEMARKING PLAN
C4.01	SOIL EROSION AND SEDIMENT CONTROL



Map data © 2017 Google

LOCALITY PLAN
N.T.S.

DIAL BEFORE YOU DIG

DIAL BEFORE YOU DIG www.1100.com.au

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

NOT FOR CONSTRUCTION

This drawing has been assigned an electronic code that signifies the drawing has been checked and approved by: JUSTIN HILL

Issue	Description	Date	Drawn	Approved
A	ISSUE FOR REVIEW	16.11.17	KL	JRH

North

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Project: PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
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Drawing Title: COVER SHEET, NOTES AND LEGEND

Drawn	Date	Scale A1	Q.A. Check	Date
GP	OCT 2017	NTS	QA	XX.XX.XX

Designed	Project No.	Dwg. No.	Issue
XX	SY170775	C1.01	A

P:\SY17\SY170775\Drawings\CIV\Drawings\SY170775_C1... Nov 16, 2017 - 6:49pm

GENERAL NOTES

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

EXISTING SERVICES AND FEATURES

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

SITEWORKS NOTES

1. ORIGIN OF LEVELS :- AUSTRALIAN HEIGHT DATUM (A.H.D.)
2. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK.
3. ALL WORK IS TO BE UNDERTAKEN IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS, THE SPECIFICATIONS AND THE DIRECTIONS OF THE PRINCIPAL'S REPRESENTATIVE.
4. EXISTING SERVICES HAVE BEEN PLOTTED FROM SUPPLIED DATA AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE PRINCIPAL'S REPRESENTATIVE. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
5. WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS OBTAINED.
6. THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
7. CARE IS TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATIONS ARE TO BE UNDERTAKEN OVER COMMUNICATIONS OR ELECTRICAL SERVICES. HAND EXCAVATE IN THESE AREAS.
8. ALL SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED WITH AN APPROVED NON-NATURAL GRANULAR MATERIAL AND COMPACTED TO 98% STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS.1289.5.1.1.
9. ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL.
10. ON COMPLETION OF PIPE INSTALLATION ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AND GRASSED AREAS AND ROAD PAVEMENTS.
11. PROVIDE 10mm ABELFLEX BETWEEN CONCRETE PAVEMENTS AND ALL BUILDINGS , WALLS, FOOTINGS, COLUMNS, KERBS, DISHDRAINS, GRATED DRAINS, BOLLARD FOOTINGS ETC
12. CONTRACTOR TO OBTAIN ALL AUTHORITY APPROVALS.
13. ALL BATTERS TO BE GRASSED LINED WITH MINIMUM 100 TOPSOIL AND APPROVED COUCH LAID AS TURF.
14. MAKE SMOOTH TRANSITION TO EXISTING SERVICES AND MAKE GOOD.
15. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY DIVERSION DRAINS AND MOUNDS TO ENSURE THAT AT ALL TIMES EXPOSED SURFACES ARE FREE DRAINING AND WHERE NECESSARY EXCAVATE SUMPS AND PROVIDE PUMPING EQUIPMENT TO DRAIN EXPOSED AREAS.
16. THESE PLANS SHALL BE READ IN CONJUNCTION WITH APPROVED ARCHITECTURAL AND STRUCTURAL DRAWINGS AND SPECIFICATIONS.
17. TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MIN 50mm IN BITUMINOUS PAVING.
18. ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN Ø80 uPVC SEWER GRADE CONDUITS EXTENDING A MIN OF 500mm PAST PAVING.
19. ON COMPLETION OF WORKS ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL INCLUDING, BUT NOT LIMITED TO, KERBS, FOOTPATHS, CONCRETE AREAS, GRASS AND LANDSCAPED AREAS.

STORMWATER NOTES

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

COMPACTION NOTES

1. STRIP TOPSOIL TO EXPOSE NATURALLY OCCURRING MATERIAL AND STOCKPILE ON SITE FOR SELECTIVE RE-USE OR DISPOSE OFF-SITE AS DIRECTED BY THE SUPERINTENDENT.
2. WHERE FILLING IS REQUIRED TO ACHIEVE DESIGN SUBGRADE PROOF ROLL EXPOSED NATURAL SURFACE WITH A MINIMUM OF TEN PASSES OF A VIBRATING ROLLER (MINIMUM STATIC WEIGHT OF 10 TONNES) IN THE PRESENCE OF THE SUPERINTENDENT. REFER TO SPECIFICATION FOR DETAILS.
3. ALL SOFT, WET OR UNSUITABLE MATERIAL TO BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS LISTED BELOW.
4. ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING :
   a. FREE FROM ORGANIC, PERISHABLE AND CONTAMINATED MATTER
   b. MAXIMUM PARTICLE SIZE 75MM
   c. PLASTICITY INDEX BETWEEN 2% AND 15%
5. ALL FILL MATERIAL SHALL BE PLACED IN MAXIMUM 200MM THICK LAYERS AND COMPACTED AT OPTIMUM MOISTURE CONTENT (+ OR - 2%) TO ACHIEVE A DRY DENSITY DETERMINED IN ACCORDANCE WITH AS 1289 E3.1 OF NOT LESS THAN THE FOLLOWING STANDARD MINIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 E1.1 :

LOCATION	STANDARD DRY DENSITY
UNDER BUILDING SLABS	98%
AREAS OF SERVICE TRENCHES	98%
EXTERNAL PAVED AREAS, ROADS AND CARPARKS	98%
LANDSCAPED AREAS	90%

6. THE CONTRACTOR SHALL PROGRAM THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS, ROLLER MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED BY THE CONTRACTOR AT THEIR COST.
7. TESTING OF THE SUBGRADE SHALL BE CARRIED OUT BY AN APPROVED NATA REGISTERED LABORATORY AT THE CONTRACTORS EXPENSE.

ASPHALTIC CONCRETE NOTES

1. GENERAL
   a) MINERAL AGGREGATES TO COMPLY WITH AUSTRALIAN STANDARDS
   b) MINERAL FILLER TO COMPLY WITH AS.2357 MINERAL FILLERS OR ASPHALT.
   c) BITUMEN BINDER SHALL COMPLY WITH AS 2008
2. MIX PROPORTIONS
   a) JOB MIX - 10mm NOMINAL SIZE AGGREGATE. MINIMUM BITUMEN CONTENT BY MASS OF TOTAL MASS - 5.1%
   b) MIX STABILITY - BETWEEN 16kN AND 36kN AS DETERMINED BY AS 2891
   c) AIR VOIDS IN COMPACTED MIX - BETWEEN 4% AND 7% OF THE VOLUME OF THE MIX.
   d) VOIDS FILLED IN BINDER - 65-80% OF AIR VOIDS IN THE TOTAL MINERAL AGGREGATE FILLED BY BINDER IN ACCORDANCE WITH AUSTRALIAN STANDARDS
3. PAVEMENT PREPARATION
   a) THE EXISTING SURFACE TO BE SEALED SHALL BE DRY AND BROOMED BEFORE COMMENCEMENT OF WORK TO ENSURE COMPLETE REMOVAL OF ALL SUPERFICIAL FOREIGN MATTER.
   b) ALL DEPRESSIONS OR UNEVEN AREAS ARE TO BE TACK-COATED AND BROUGHT UP TO GENERAL LEVEL OF PAVEMENT WITH ASPHALTIC CONCRETE BEFORE LAYING OF MAIN COURSE.
4. TACK COAT
   a) THE WHOLE OF THE AREA TO BE SHEETED WITH ASPHALTIC CONCRETE SHALL BE LIGHTLY AND EVENLY COATED WITH RAPID SETTING BITUMEN COMPLYING WITH AUSTRALIAN STANDARDS. APPLICATION RATE FOR RESIDUAL BITUMEN SHALL BE 0.15 TO 0.30 LITRES/SQUARE METRE. APPLICATION SHALL BE BY MEANS OF A MECHANICAL SPRAYER WITH SPRAY BAR.
5. SPREADING
   a) ALL ASPHALTIC CONCRETE SHALL BE SPREAD WITH A SELF PROPELLED PAVING MACHINE.
   b) THE ASPHALTIC CONCRETE SHALL BE LAID AT A MIX TEMPERATURE AS SHOWN BELOW;

ROAD SURFACE TEMPERATURE IN SHADE (°C)	MIX TEMPERATURES (°C)
5 - 10	NOT PERMITTED
10 - 15	150
15 - 25	145
OVER 25	140

   c) ASPHALTIC CONCRETE SHALL NOT BE LAID WHEN THE ROAD SURFACE IS WET OR WHEN COLD WINDS CHILL THE MIX ADVERSELY AFFECT SPREADING AND COMPACTION.
   d) THE MINIMUM COMPACTED THICKNESS IS 30mm OVER EXISTING SEALED PAVEMENTS AND 50mm OVER NEW PAVEMENTS
6. JOINTS
   a) THE NUMBER OF JOINTS BOTH LONGITUDINAL AND TRANSVERSE SHALL BE KEPT TO A MINIMUM.
   b) THE DENSITY AND SURFACE FINISH AT JOINTS SHALL BE SIMILAR TO THOSE OF THE REMAINDER OF THE LAYER.
7. COMPACTION
   a) ALL COMPACTION SHALL BE UNDERTAKEN USING SELF PROPELLED ROLLERS.
   b) INITIAL ROLLING SHALL BE COMPLETE BEFORE THE MIX TEMPERATURE FALLS BELOW 105°C
   c) SECONDARY ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 60°C
   d) MINIMUM CHARACTERISTICS VALUE OF RELATIVE COMPACTION OF A LOT WHEN TESTED IN ACCORDANCE WITH AS2150
8. FINISHED PAVEMENT PROPERTIES
   a) FINISHED SURFACES SHALL BE SMOOTH, DENSE AND TRUE TO SHAPE AND SHALL NOT VARY MORE THAN 10mm FROM THE SPECIFIED PLAN LEVEL AT ANY POINT AND SHALL NOT DEVIATE FROM THE BOTTOM OF A 3m STRAIGHT EDGE LAID IN ANY DIRECTION BY MORE THAN 5mm.

LINEMARKING NOTES

1. THE WORK SHALL INCLUDE ALL LINE MARKING TO ROADS, HARDSTANDS, PATHS, CARPARKS AND THE TRAFFICABLE AREAS.
2. THE PAVEMENT MARKING AND PAINT SHALL BE IN ACCORDANCE WITH AS 1742.2 AND THE RELEVANT LOCAL AND STATE AUTHORITY GUIDELINES.
3. PAINT SHALL BE TYPE 3, CLASS A AND THE COLOUR SHALL BE WHITE AND NOT SUBJECT TO DISCOLOURATION BY BITUMEN FROM THE ROAD SURFACE. EACH LINE SHALL BE 80mm WIDE, UNO IN LEGEND. ALL PAINT SHALL BE APPLIED BY MECHANICAL SPRAYER.
4. LINE MARKING SHALL BE SPOTTED OUT AND APPROVED PRIOR TO SPRAYING.
5. PAINT SHALL BE APPLIED AT A WET THICKNESS OF BETWEEN 0.35mm TO 0.40mm.
6. ALL EXISTING PAVEMENT MARKING WHICH IS LOCATED ON EXISTING PAVEMENT TO BE RETAINED SHALL BE REMOVED BY GRINDING WHERE THE EXISTING MARKINGS ARE MADE REDUNDANT BY THE PROPOSED WORKS.

EROSION AND SEDIMENT CONTROL NOTES

GENERAL INSTRUCTIONS

E1. THIS PLAN IS TO BE READ IN CONJUNCTION WITH THE ENGINEERING PLANS, AND ANY OTHER PLANS OR WRITTEN INSTRUCTIONS THAT MAY BE ISSUED AND RELATING TO DEVELOPMENT AT THE SUBJECT SITE.

E2. THE SITE SUPERINTENDENT WILL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS INSTRUCTED IN THIS SPECIFICATION.

E3. ALL BUILDERS AND SUB-CONTRACTORS WILL BE INFORMED OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS.

DEMOLITION SEQUENCE

E4. THE SOIL EROSION POTENTIAL ON THIS SITE SHALL BE MINIMISED. HENCE WORKS SHALL BE UNDERTAKEN IN THE FOLLOWING SEQUENCE :

   a. INSTALL SEDIMENT FENCES, TEMPORARY CONSTRUCTION EXIT AND SANDBAG KERB INLET SEDIMENT TRAP.
   b. UNDERTAKE SITE DEVELOPMENT WORKS IN ACCORDANCE WITH THE ENGINEERING PLANS. PHASE DEVELOPMENT SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF WORKABLE SIZE.

EROSION CONTROL

E5. DURING WINDY CONDITIONS, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL.

E6. SITE TOPSOILING AND SEEDING WILL BE UNDERTAKEN AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM COMPLETION OF DEMOLITION ACTIVITIES.

FENCING

E7. STOCKPILES WILL NOT BE LOCATED WITHIN 2 METRES OF HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS. WHERE THEY ARE BETWEEN 2 AND 5 METRES FROM SUCH AREAS, SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION TO DOWNSLOPE WATERS, E.G. THROUGH INSTALLATION OF SEDIMENT FENCING.

E8. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) WILL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.

E9. WATER WILL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE, I.E. THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.

E10. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES WILL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED.

OTHER MATTERS

E11. ACCEPTABLE RECEPTORS WILL BE PROVIDED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER.

E12. RECEPTORS FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER ARE TO BE EMPTIED AS NECESSARY. DISPOSAL OF WASTE SHALL BE IN A MANNER APPROVED BY THE SITE SUPERINTENDENT.

SITE INSPECTION & MAINTENANCE

E13. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED AFTER RAINFALL EVENTS TO ENSURE THAT THEY OPERATE EFFECTIVELY. REPAIR AND OR MAINTENANCE SHALL BE UNDERTAKEN AS REQUIRED.

E14. THE CONTRACTOR IS TO PROVIDE A SUM TO ATTEND THE SITE ON A WEEKLY BASIS AND AFTER MAJOR STORM EVENTS TO PERFORM UPKEEP ON THE CYCLONE FENCING, PUMP OUT SYSTEM, SEDIMENT AND EROSION INFRASTRUCTURE, WATERING OF GRASS SEEDING AND DUST SUPPRESSION UNTIL THE COMMENCEMENT OF THE CONSTRUCTION WORKS OR UNLESS OTHERWISE ADVISED BY THE SITE REPRESENTATIVE.

NOT FOR CONSTRUCTION

This drawing has been assigned an electronic code that signifies the drawing has been checked and approved by: JUSTIN HILL

Issue	Description	Date	Drawn	Approved
A	ISSUE FOR REVIEW	16.11.17	KL	JRH

North

0 1cm at full size 10cm 20cm

Client
Healthcare Imaging Services
LEVEL 6, 203 PACIFIC HIGHWAY
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Architect
BN Group
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Project
PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
14 HIGHFIELDS CIRCUIT
PORT MACQUARIE NSW 2444

Drawing Title
COVER SHEET, NOTES AND LEGEND

Drawn	Date	Scale	A1	Q.A. Check	Date
GP	OCT 2017	NTS		QA	XX.XX.XX
Designed	Project No.			Dwg. No.	Issue
XX	SY170775			C1.02	A

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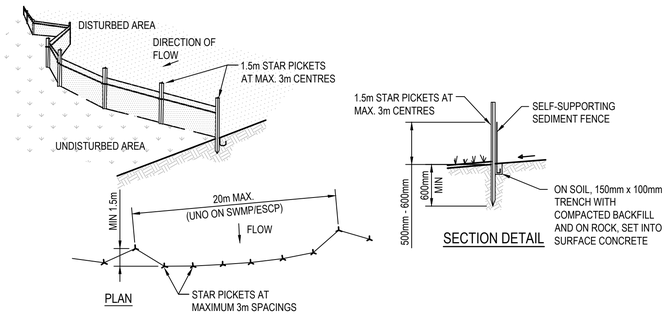


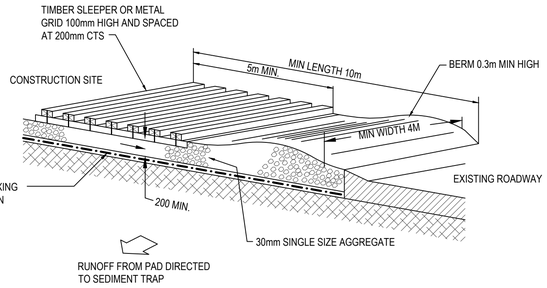
CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE.
2. DRIVE 1.5m LONG STAR PICKETS INTO GROUND, 3 METRES APART.
3. DIG A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
4. BACKFILL TRENCH OVER BASE OF FABRIC.
5. FIX SELF-SUPPORTING SEDIMENT FENCE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY SEDIEMNT FENCE MANUFACTURER.
6. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.

SEDIMENT CONTROL FENCE

NTS

NOTE:
ENSURE THAT ALL UTILITY ASSETS ARE MAINTAINED AND PROTECTED AT ALL TIMES IN THE VICINITY OF THE TEMPORARY CONSTRUCTION EXIT



CONSTRUCTION NOTES

1. STRIP TOPSOIL AND LEVEL SITE.
2. COMPACT SUBGRADE.
3. COVER AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
4. CONSTRUCT 200mm THICK PAD OVER GEOTEXTILE USING 30mm SINGLE SIZE AGGREGATE.
5. CONSTRUCT HUMP IMMEDIATELY WITHIN BOUNDARY TO DIVERT WATER TO A SEDIMENT FENCE OR OTHER SEDIMENT TRAP WHERE THE SEDIMENT IS COLLECTED AND REMOVED.

MAINTENANCE NOTES

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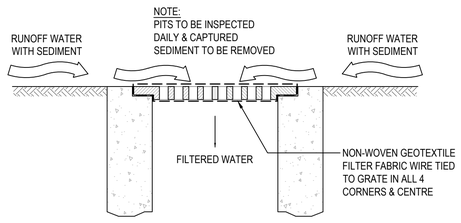
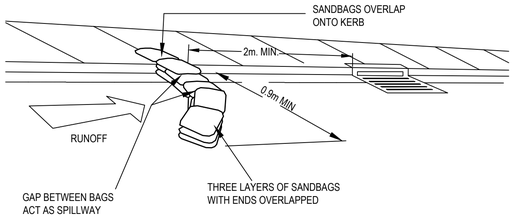
TEMPORARY STABILISED CONSTRUCTION EXIT



INLET TRAP

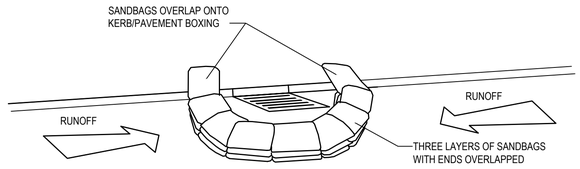
N.T.S.

NOTE:
TO BE USED IN PAVED AREAS WHERE TRAFFIC ACCESS IS REQUIRED

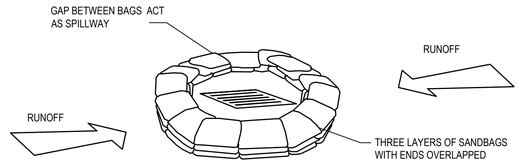


SANDBAG SEDIMENT TRAP

N.T.S.



SANDBAG SEDIMENT TRAP - AT KERB SAG PIT



SANDBAG SEDIMENT TRAP - AT OTHER THAN KERB SAG PIT

SANDBAG SEDIMENT TRAP DETAILS

NTS

NOT FOR CONSTRUCTION

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North

Issue	Description	Date	Drawn	Approved
A	ISSUE FOR REVIEW	16.11.17	KL	JRH

0 1cm at full size 10cm 20cm

Client: Healthcare Imaging Services
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CONSULTANTS ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project:
PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
14 HIGHFIELDS CIRCUIT
PORT MACQUARIE NSW 2444

Drawing Title: DETAILS - SHEET 3

Drawn	Date	Scale A1	Q.A. Check	Date
DW	NOV 2017	AS SHOWN	QA	XX.XX.XX
Designed	Project No.		Dwg. No.	Issue
NP	SY170775		C1.07	A

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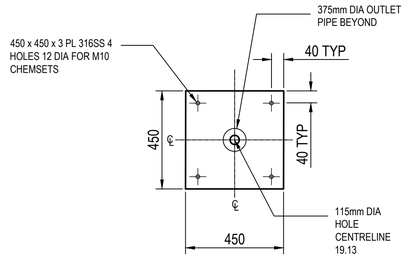
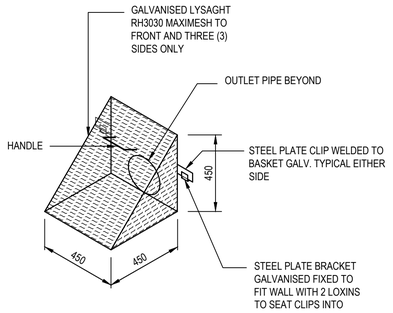


ORIFICE PLATE
SCALE 1:10



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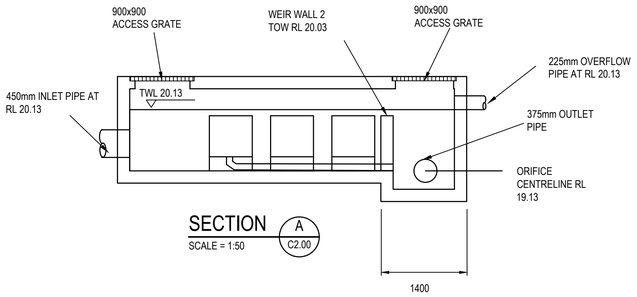
N.T.S.



SECTION A
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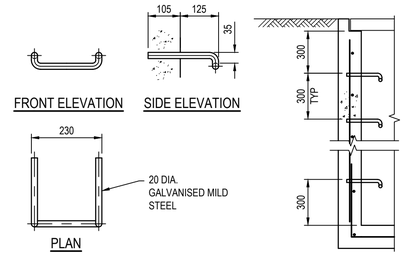

STEP IRON DETAIL
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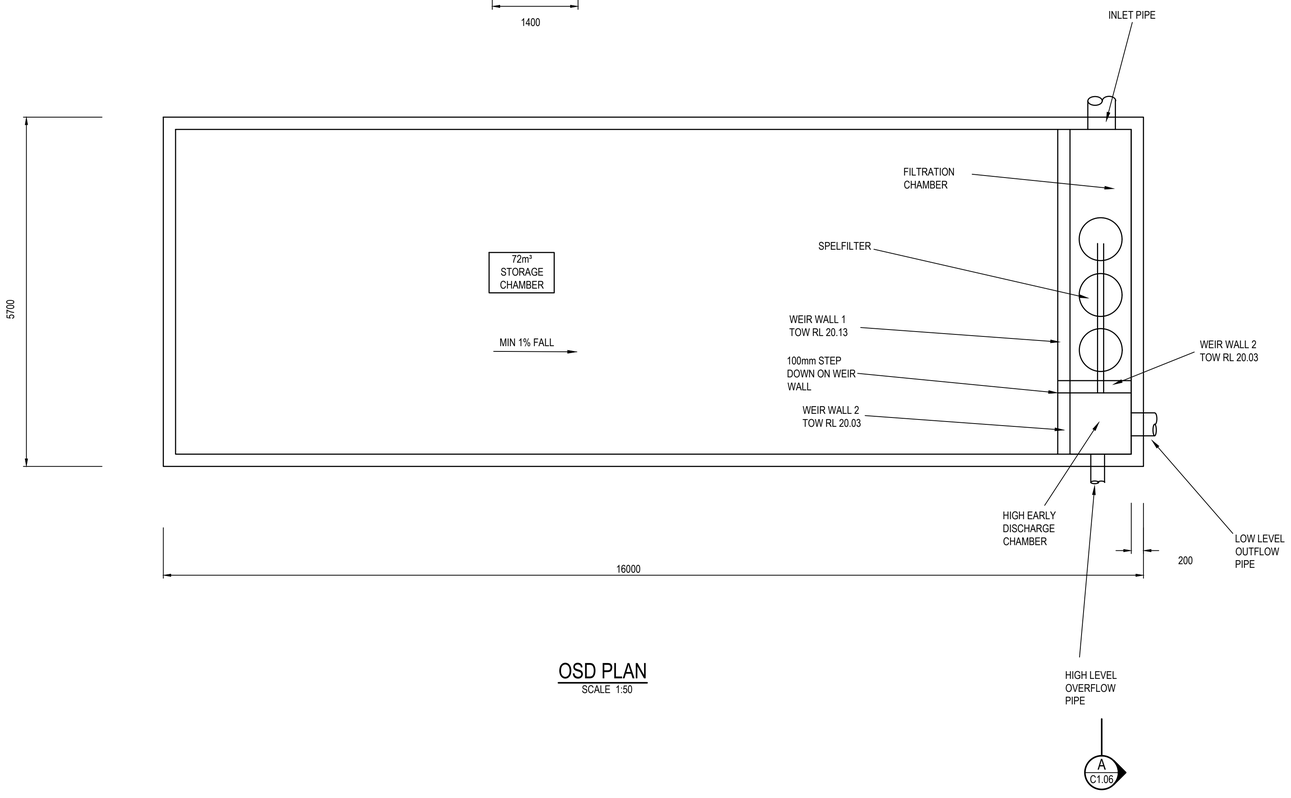

OSD PLAN
SCALE 1:50

DESIGN CRITERIA

TOTAL SITE AREA =	.....m²
DESIGN METHOD =	ILSAX
MAXIMUM DEPTH =	...m
PRE-DEVELOPED IMPERVIOUS AREA =	....%
POST-DEVELOPED IMPERVIOUS AREA =	....%
POST DEVELOPED FLOWS (l/s) =	Q_5 = ... Q_{20} = ... Q_{100} = ...
PRE DEVELOPED FLOWS (l/s) =	Q_5 = ... Q_{20} = ... Q_{100} = ...
PORTION OF SITE THROUGH OSD SYSTEM =	....%
PORTION OF SITE BYPASSING OSD SYSTEM =	....%
REQUIRED STORAGE VOLUME =	....m³
ACTUAL STORAGE VOLUME =	....m³

NOT FOR CONSTRUCTION

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Issue	Description	Date	Drawn	Approved
A	ISSUE FOR REVIEW	16.11.17	KL	JRH

North

1cm at full size

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Architect: BN Group
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Project: PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
14 HIGHFIELDS CIRCUIT
PORT MACQUARIE NSW 2444

Drawing Title: DETAILS - SHEET 2

Drawn	Date	Scale A1	Q.A. Check	Date
DW	NOV 2017	AS SHOWN	QA	XX.XX.XX
Designed	Project No.		Dwg. No.	Issue
NP	SY170775		C1.06	A

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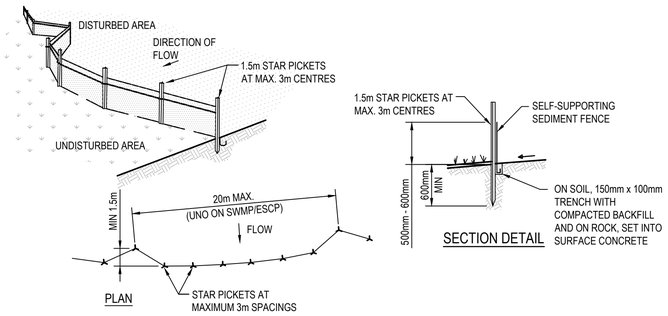

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SEDIMENT CONTROL FENCE

NTS

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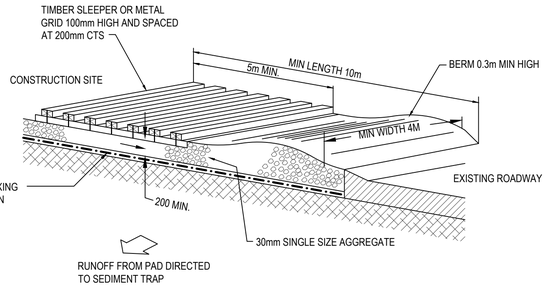

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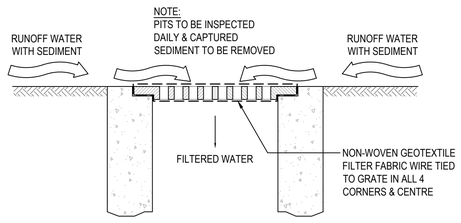
TEMPORARY STABILISED CONSTRUCTION EXIT



INLET TRAP

N.T.S.

NOTE:
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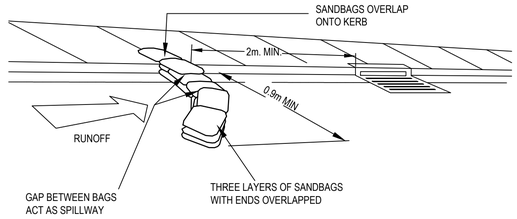
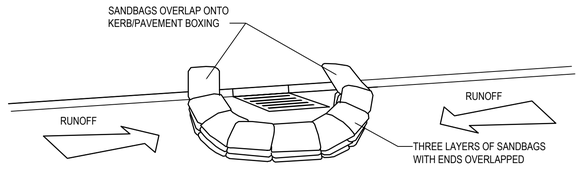
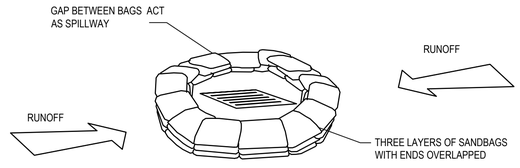


SANDBAG SEDIMENT TRAP

N.T.S.



SANDBAG SEDIMENT TRAP - AT KERB SAG PIT



SANDBAG SEDIMENT TRAP - AT OTHER THAN KERB SAG PIT

SANDBAG SEDIMENT TRAP DETAILS

NTS

NOT FOR CONSTRUCTION

This drawing has been assigned an electronic code that signifies the drawing has been checked and approved by: JUSTIN HILL

Issue	Description	Date	Drawn	Approved
A	ISSUE FOR REVIEW	16.11.17	KL	JRH

North

0 1cm at full size 10cm 20cm

Client: Healthcare Imaging Services
LEVEL 6, 203 PACIFIC HIGHWAY
ST LEONARDS NSW 2065
PHONE : 02 9432 9400 FAX : 02 9432 9447

Architect: BN Group
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CONSULTANTS ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project: PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
14 HIGHFIELDS CIRCUIT
PORT MACQUARIE NSW 2444

Drawing Title: DETAILS - SHEET 3

Drawn	Date	Scale A1	Q.A. Check	Date
DW	NOV 2017	AS SHOWN	QA	XX.XX.XX
Designed	Project No.		Dwg. No.	Issue
NP	SY170775		C1.07	A

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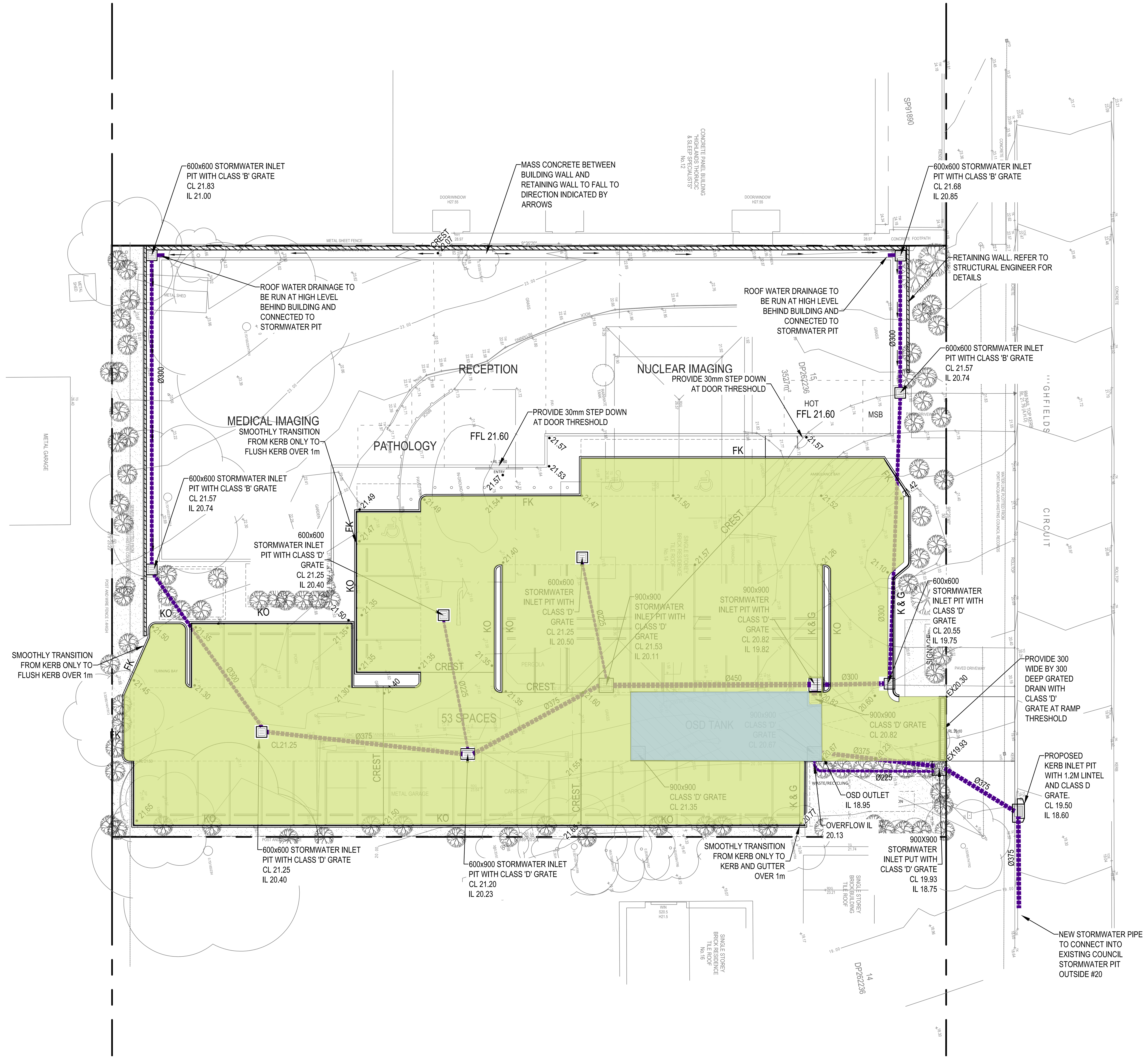

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Issue	Description	Date	Drawn	Approved
A	ISSUE FOR REVIEW	16.11.17	KL	JRH

NOT FOR CONSTRUCTION

North

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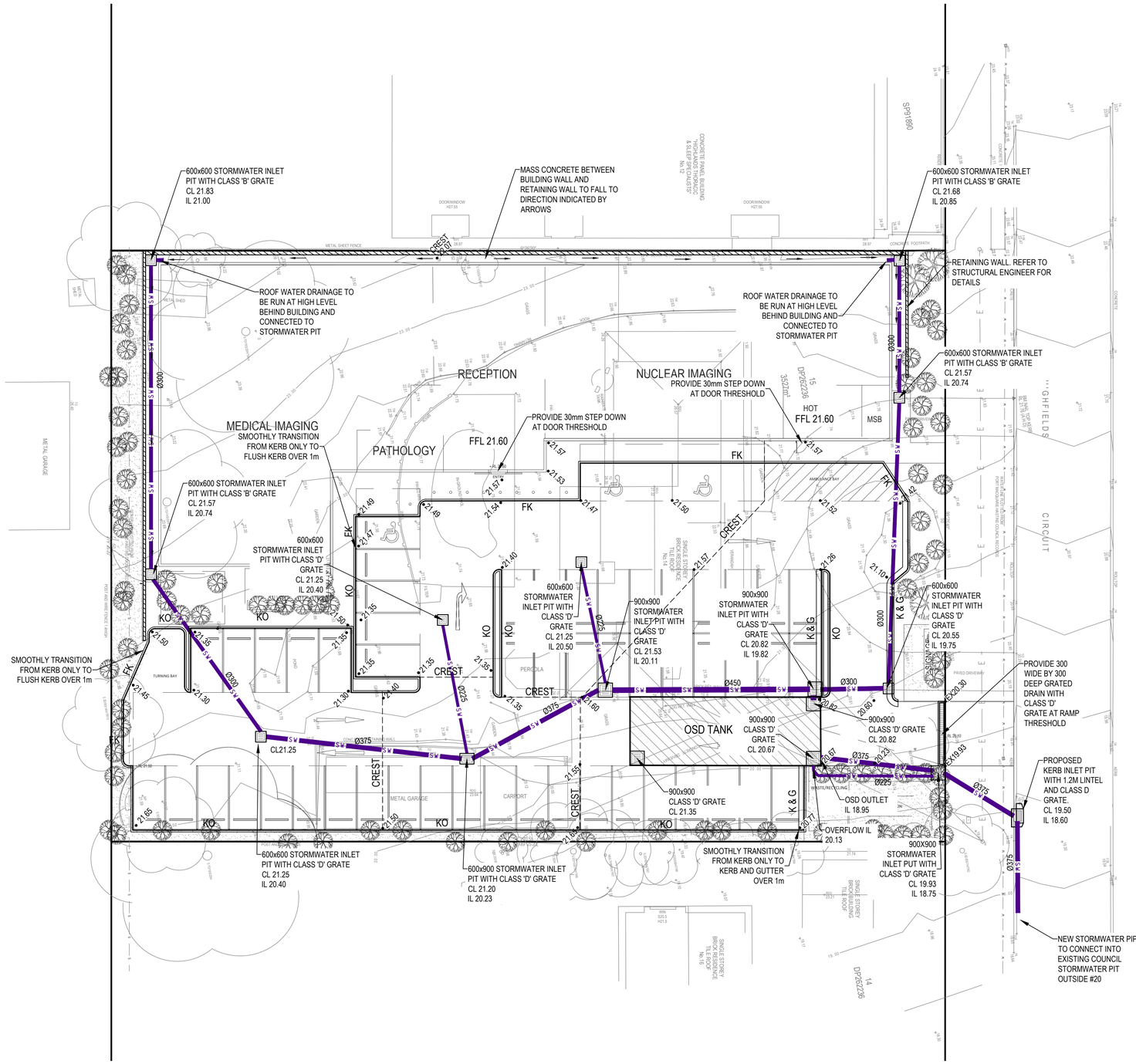
Project: PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
14 HIGHFIELDS CIRCUIT
PORT MACQUARIE NSW 2444

Drawing Title: PAVEMENT PLAN

Drawn	Date	Scale A1	Q.A. Check	Date
DW	NOV 017	1:200		

Designed	Project No.	Dwg. No.	Issue
NP	SY170775	C1.50	A



DIAL BEFORE YOU DIG

DIAL BEFORE YOU DIG www.1100.com.au

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

NOT FOR CONSTRUCTION

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Issue	Description	Date	Drawn	Approved
C	ISSUE FOR REVIEW	16.11.17	KL	JRH
B	ISSUE FOR COORDINATION	13.11.17	DW	NP
A	ISSUE FOR COORDINATION	27.10.17	JK	NP

1cm at full size 10cm 20cm

North

Client: Healthcare Imaging Services
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Project: PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
14 HIGHFIELDS CIRCUIT
PORT MACQUARIE NSW 2444

Drawing Title: SITE AND STORMWATER MANAGEMENT PLAN

Drawn	Date	Scale	A1	O.A. Check	Date
JK	OCT 2017	1:200		QA	XX.XX.XX
Designed	Project No.			Dwg. No.	Issue
NP	SY170775			C2.01	B

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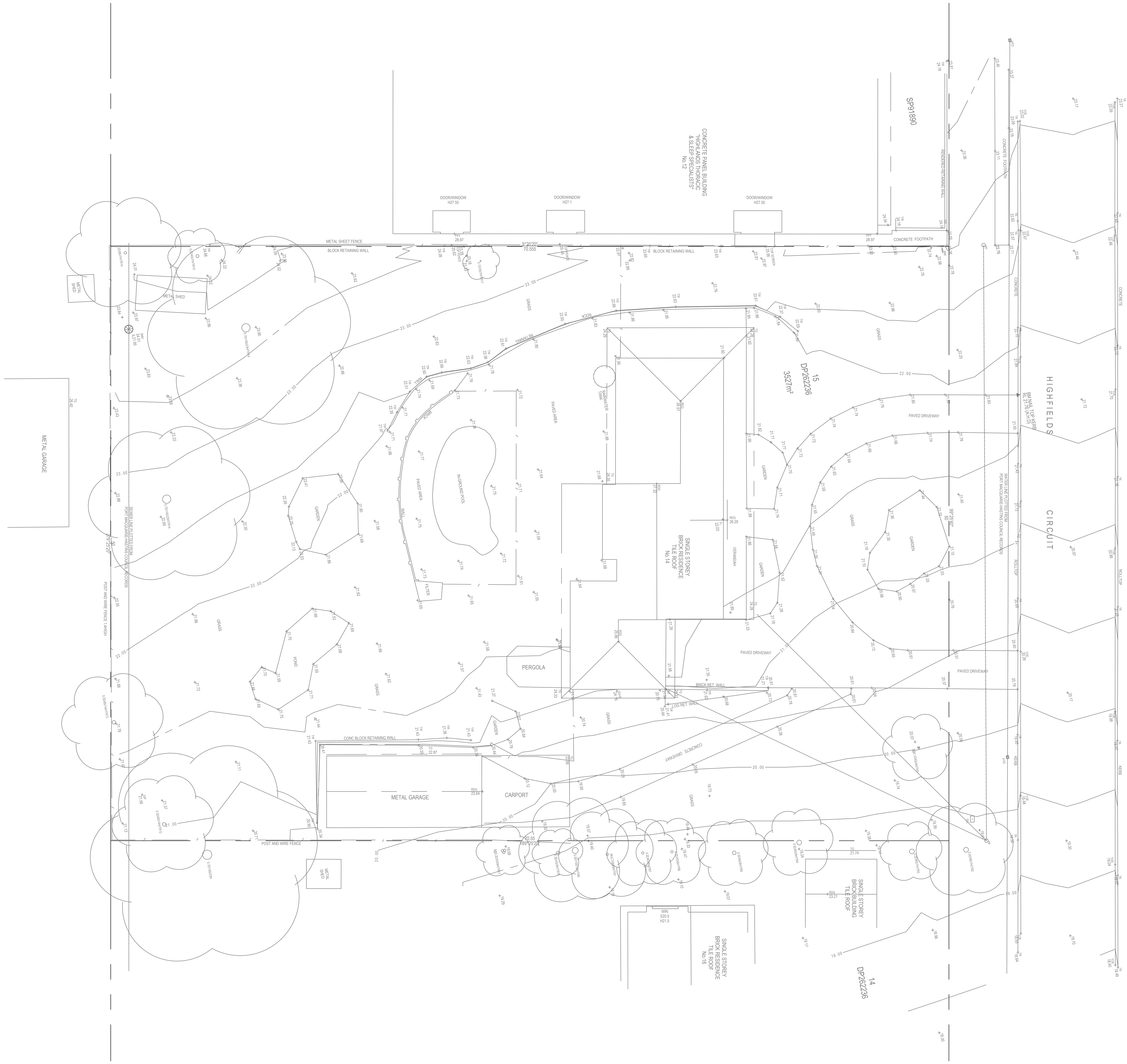

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DIAL BEFORE YOU DIG
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Issue	Description	Date	Drawn	Approved
A	ISSUE FOR REVIEW	16.11.17	KL	JRH

1cm at full size — 0 — 10cm — 20cm

North

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Project
PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
14 HIGHFIELDS CIRCUIT
PORT MACQUARIE NSW 2444

Drawing Title
SIGNS AND LINEMARKING PLAN

Drawn	Date	Scale A1	Q.A. Check	Date
DW	NOV 2017	1:200	QA	XX.XX.XX
Designed	**Project No.**		**Dwg. No.**	**Issue**
NP	SY170775		C3.01	A

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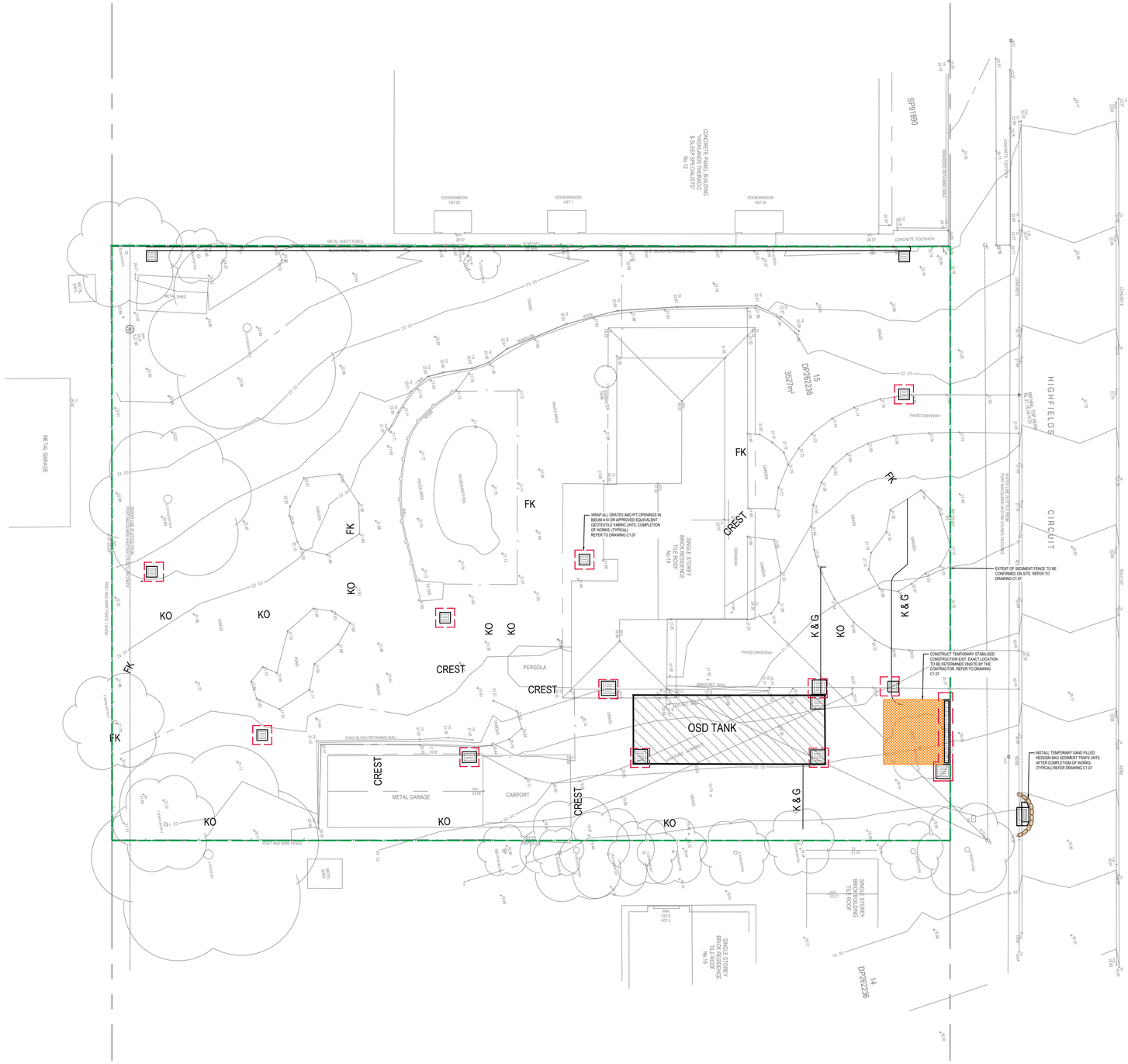

DIAL BEFORE YOU DIG

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Issue	Description	Date	Drawn	Approved
A	ISSUE FOR REVIEW	16.11.17	KL	JRH

1cm at full size (0, 10cm, 20cm)

North

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Project
PROJECT HORIZONS IMAGING AND PATHOLOGY CENTRE
14 HIGHFIELDS CIRCUIT
PORT MACQUARIE NSW 2444

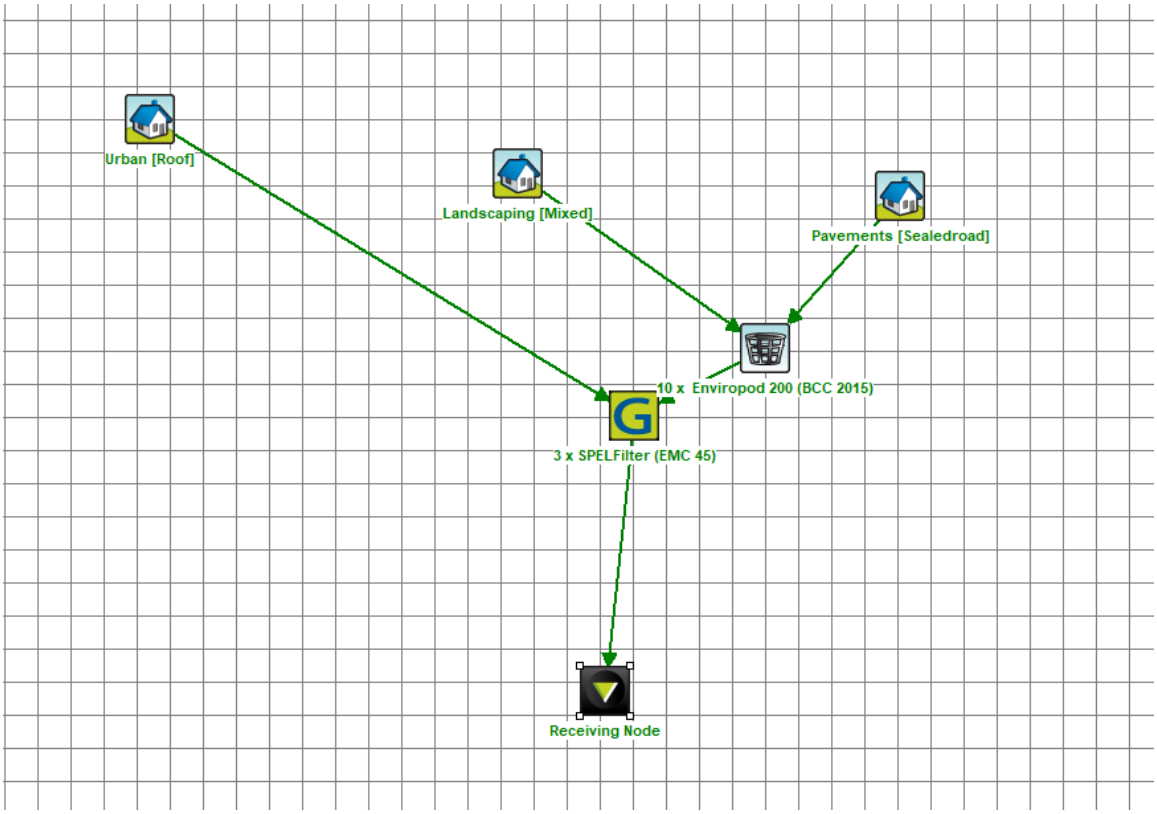
Drawing Title
SOIL EROSION AND SEDIMENT CONTROL PLAN

Drawn	Date	Scale	A1	Q.A. Check	Date
DW	NOV 2017	1:200		QA	XX.XX.XX
Designed	Project No.			Dwg. No.	Issue
XX	SY170775			C4.01	A

P:\SY\170775\Drawings\Civil\Drawings\170775_CA10.dwg
Nov 16, 2017 - 4:28pm

APPENDIX B – MUSIC Model

Figure 1 - MUSIC Model Layout and Results for the proposed development



Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	5.28	5.28	0
Total Suspended Solids (kg/yr)	1070	69.6	93.5
Total Phosphorus (kg/yr)	2.16	0.728	66.3
Total Nitrogen (kg/yr)	12.4	6.19	49.9
Gross Pollutants (kg/yr)	110	0.0134	100

APPENDIX C – Drains Model

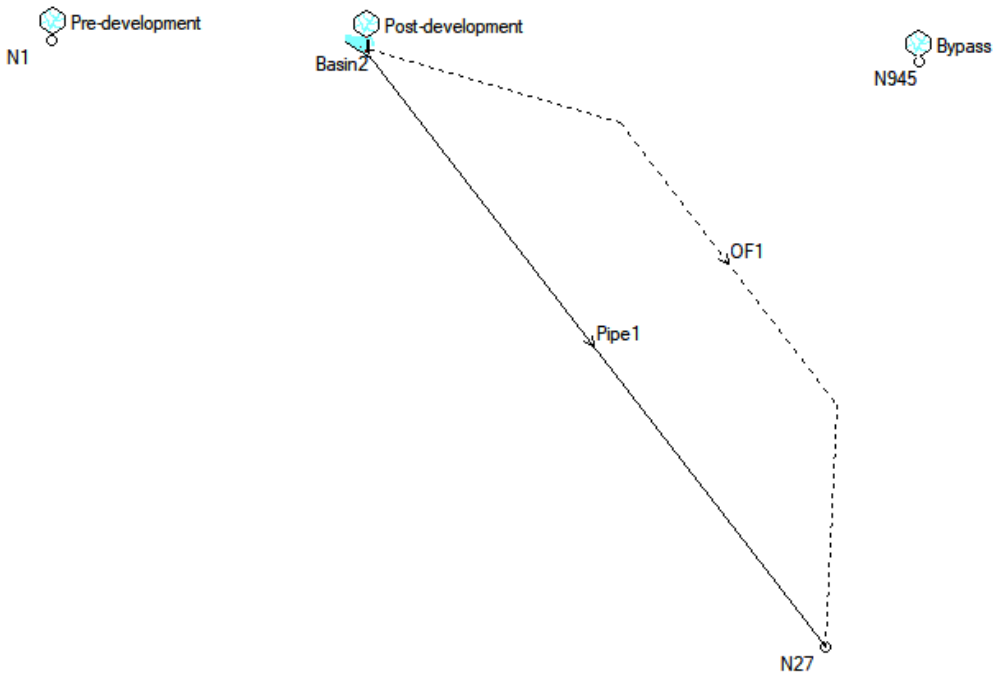


Figure 2 – Drains model layout

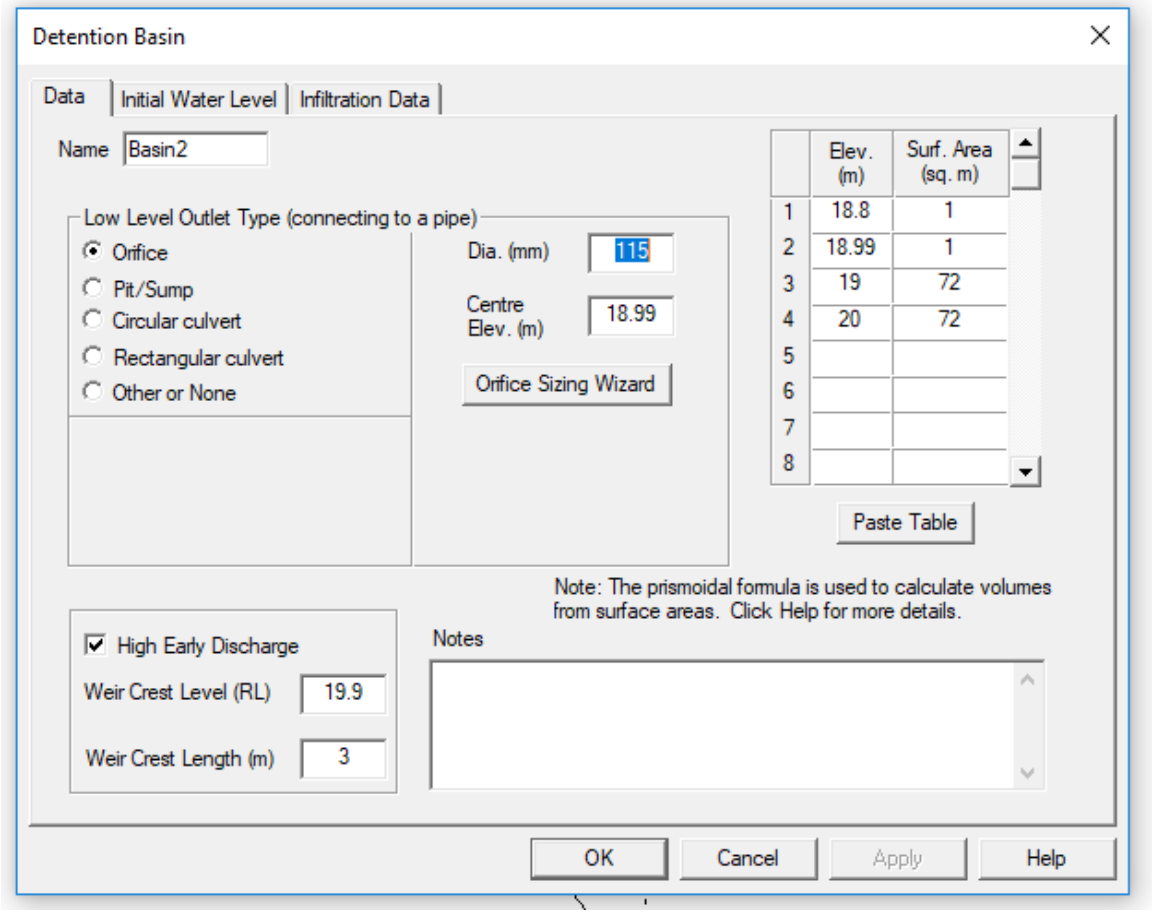


Figure 3 – OSD parameters

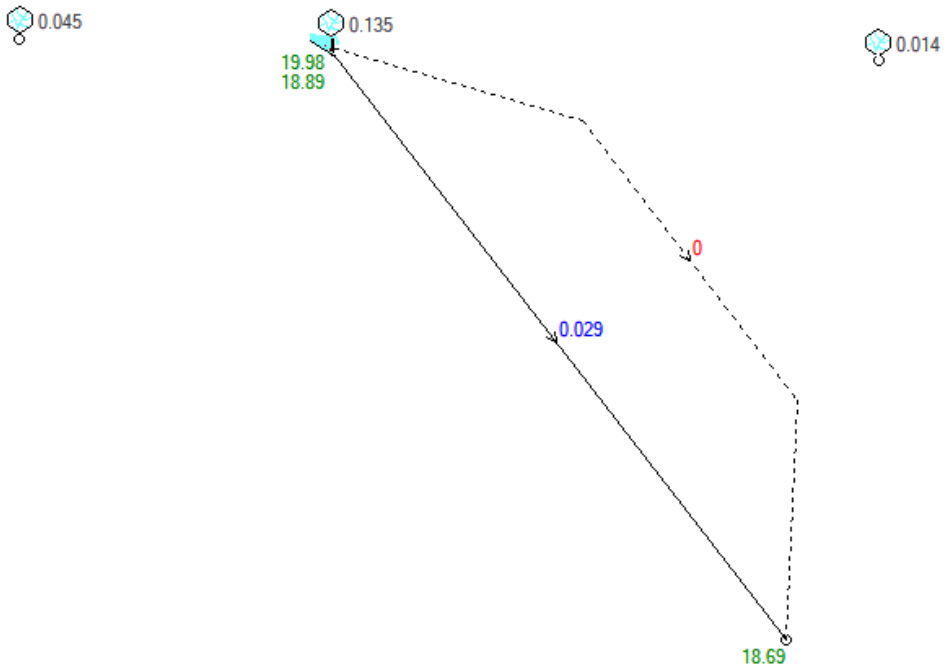


Figure 4 – Drains output for 5 year ARI storm event

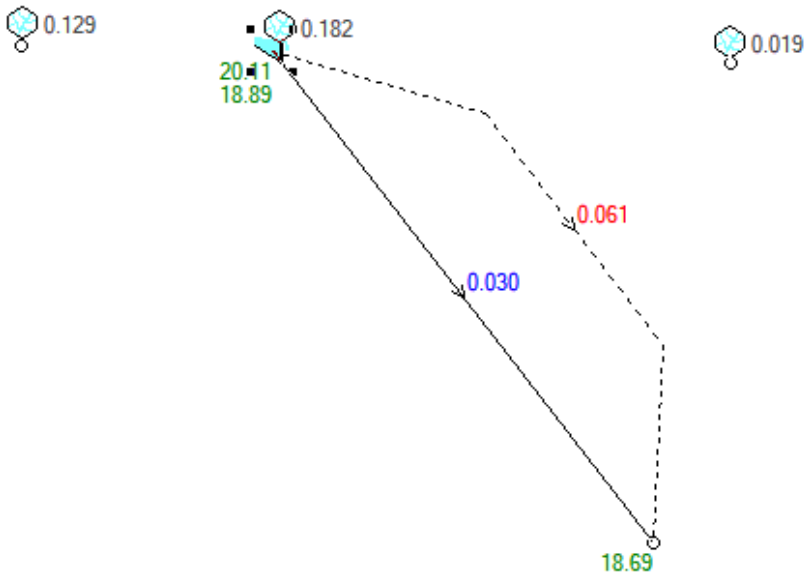


Figure 5 – Drains output for 20 year ARI storm event

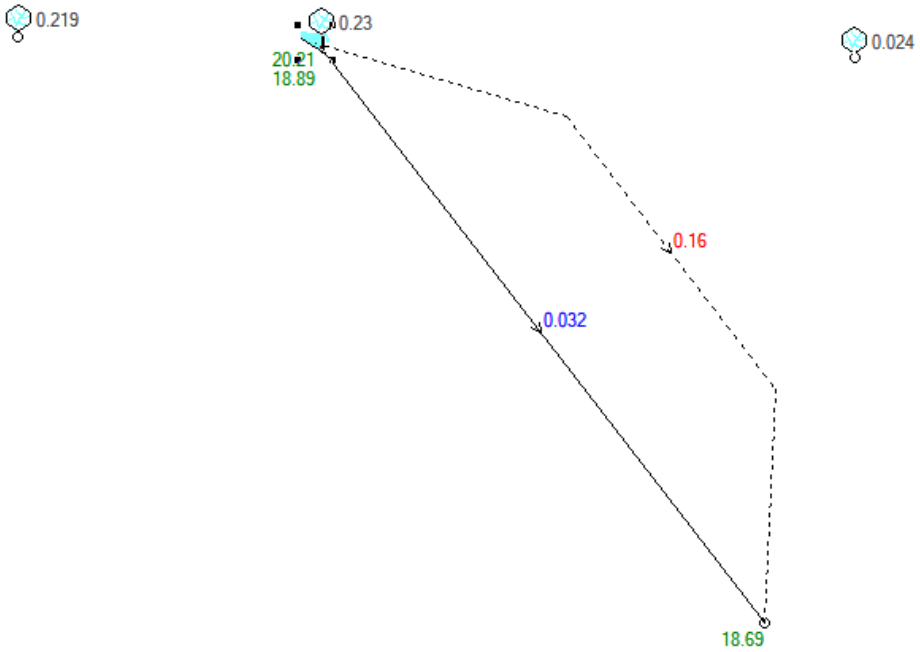


Figure 6 – Drains output for 100 year ARI storm event