Stormwater Report

Casula Aged Care

Prepared for Summit Care / 09 December 2019

191583 CAAA

Taylor Thomson Whitting (NSW) Pty Ltd, Consulting Engineers | ABN 81 113 578 377 |
Level 3, 48 Chandos Street, St Leonards NSW 2065 | +612 9439 7288 | ttw.com.au

Structural
Civil
Traffic
Facade
Consulting
Engineers

Contents

1. Executive Summary

Taylor Thomson Whitting (NSW) has been engaged by Besol Pty ltd c/o Centurion Project Management Pty Ltd to provide civil engineering and stormwater drainage management systems designs for the Casula Aged Care Development.

The proposed development will include:

- Aged care rooms and associated services.
- Assisted care units designed to senior housing standards
- Residential apartments
- Associated basement carpark

This report covers the proposed stormwater related aspect, and flood risk assessment relevant to the site based on information known at the time of report production.

Stormwater design has been undertaken based on the site layout plans as developed by the site architect (Jackson Teece Architects) and the design team, and incorporates the following design principles:

- Stormwater has been designed to ensure that the requirements of the local Council (Liverpool City Council) are met, that stormwater discharges from the site are not changed or detrimental to the surrounding areas, and that the site is accessible in minor and major rainfall events and is operational in extreme rainfall events.
- The Stormwater concept plans as documented in Appendix A of this report propose to connect to an existing inground stormwater infrastructure in Kurrajong Road and does not need to traverse over adjoining properties.

2. Introduction

This report presents the proposed stormwater design for the proposed development of the Casula Aged Care facility including stormwater quantity and quality management measures, and identifies any site constraints associated with the development.

The proposed development (residential aged care facility, mixed use/retail residential building, residential apartments and associated carparking) is in accordance with the architectural drawings prepared by Jackson Teece.

The areas in the below plans have been assessed and are included within this report.

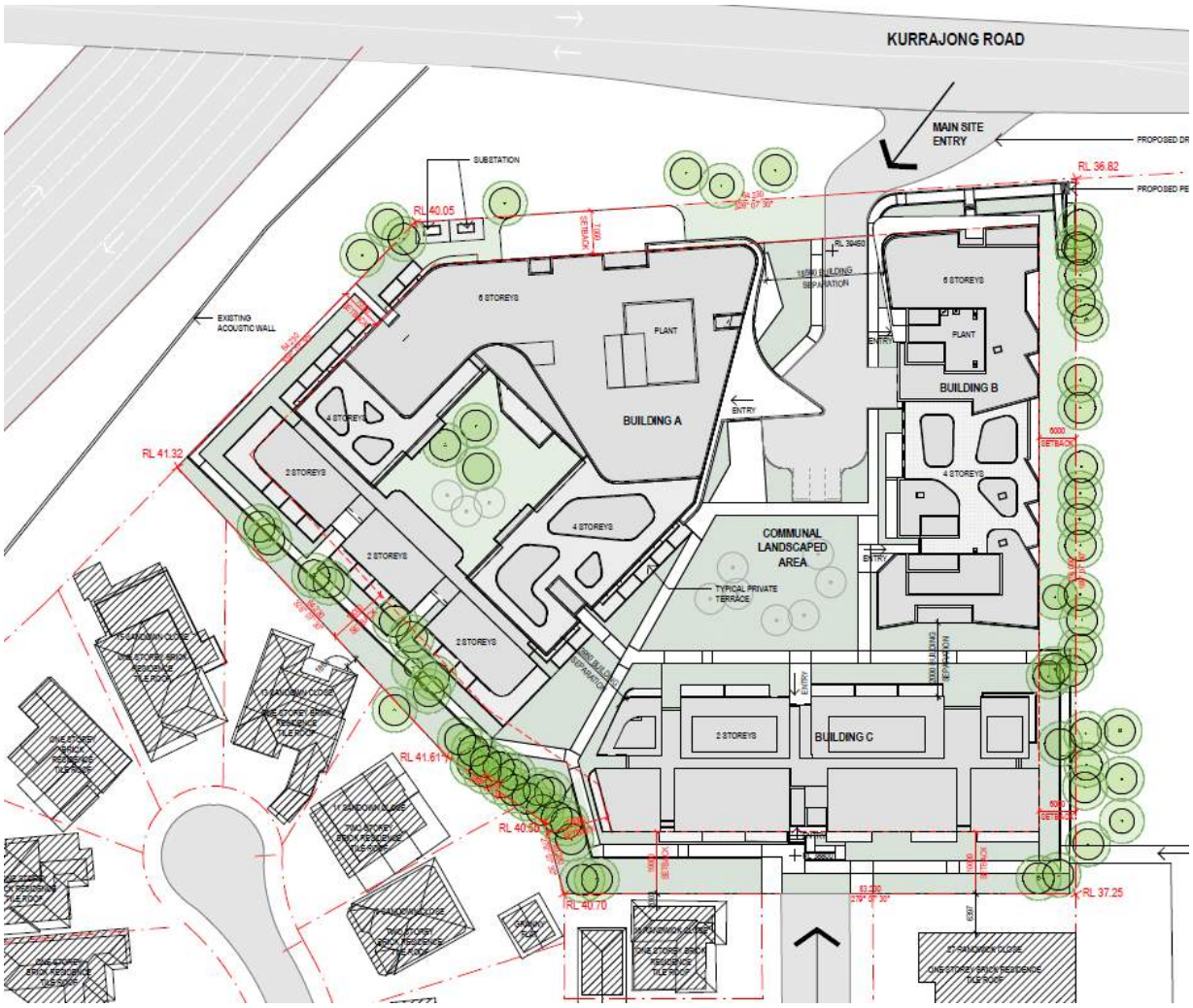


Figure 2.1 – Casula Aged Care (Jackson Teece Architects-Site Plan)

3. Existing Site

The subject site is located at 18 Randwick Close, Casula and falls within Liverpool City Council's Local Government Area. The legal description of the site is Lot 104 in DP 863214 and comprises an area of 1314m^2. It is currently vacant (greenfield) land and borders Kurrajong Road to the north, M5 Motorway to the west, Daruk Park to the west and residential developments to the south.

Based on the site survey by Pinnacle Land Surveyors, the site generally falls towards the northern boundary with the lowest levels occurring at the north eastern corner of the site. The location of the proposed site is shown in Figure 3.1 and Figure 3.2.

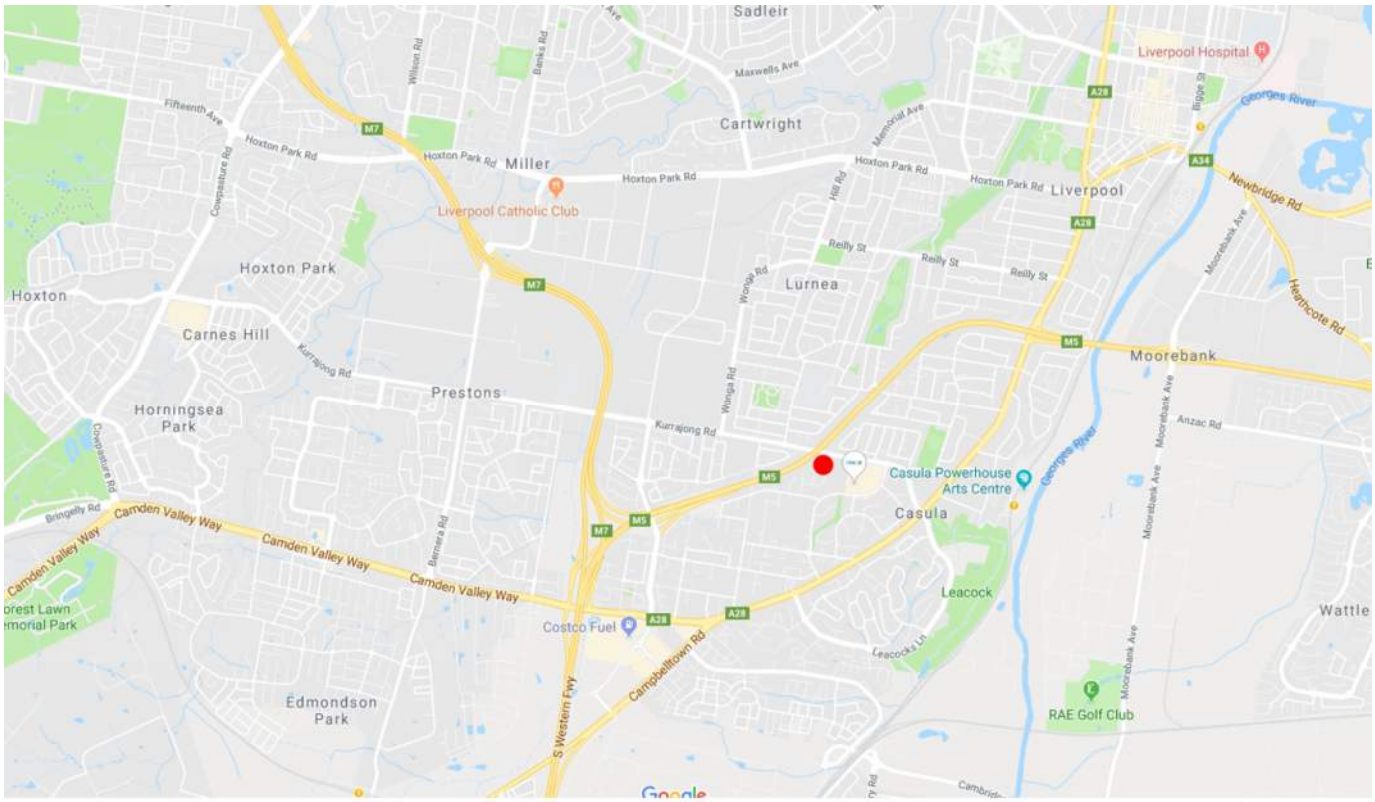


Figure 3.1 Locality Plan (Google Maps)

Figure 3.2 Aerial Photo 30/8/2018 (Nearmap)

4. Stormwater

Liverpool City Councils Development Control Plan (DCP) and Draft On-Site Stormwater Detention Policy, 2004 define the requirements for the control, treatment and discharge of stormwater from development sites within the Council area. This DCP, along with relevant Australian Standards, and industry guides have been used as the basis for the design of the proposed stormwater system.

4.1 Authority Requirements

4.1.1 Conveyance

Liverpool City Council require the following design principles, and that stormwater drainage systems shall be designed to achieve the following goals:-

- Ensure that there is no adverse impact from runoff on the downstream properties as a result of the development for all storms up to and including 100 year ARI event.
- Retain and reuse rainwater to reduce water consumption
- Ensure adequate drainage is provided for the development
- Protect properties form localised flooding
- Prevent contaminated runoff from entering watercourses
- Minimise erosion and reduce the volume of waste water entering waterways.
- Minimise sedimentation and pollution in waterways and drainage systems.
- All new developments are to provide a stormwater drainage system in accordance with the major/minor system concept set out in ARR 1987

It is noted that whilst Liverpool Council guidelines refer to the rainfall intensities of Australian Rainfall and Runoff 1987, the modelling of the stormwater on the project has been undertaken in the updated Australian Rainfall and Runoff 2016 version. As such, rainfall events that infrastructure is designed for is in relation to an Annual Exceedance Probability rather than a return period. As such, major stormwater has been designed for the 1% Average Exceedance Probability (AEP) rather the equivalent 100 year Average Recurrence Interval (ARI) rainfall event. Minor drainage systems have been designed for the 5% AEP event.

4.1.2 On Site Detention

Liverpool Council on-site detention (OSD) Policy state that OSD shall apply to all developments where any of the following may occur:

- The existing or proposed stormwater pipe system that is unable to cater for the increase in discharge due to development.
- The development will involve an increase in impervious area on the site.
- It is intended to connect stormwater directly to the street kerb and gutter only and the discharge exceeds 20 litres per second for the 10-year ARI

As the proposed development increases the impervious are of the site, an OSD system is incorporated into the design to limit stormwater flows to predeveloped conditions.

4.2 Stormwater Conveyance Design

The proposed design of the stormwater system for the development includes both minor and major stormwater conveyance systems, consisting of conventional pipe and pit drainage networks, treated and discharged to Kurrajong Road, ensuring that there are no adverse impacts on downstream receiving environment is minimised as a result of the development. The proposed stormwater design is shown in **Appendix A** to this report.

A traditional pit and pipe network of surface inlet pits, and concrete stormwater pipes is proposed for the site drainage. The site stormwater system discharges via an OSD tank to Kurrajong Road, and flows are restricted to reduce site discharge to no greater than the existing site outflows for all storm events from the 5-year (20%AEP) up to and including the 100-year (1% AEP) storm events.

Emergency overflow path to the council system along Kurrajong Road is provided to cater for excessive flows or blockages.

Part of the roof drainage is proposed to be diverted to a rainwater tank for retention and reuse purposes. The Rainwater system is also part of the Water Quality treatment system – refer section 5 of this report for water quality treatment.

Total peak flows for the site for various storm events calculated via DRAINS and shown in Table 5.2 as follows:

Site Peak Stormwater Discharge			
OSD Volume (cu.m)	402		
Catchment Area (ha)	1.32		
	20% AEP	5% AEP	1% AEP
Pre Development Flows (cu.m/s)	0.059	0.126	0.219
Post Development Flows (cu.m/s)	0.247	0.327	0.439
Post Development with OSD Flows (cu.m/s)	0.058	0.074	0.093

Table 5.2 Stormwater peak flows

Drains schematic and detailed results output is added in **Appendix B** of this report.

5. Water Quality Treatment (Water Sensitive Urban Design(WSUD))

5.1 Authority Requirements

Liverpool City Council requires that the quality of stormwater runoff from new developments minimises the potential adverse effects on the aquatic ecosystems of the waterbodies in downstream catchments. The DCP sets out post developed water quality targets as follows:

Pollutant	Load Reduction Target
Total Suspended Solids	80%
Total Phosphorus	45%
Total Nitrogen	45%

Table 6.1 Water Quality Treatment Requirements

5.2 Water Quality Treatment Design

Water quality treatment devices and water sensitive urban design features will be incorporated into the stormwater network to provide the required reduction in pollutant and nutrient loads. Measures proposed are the retention of the larger roof catchment (Building 1) for reuse and filtration devices such as ocean guards in pits to treat surface runoff from paved areas. Ultimately site runoff passes through storm filter treatment devices before discharge to the council stormwater system.

Typical treatment chain is as below:

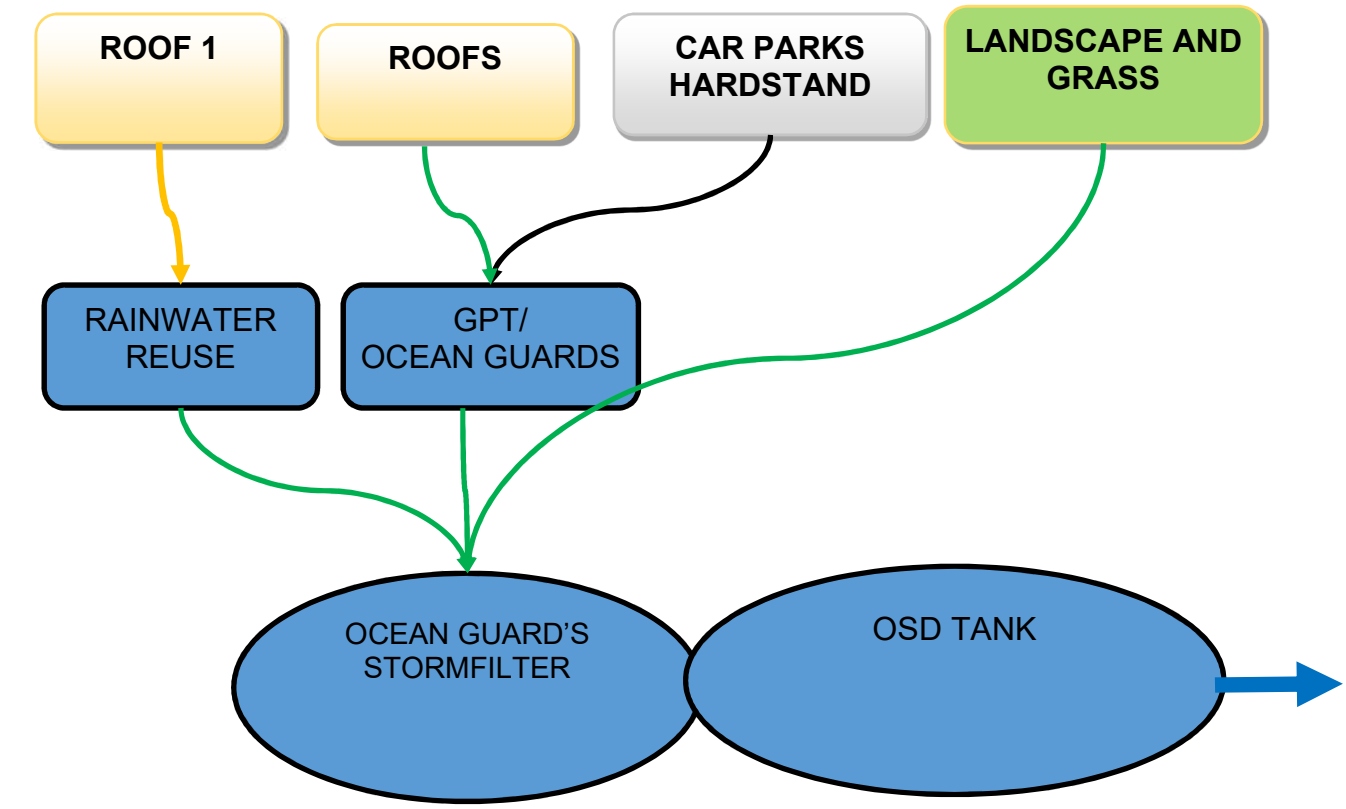


Figure 6.1 - Proposed Water Quality Treatment Chain

The proposed treatment train and MUSIC model results are provided in **Appendix B** and is summarised in Table 6.2 below

Pollutant	Load Reduction Target	MUSIC Modelling Results
Total Suspended Solids	80%	84.3%
Total Phosphorus	45%	61.3%
Total Nitrogen	45%	45.1%

Table 6.2 Water Quality Treatment Requirements & MUSIC modelling results

The following water quality treatment devices are required to achieve the removal rates target:

- Landscaping Buffers at the Central courtyard adjacent the drop off zone
- 6 off Ocean Protect's Oceanguard or approved equivalent
- 6 off Ocean Protect's 690mm Stormfilters
- 30Kl Rainwater tank system to be re-used for landscaping irrigation. (Minimum landscape area to be irrigated = 1,400sq.m) with a minimum roof catchment of 3,000sq.m to the rainwater tank.

5.3 Sediment, Erosion and Dust Controls

Council and Department of a soil and erosion control plan in accordance with NSW Department of Housing Managing Urban Stormwater, 3rd Edition, August 1998, Soils and Construction "Blue Book" has been prepared.

The Soil and Water Management Plan has been based on providing Sediment basins on the downslope side of each section of the development. A series of catch drains will convey sediment laden runoff from disturbed areas during the construction phase to these sediment basins.

Dust suppression and erosion controls to minimise erosion from construction vehicles/traffic and wind, will include vehicle wash downs, utilisation of water carts to supress dust during construction activities, and ongoing dust monitoring of the site. Further controls such as locating material stockpiles away from sensitive areas, staging construction works to minimise extent of disturbed surfaces, early revegetation of completed surfaces, and imposing speed limits on all site vehicles will further reduce dust generation and impacts.

A Soil & Erosion Control Plan is attached in **Appendix A** of this report.

6. Recommendation

Based on our assessment to ensure that the requirements of the local Council (Liverpool City Council) are met, that stormwater discharges from the site are not changed or detrimental to the surrounding areas we recommend the following:

- That the Stormwater Drainage system be generally in accordance with the Stormwater Concept Plan shown in Appendix A of this report which incorporates water quality and quantity system.
- That OSD system be provided with a minimum volume of 402cu.m and a permissible site discharge (PSD) of 59 litres/second.
- Water Quality Treatment system with the following minimum devices.
    1) Landscaping Buffers at the Central courtyard adjacent the drop off zone.
    2) 6 off Ocean Protect's Oceanguard or approved equivalent.
    3) 6 off Ocean Protect's 690mm Stormfilters.
    4) 30Kl Rainwater tank system to be re-used for landscaping irrigation. (Minimum landscape area to be irrigated = 1,400sq.m) with a minimum roof catchment of 3,000sq.m to the rainwater tank.

Prepared By:

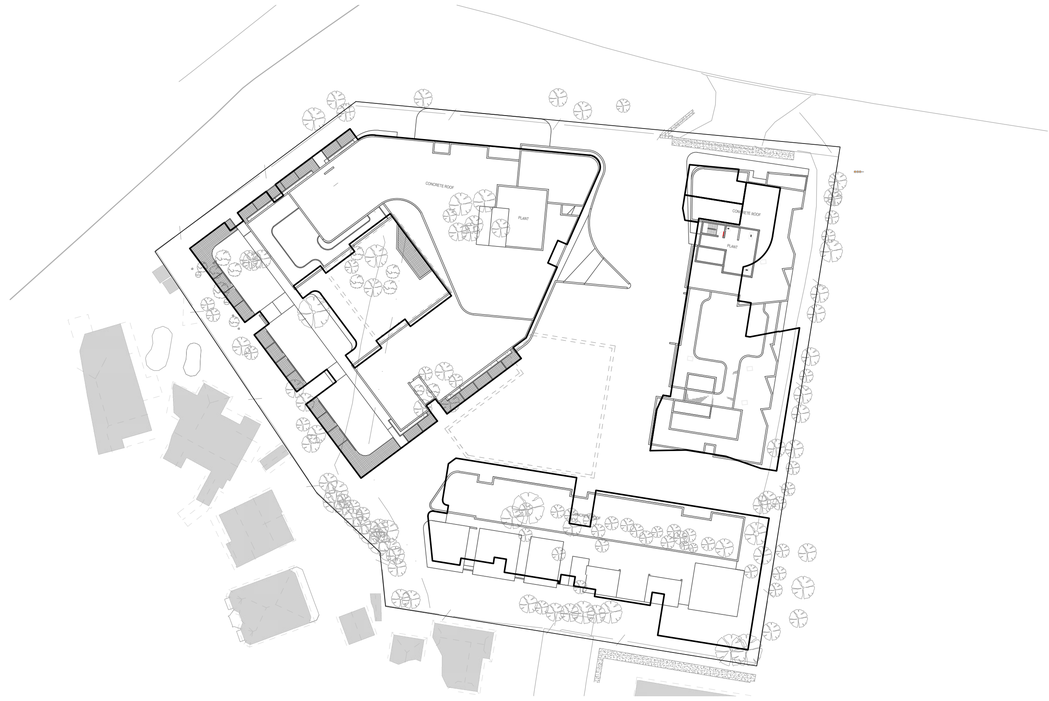
TAYLOR THOMSON WHITTING (NSW) PTY LTD
in its capacity as trustee for the
TAYLOR THOMSON WHITTING NSW TRUST

Nemesio Biason
Associate Director
P:\2019\1915\191583\Reports\TTW\191209 Stormwater Report_ nb.docx

Appendix A

Civil Design Drawings

CASULA AGED CARE,
18 RANDWICK CLOSE, CASULA, NSW 2758
CIVIL WORKS



DRAWING LIST	
DRAWING No.	**DRAWING NAME**
C01	COVER SHEET AND DRAWING LIST
C02	GENERAL NOTES AND LEGENDS
C05	SEDIMENT AND EROSION CONTROL PLAN
C06	SEDIMENT AND EROSION CONTROL DETAILS
C10	BULK EARTH WORKS PLAN
C11	STORMWATER CONCEPT PLAN – GROUND LEVEL
C12	OSD TANK PLAN AND DETAILS

Rev	Description	Eng	Draft	Date
P1	ISSUED FOR APPROVAL	NB	MB	03.10.19

Project

CASULA AGED CARE
CIVIL WORKS

Sheet Subject

COVER SHEET AND
DRAWING LIST

Architect

JACKSON TEECE

LOT 1, PIER 8-9, 23 HICKSON ROAD,
WALSH BAY, NSW 2000

Engineer

TTW Structural Civil Traffic Façade

612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
1:1	LS	NB

Job No	Drawing No	Revision
191583	C01	P1

Plot File Created: Oct 03, 2019 - 6:36pm

FileName: C01.dwg - USER: mahlib - Plot File Created: Oct 03, 2019 - 6:36pm

A1 0 1 2 3 4 5 6 7 8 9 10

GENERAL NOTES

1. Contractor must verify all dimensions and existing levels on site prior to commencement of works. Any discrepancies to be reported to the Engineer
2. Strip all topsoil from the construction area. All stripped topsoil shall be disposed of off-site unless directed otherwise.
3. Make smooth connection with all existing works.
4. Compact subgrade under buildings and pavements to minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1. Compaction under buildings to extend 2m minimum beyond building footprint.
5. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority, the Contractor is to ensure that the drawings used for construction have been approved by all relevant authorities prior to commencement site.
6. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority is to be carried out in accordance with the requirements of the relevant Authority. The Contractor shall obtain these requirements from the Authority. Where the requirements of the Authority are different to the drawings and specifications, the requirements of the Authority shall be applicable.
7. For all temporary batters refer to geotechnical recommendations.

REFERENCE DRAWINGS

1. These drawings have been based from, and to be read in conjunction with the following Consultants drawings. Any conflict to the drawings must be notified immediately to the Engineer.

Consultant	Dwg Title	Dwg No	Rev	Date
JACKSON TEECE	GROUND FLOOR	DA-110	P14	27.09.18
PINNACLE	SURVEY	11850etReA	A	20.05.19

SITEWORKS NOTES

1. All basecourse material to comply with RMS specification No 3051 and compacted to minimum 98% modified standard dry density in accordance with AS 1289 5.2.1.
2. All trench backfill material shall be compacted to the same density as the adjacent material.
3. All service trenches under vehicular pavements shall be backfilled with an approved select material and compacted to a minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1

BOUNDARY AND EASEMENT NOTE

The property boundary and easement locations shown on Taylor Thomson Whitting drawing's have been based from information received from : BOUNDARY
BOUNDARY

Taylor Thomson Whitting makes no guarantees that the boundary or easement information shown is correct.
Taylor Thomson Whitting will accept no liabilities for boundary inaccuracies. The contractor/builder is advised to check/confirm all boundaries in relation to all proposed work prior to the commencement of construction. Boundary inaccuracies found are to be reported to the superintendent prior to construction starting.

EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
   (A) Local authority requirements,
   (B) EPA – Pollution control manual for urban stormwater,
   (C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control drawings and notes are provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
   The erosion and sediment control plan shall be implemented and adapted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

WATER QUALITY TESTING REQUIREMENTS

Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:

- Compliance with the criteria of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
- If required subject to the environmental consultants advice, provide remedial measures to improve the quality of water that is to be discharged into Councils storm water drainage system.This should include comments from a suitably qualified environmental consultant confirming the suitability of these remedial measures to manage the water discharged from the site into Councils storm water drainage system. Outlining the proposed, ongoing monitoring, contingency plans and validation program that will be in place to continually monitor the quality of water discharged from this site. This should outline the frequency of water quality testing that will be undertaken by a suitably qualified environmental consultant.

SAFETY IN DESIGN

Contractor to refer to Appendix B of the Civil Specification for the Civil Risk and Solutions Register.

EXISTING SERVICES

Contractor to be aware existing services are located within the site. Location of all services to be verified by the Contractor prior to commencing works. Contractor to confirm with relevant authority regarding measures to be taken to ensure services are protected or procedures are in place to demolish and/or relocate.

EXISTING STRUCTURES

Contractor to be aware existing structures may exist within the site. To prevent damage to existing structure(s) and/or personnel, site works to be carried out as far as practicably possible from existing structure(s).

EXISTING TREES

Contractor to be aware existing trees exist within the site which need to be protected. To prevent damage to trees and/or personnel, site works to be carried out as far as practicably possible from existing trees. Advice needs to be sought from Arborist and/or Landscape Architect on measures required to protect trees.

GROUNDWATER

Contractor to be aware ground water levels are close to existing surface level. Temporary de-watering may be required during construction works.

EXCAVATIONS

Deep excavations due to stormwater drainage works is required. Contractor to ensure safe working procedures are in place for works. All excavations to be fenced off and batters adequately supported to approval of Geotechnical Engineer.

GROUND CONDITIONS

Contractor to be aware of the site geotechnical conditions. Refer to geotechnical report by (insert report details) for details.

HAZARDOUS MATERIALS

Existing asbestos products & contaminated material may be present on site. Contractor to ensure all hazardous materials are identified prior to commencing works. Safe working practices as per relevant authority to be adopted and appropriate PPE to be used when handling all hazardous materials. Refer to geotechnical/environmental report by (insert report details) for details.

CONFINED SPACES

Contractor to be aware of potential hazards due to working in confined spaces such as stormwater pits, trenches and/or tanks. Contractor to provide safe working methods and use appropriate PPE when entering confined spaces.

MANUAL HANDLING

Contractor to be aware manual handling may be required during construction. Contractor to take appropriate measures to ensure manual handling procedures and assessments are in place prior to commencing works.

WATER POLLUTION

Contractor to ensure appropriate measures are taken to prevent pollutants from construction works contaminating the surrounding environment.

SITE ACCESS/EGRESS

Contractor to be aware site works occur in close proximity to footpaths and roadways. Contractor to erect appropriate barriers and signage to protect site personnel and public.

VEHICLE MOVEMENT

Contractor to supply and comply with traffic management plan and provide adequate site traffic control including a certified traffic marshall to supervise vehicle movements where necessary.

SURVEY LEGEND

+18.48	Surface level
19	Contour
	Kerb line
	Batter
	Retaining wall
SW	Stormwater drainage line
T	Telecommunications line
G	Gas line
W	Water main
S	Sewer line
E	Electrical line
EASEMENT FOR _____(__m WIDE)	Easement
	Fence
	Tree to be removed/be retained
	Boundary
SGN	Sign
H	Hydrant
MH	Manhole
G	Gas
SV	Stop Valve
W	Water
TEL	Telecomunications
TRAP	Trap
	Gully
	Grate
S	Sewer Manhole
E	Electricity
ELP	Electric Light Pole
TL	Traffic Light
TLL	Traffic Light Lid
TLB	Traffic Light Box
TB	Telephone Box
PKM	Parking Meter
PM 1234	Permanent Mark
BM 51.10	Bench Mark
BH 0	Borehole
TP No	Test Pit
FC	Fuel Cock
FL	Flood Light
LH	Lamp Hole
BUB	Bubbler
LB	Letter Box
FP	Flag Pole
FP BOX	Flag Pole Box
BOL	Bollard
SEAT	Seat
BIN	Bin
KO	Kerb Outlet

SITEWORKS LEGEND

● F22.20	Finished surface level
	Stormwater pit, flow direction and line with
IL10.00 600 ø 'Z' 1.25% Q=345 L/s IL9.65	Invert level upstream Pipe size and class Pipe grade Flow (Litres per second) Invert level downstream
GD	Grated drain
	Subsoil drainage line (100 dia) – refer detail sheets
IR	Intermediate riser with subsoil drainage line (100 dia)
FP	Flushing point with subsoil drainage line (100 dia)
DP	Down pipe
RP	Rodding point
	Concrete encased stormwater line
	Stormwater line with pipe taper and flow direction Taper kerb to zero height over 500 mm

Rev	Description	Eng	Draft	Date
P1	ISSUED FOR APPROVAL	NB	MB	03.10.19

Project

CASULA AGED CARE CIVIL WORKS

Sheet Subject

GENERAL NOTES AND LEGEND

Architect
JACKSON TEECE
LOT 1, PIER 8-9, 23 HICKSON ROAD,
WALSH BAY, NSW 2000

Engineer
TTW Structural Civil Traffic Façade
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
1:1	LS	NB

Job No	Drawing No	Revision
191583	C02	P1

Plot File Created: Oct 03, 2019 - 6:35pm

PRELIMINARY

FileName: C02.dwg - USER: mahlib - Plot File Created: Oct 03, 2019 - 6:35pm

A1 0 1 2 3 4 5 6 7 8 9 10

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01

EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
   (A) Local authority requirements,
   (B) EPA – Pollution control manual for urban stormwater,
   (C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control **drawings and notes are** provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
   The erosion and sediment control **plan** shall be implemented and adopted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

EROSION AND SEDIMENT CONTROL LEGEND

- Batter
- Sitation fence
- Stormwater pit with Geotextile filter surround
- Hay bale barriers
- Sandbag sediment trap
- Catch drain
- Overland flow path

PROVIDE CATCH DRAIN (TYP.) REFER TO DETAILS ON DRG C06

PROVIDE TEMPORARY CONSTRUCTION ENTRY/EXIT, REFER TO DETAIL ON DRG C06

PROVIDE SEDIMENT FENCE, REFER TO DETAILS ON DRG C06

PROVIDE SEDIMENTATION BASIN VOLUME =320m³ WITH SEDIMENTATION TRAP

PROVIDE GEOTEXTILE FILTER PIT SURROUND(TYP.), REFER TO DETAILS ON DRG C06

KURRAJONG ROAD

M5 MOTOWAY

RANDWICK CLOSE

LOT 104
DP 863214
Area = 13194.1m²

DARUK PARK

ONE STOREY BRICK RESIDENCE TILE ROOF No. 13

TWO STOREY BRICK RESIDENCE TILE ROOF No. 11

TWO STOREY BRICK RESIDENCE TILE ROOF No. 9

ONE STOREY BRICK RESIDENCE TILE ROOF No. 16

GRANNY FLAT

GARAGE

SHED

POOL

BALCONY FL 45.89

FL 42.85

FL 42.49

FL 42.59

FL 43.07

GRASS

BITUMEN

TOW

SL37.94 0.6x0.45 GIP

SL37.96 0.6x0.45 GIP

SL37.65 9x0.9 GIP

SL38.17 GIP

SL37.71 0.9x0.9 GIP

SL36.28

SL37.56

SL37.85 0.9x0.9 GIP

SL36.18 0.6x0.45 GIP

53° 16' 10"

326° 07' 30"

313° 05' 40"

354° 07' 30"

279° 07' 30"

95° 20' 50"

0 2.5 5 7.5 10 12.5 15 17.5 20m

1:250 A1 1:500 A3

Rev	Description	Eng	Draft	Date
P1	ISSUED FOR APPROVAL	NB	MB	03.10.19

Project

CASULA AGED CARE CIVIL WORKS

Sheet Subject

SEDIMENT AND EROSION CONTROL PLAN

Architect
JACKSON TEECE
LOT 1, PIER 8-9, 23 HICKSON ROAD,
WALSH BAY, NSW 2000
Engineer
TTW Structural Civil Traffic Façade
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
1:250	LS	NB

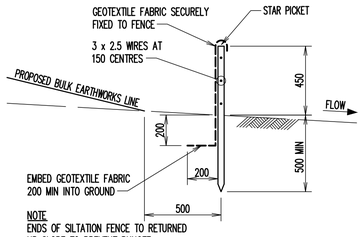
Job No	Drawing No	Revision
191583	C05	P1

Plot File Created: Oct 03, 2019 - 6:35pm

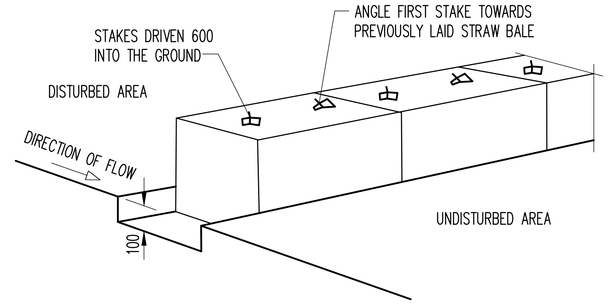
PRELIMINARY

FileName: C05.dwg - USER: mohitb - Plot File Created: Oct 03, 2019 - 6:35pm

A1 0 1 2 3 4 5 6 7 8 9 10

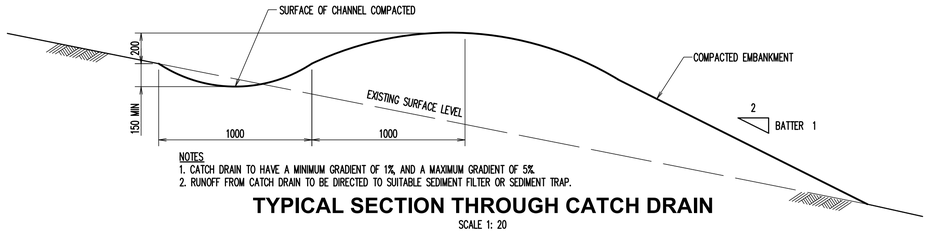


SILTATION FENCE DETAIL
SCALE 1: 20

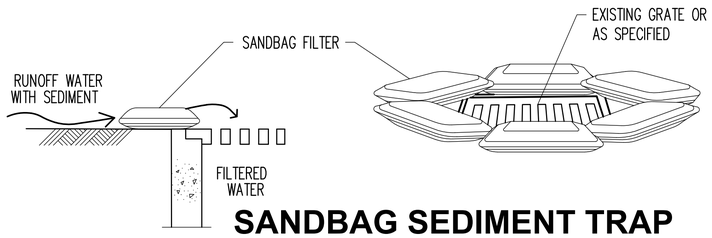


HAY BALE SEDIMENT FILTER
NTS

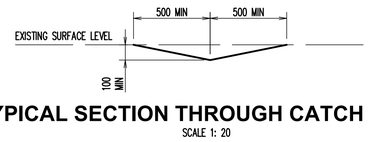
NOTE: STAKE TO BE EITHER TAR COATED STAR OR 50 x 50 HARDWOOD



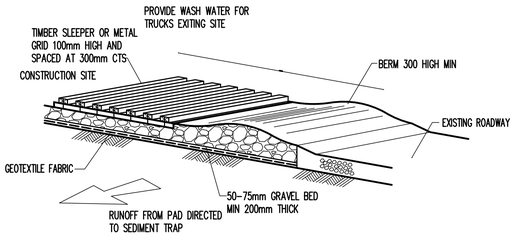
TYPICAL SECTION THROUGH CATCH DRAIN
SCALE 1: 20



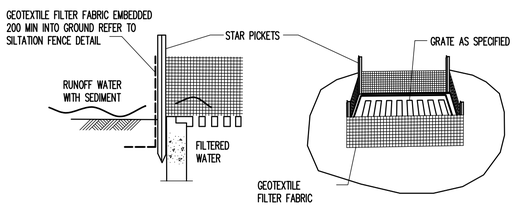
SANDBAG SEDIMENT TRAP
NTS



TYPICAL SECTION THROUGH CATCH DRAIN
SCALE 1: 20



TEMPORARY CONSTRUCTION VEHICLE EXIT
NTS



GEOTEXTILE FILTER PIT SURROUND
NTS

0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6m

1:20 A1 1:40 A3

Rev	Description	Eng	Draft	Date
P1	ISSUED FOR APPROVAL	NB	MB	03.10.19

Project

CASULA AGED CARE
CIVIL WORKS

Sheet Subject

SEDIMENT AND EROSION CONTROL DETAILS

Architect

JACKSON TEECE

LOT 1, PIER 8-9, 23 HICKSON ROAD,
WALSH BAY, NSW 2000

Engineer

TTW Structural Civil Traffic Façade

612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
AS SHOWN	LS	NB

Job No	Drawing No	Revision
191583	C06	P1

Plot File Created: Oct 03, 2019 - 6:35pm

PRELIMINARY

FileName: C06.dwg - USER: mohlib - Plot File Created: Oct 03, 2019 - 6:35pm

A1 0 1 2 3 4 5 6 7 8 9 10

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01

BASEMENT RETAINING PERIMETER WALLS TYPICAL (INTERNAL DEEP SOIL ZONE) AS SHOWN

1:1 TEMPORARY BATTER (TYP)

SHORING WALL ALONG EASTERN SIDE AS SHOWN

BE 36.28

BE 35.64

BE 36.53

BE 35.49

BE 35.03

BE 36.345

1:40

RAMP

CUT VOLUME = 30,700m³

BULK EARTHWORKS LEGEND

Batter

BE 22.00 — Bulk earthworks platform level

Flat platforms shown with dots

0 2.5 5 7.5 10 12.5 15 17.5 20m

1:250 A1 1:500 A3

Rev	Description	Eng	Draft	Date
P3	CUT VOLUME ADDED	NB	KHA	09.12.19
P2	FOR INFORMATION	NB	JH	15.10.19
P1	ISSUED FOR APPROVAL	NB	MB	03.10.19

Project

CASULA AGED CARE CIVIL WORKS

Sheet Subject

BULK EARTHWORKS PLAN

Architect

JACKSON TEECE

LOT 1, PIER 8-9, 23 HICKSON ROAD, WALSH BAY, NSW 2000

Engineer

TTW Structural Civil Traffic Façade

612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
1:250	JH	NB

Job No	Drawing No	Revision
191583	C10	P3

Plot File Created: Dec 09, 2019 - 4:25pm

FileName: C10.dwg - USER: Kamrah - Plot File Created: Dec 09, 2019 - 4:25pm

A1 0 1 2 3 4 5 6 7 8 9 10

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01

M5 MOTOWAY

KURRAJONG ROAD

EXISTING MAINTENANCE TRAIL

EXISTING ACOUSTIC WALL

RAINWATER TANK (UNDER GROUND)

ON-SITE DETENTION (OSD) AND WATER QUALITY FILTER TANK

EXISTING ø600 PIPE WITH IL 34.68 APPROX. TO BE CONFIRMED BY DETAILED SURVEY

IL38.83 ø375 '2' 1.0% Q= L/sec IL37.89

IL37.86 ø375 '2' 1.0% Q= L/sec IL37.29

IL37.26 ø450 '2' 4.51% Q= L/sec IL37.24

IL37.21 ø450 '2' 4.51% Q= L/sec IL37.09

IL37.06 ø450 '2' 4.51% Q= L/sec IL36.45

IL36.42 ø450 '2' 1.0% Q= L/sec IL36.24

IL34.80 ø450 '2' 1.0% Q= L/sec IL34.68

IL36.90 ø450 '2' 1.0% Q= L/sec IL36.58

IL39.00 ø300 '2' 1.0% Q= L/sec IL38.36

IL37.24 ø450 '2' 1.0% Q= L/sec IL36.93

IL37.59 ø375 '2' 1.25% Q= L/sec IL37.27

IL37.72 ø375 '2' 1.25% Q= L/sec IL37.62

F39.85 F39.00 F37.50 F37.30 F37.80 F38.00 F38.50 F38.70 F39.90

BULDING 1
GROUND FLOOR RL 40.00

BULDING 2
GROUND FLOOR RL 39.60

BULDING 3
GROUND FLOOR RL 39.20

FFL 39.000

FFL 39.300

LOT 104
DP 863214
Area = 13194.1m²

DARUK PARK

SANDOWN CLOSE

GRANDWICK CLOSE

ONE STOREY BRICK RESIDENCE TILE ROOF No. 13

TWO STOREY BRICK RESIDENCE TILE ROOF No. 11

TWO STOREY BRICK RESIDENCE TILE ROOF No. 9

ONE STOREY BRICK RESIDENCE TILE ROOF No. 16

PRELIMINARY

0 2.5 5 7.5 10 12.5 15 17.5 20m

1:250 A1 1:500 A3

Rev	Description	Eng	Draft	Date
P1	ISSUED FOR APPROVAL	NB	MB	03.10.19

Project

CASULA AGED CARE
CIVIL WORKS

Sheet Subject

STORMWATER CONCEPT PLAN - GROUND LEVEL

Architect

JACKSON TEECE
LOT 1, PIER 8-9, 23 HICKSON ROAD,
WALSH BAY, NSW 2000

Engineer

TTW Structural Civil Traffic Façade
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
1:250	LS	NB

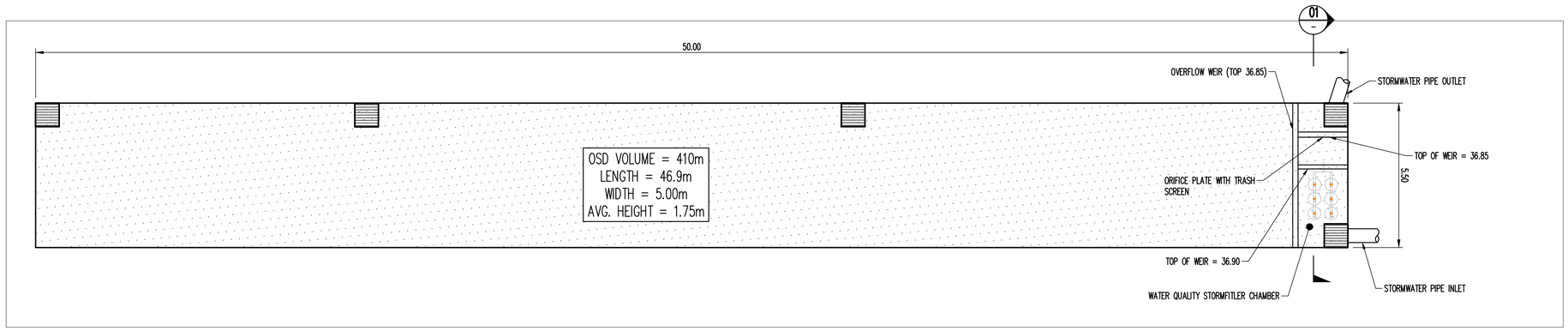
Job No	Drawing No	Revision
191583	C11	P1

Plot File Created: Oct 03, 2019 - 6:35pm

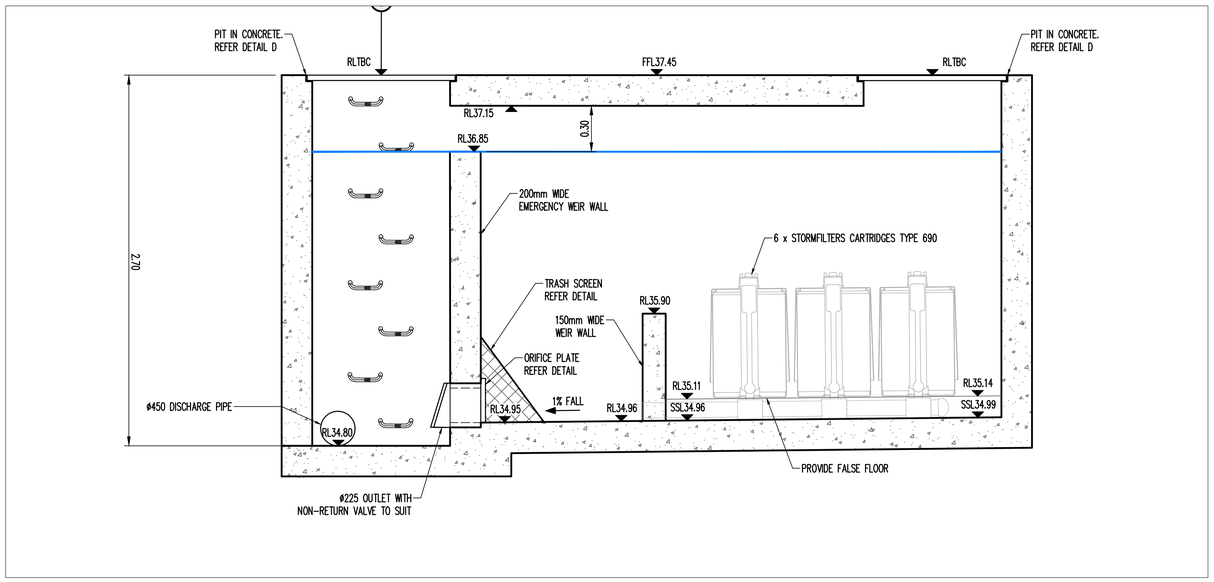
FileName: C11.dwg - USER: mohlb - Plot File Created: Oct 03, 2019 - 6:35pm

A1 0 1 2 3 4 5 6 7 8 9 10

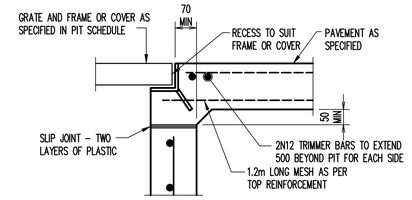
THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01



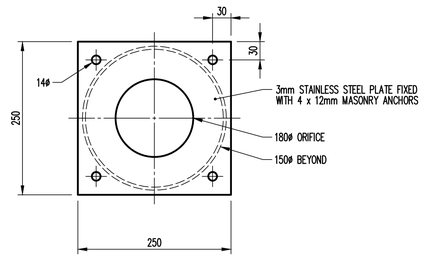
OSD PLAN
SCALE 1: 100



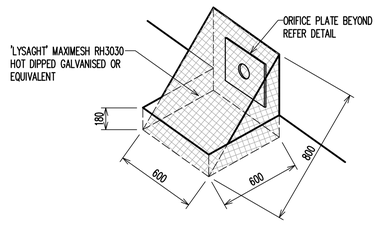
SECTION 01



DETAIL D
SCALE 1: 10



ORIFICE PLATE DETAIL
SCALE 1: 5



TRASH SCREEN DETAIL
NTS

Rev	Description	Eng	Draft	Date
P1	ISSUED FOR APPROVAL	NB	MB	03.10.19

Project

CASULA AGED CARE
CIVIL WORKS

Sheet Subject

OSD TANK DETAILS & SECTIONS

Architect
JACKSON TEECE
LOT 1, PIER 8-9, 23 HICKSON ROAD,
WALSH BAY, NSW 2000

Engineer
TTW Structural Civil Traffic Façade
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
AS SHOWN	MB	

Job No	Drawing No	Revision
191583	C12	P1

Plot File Created: Oct 03, 2019 - 7:00pm

PRELIMINARY

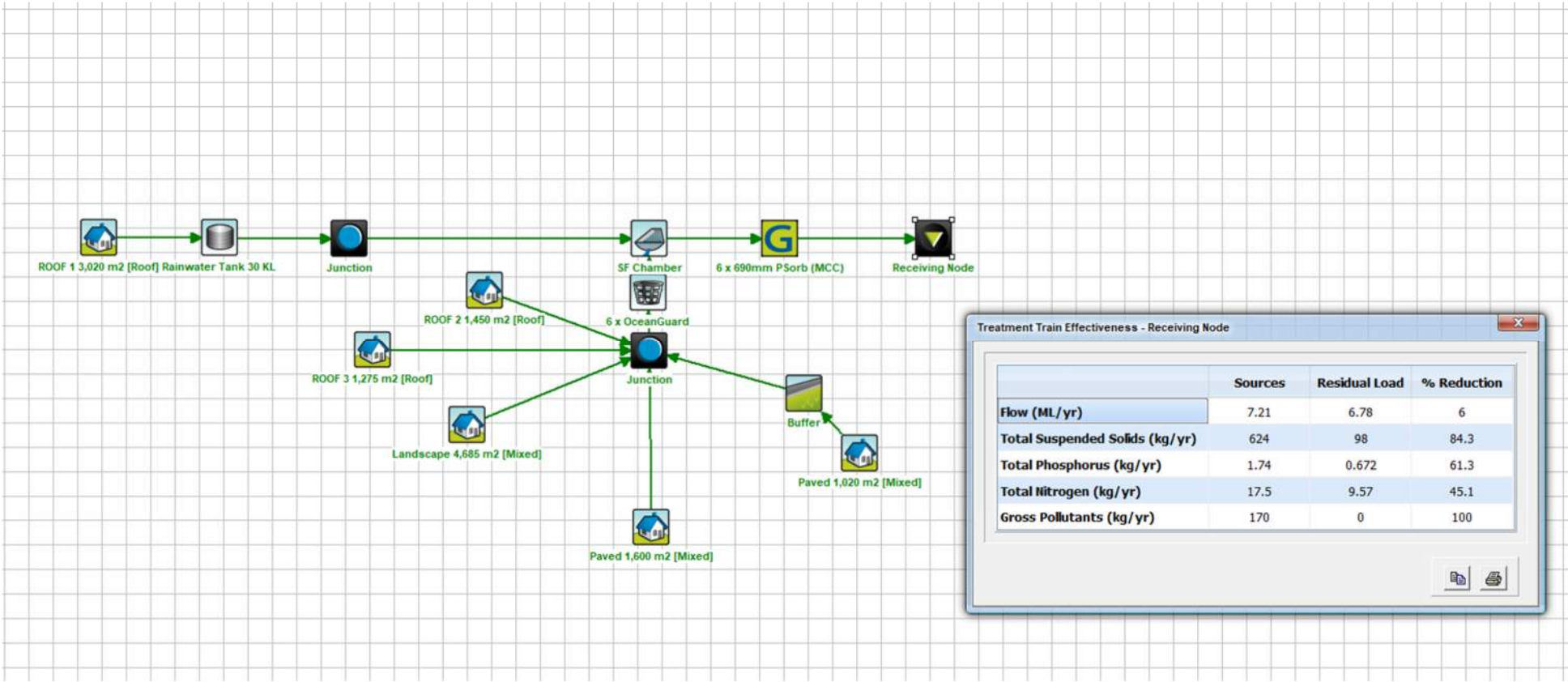
FileName: C12.dwg - USER: mohlb - Plot File Created: Oct 03, 2019 - 7:00pm

P1 ISSUE FOR APPROVAL NB MB 03.10.19

A1 0 1 2 3 4 5 6 7 8 9 10

Appendix B

- MUSIC Model and Results
- DRAINS Modelling Schematic and detailed results

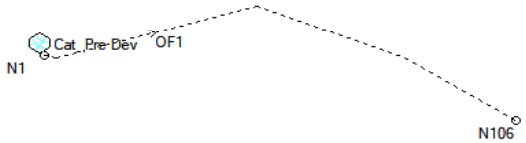


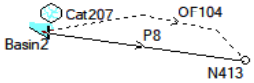
Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	7.21	6.78	6
Total Suspended Solids (kg/yr)	624	98	84.3
Total Phosphorus (kg/yr)	1.74	0.672	61.3
Total Nitrogen (kg/yr)	17.5	9.57	45.1
Gross Pollutants (kg/yr)	170	0	100

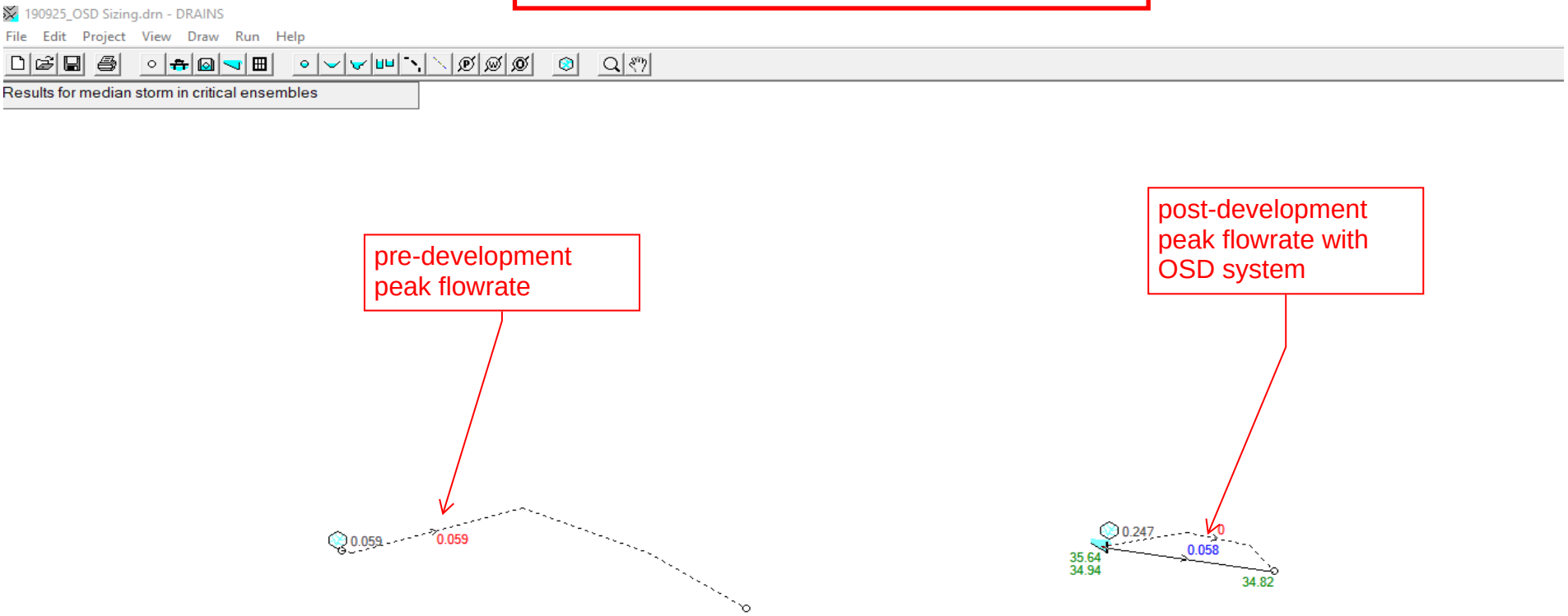
190925_OSD Sizing.drn - DRAINS

File Edit Project View Draw Run Help

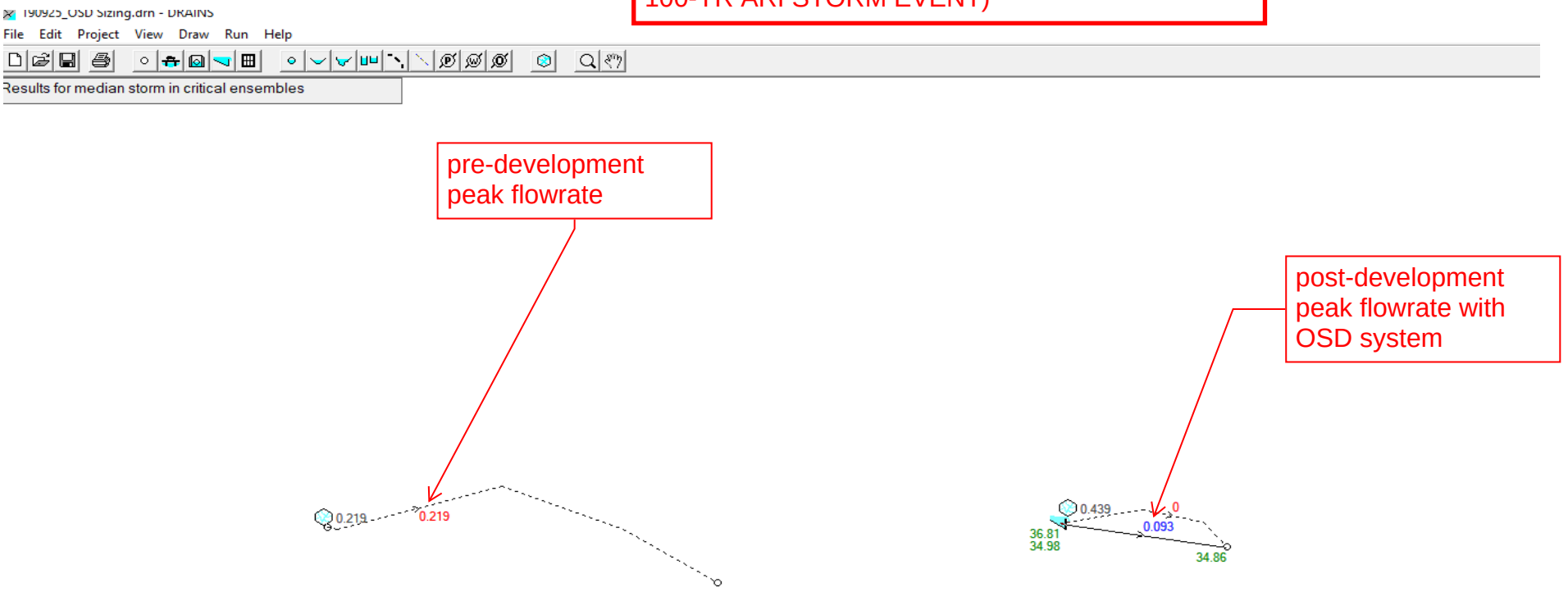




DRAINS SCHEMATIC RESULTS PLAN (20%AEP = 5-YR ARI STORM EVENT)



DRAINS SCHEMATIC RESULTS PLAN (1%AEP = 100-YR ARI STORM EVENT)



DRAINS results prepared from Version 2019.03

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
N413	34.86		0.084				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	EIA Max Q (cu.m/s)	Remaining Max Q (cu.m/s)	EIA Tc (min)	Remaining Tc (min)	Due to Storm
Cat_Pre De	0.219	0	0.219	17.44	17.44	1% AEP, 45 min burst, Storm 7
Cat207	0.439	0.439	0	6	10	1% AEP, 10 min burst, Storm 1

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
P8	0.093	1.55	36.056	34.862	1% AEP, 1.5 hour burst, Storm 10

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF1	0.219	0.219	0.362	0.104	0.1	5.66	0.97	1% AEP, 45 min burst, Storm 7
OF104	0	0	1.479	0	0	0	0	

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin2	36.81	402.4	0.093	0.093	0

Run Log for 190925_OSD Sizing.drn run at 11:12:00 on 3/10/2019

Flows were safe in all overflow routes.