Civil Engineering Report

SummitCare Monterey

Prepared for Monterey Equity Pty Ltd c/o Centurion Project Management / 23 August 2021

201718 CAAA

Taylor Thomson Whitting (NSW) Pty Ltd (ACN 113 578 377)
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Your Partner in Engineering

Contents

1.0 Introduction

Taylor Thomson Whitting Pty Ltd (TTW) NSW has been engaged by Wohl Investments Pty Ltd c/o Centurion Project Management to provide the associated Civil Engineering design and documentation for the proposed development of SummitCare Monterey. This report has been prepared to support the SummitCare Monterey Development Application submission.

1.1 The Existing Site

The address of the site is No. 119 Barton Street, Monterey. The site is legally described as Lot 2 in DP 857520.

The site has an area of 7,220 sqm and bound by Barton Street to the north, The Grand Parade to the east, Scarborough Street to the south and Jones Avenue to the west.

The existing site falls from all ends of the site towards the low point in the centre of the site at a reduced level (RL) of 3.70m. The highest point of the site is at the Barton Street frontage with the highest reduced level (RL) of 8.80m.

Figure 1 – Site Location (Aerial Courtesy of SIX Maps)

1.2 Reference Documents

- Rockdale Development Control Plan (DCP) 2011
- Rockdale Technical Specification Stormwater Management 2011
- Rockdale Local Environmental Plan (LEP) 2011
- Landscape Architectural drawings prepared by LandFX Landscape Architecture
- Architectural drawings prepared by Boffa Robertson Group

2.0 Proposed Development

The proposed development of the SummitCare at this site includes:

- Demolition of existing club house / church.
- Demolition of existing on-grade car park.
- Demolition of bowling green / playing field.
- Construction of the new SummitCare building with:
    - Basement level parking
    - 3 storeys of housing

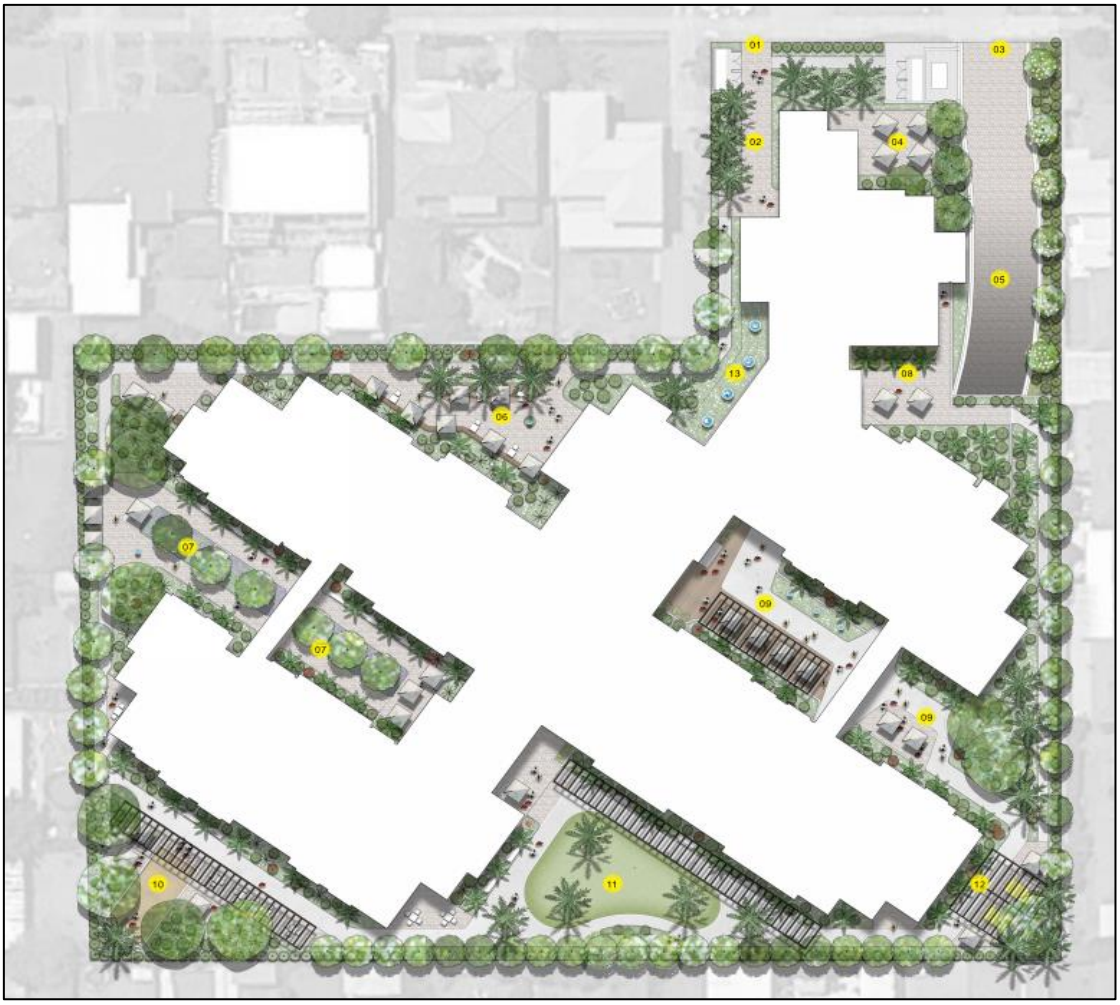


Figure 2 – Overall Plan (LandFX Landscape Architecture)

3.0 Stormwater Disposal System

3.1 In-Ground Drainage System and Overland Flow Path

The overall site is separated into 3 catchments which discharge into their respective absorption tanks to then permeate into the Botany Bay Sand Aquifer (refer to figure 3 below which identifies the 3 separate catchments). As the levels within Barton Street a higher than the proposed development and the existing site levels currently fall towards the centre of the site, an overland flow path to convey storm events with greater rainfall intensities is not practical to design for / surrounding levels do not permit. In order to compensate for the lack of an overland flow path on the site the proposed in-ground pipe system is designed to convey flows for a minimum of the 100 year ARI storm event, the absorption tanks have also been designed to cater for the 100 year ARI storm event, landscaping areas have been proposed all over the site in order to facilitate the absorption of stormwater runoff into Botany Bay Sand Aquifer, and all surrounding levels are to be set a minimum of 200mm below the ground floor finished floor level of RL 4.50m.

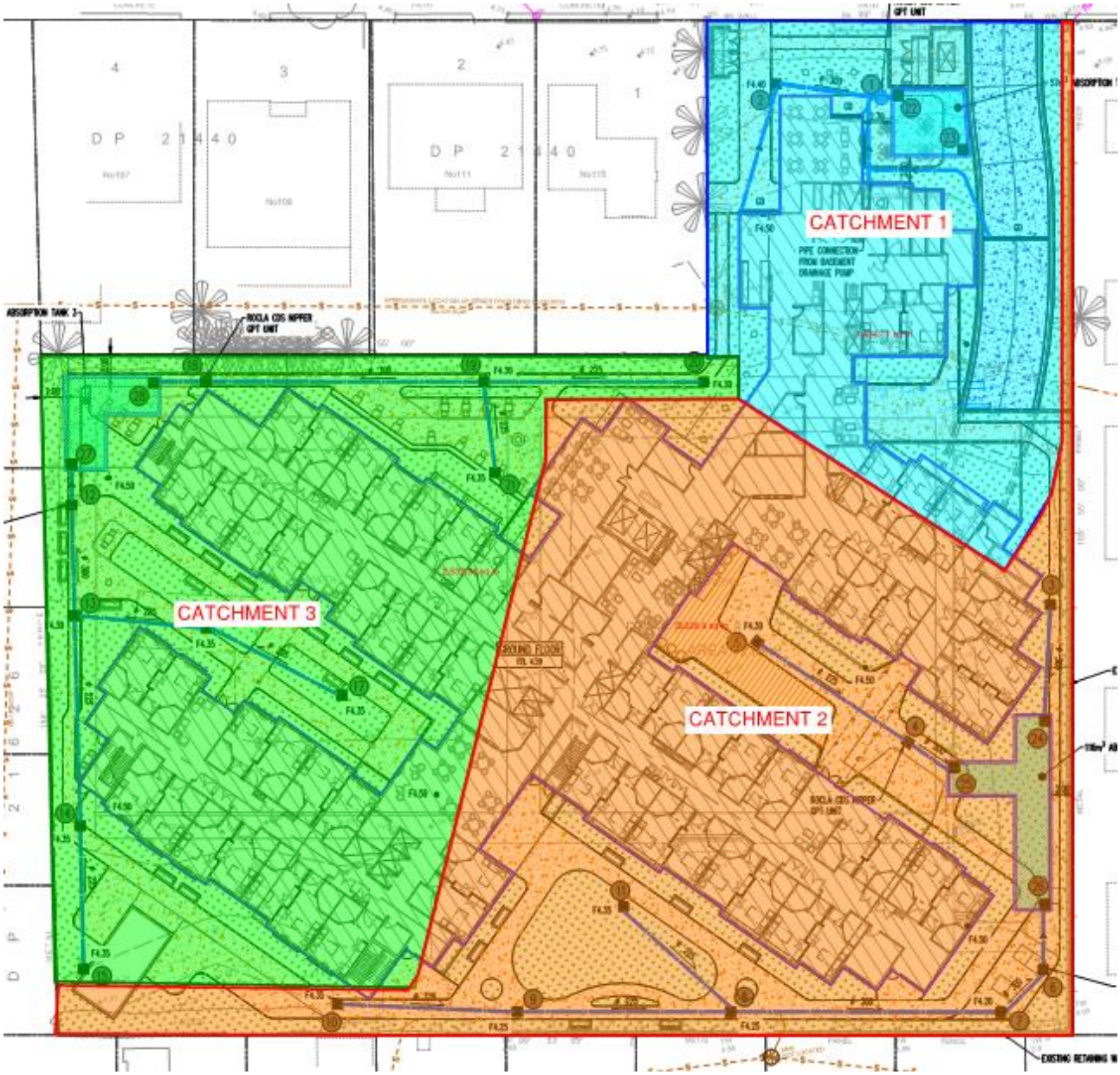


Figure 3 – Proposed Catchment Plan

3.2 On-Site Retention (Absorption)

Due to the site's proximity to Botany Bay, the site is located within the Botany Bay Sand Aquifer and as per Rockdale Technical Specification – Stormwater Management, on-site retention in the form of absorption tank applies to sites located within the Botany Bay Sand Aquifer due to the typically sandy soils with acceptable permeability rates.

Bayside Council requires the absorption system to be designed to accept all the flows off the impervious areas for an Average Recurrence Interval (ARI) storm of 50 Years. However, as mentioned in the previous section due to the lack of an overland flow path the absorption tanks have been designed to cater for the 100 Year ARI storm event. The absorption tanks were sized using the Bayside Council provided Absorption Design Calculation Sheet but with the rainfall intensities swapped from the 50 Year ARI storm event to the rainfall intensities for the 100 Year ARI storm event. These Absorption Design Calculation Sheets are attached in Appendix B. Council also requires the contributing impervious area to be increased by 20% in order to cater for future increases in impervious areas.

According to the Geotechnical Investigation Report by Douglas Partners, attached in Appendix C, the nominal absorption rate varies across the site and thus different absorption rates were used based on the location of the absorption tank for the respective 3 catchments, these absorption rates at these particular locations are to be confirmed prior to construction. Refer to Table 1 below for a summary of the absorption tank design results.

	Contributing Impervious Area (m^2)	Nominal Absorption Rate ($L/m^2/sec$)	Maximum Required Absorption Tank Volume (m^3)
Absorption Tank 1	1051 x 120% = **1,261**	0.4	57
Absorption Tank 2A & 2B	2500 x 120% = **3,000**	0.7	100
Absorption Tank 3	1835 x 120% = **2,202**	0.7	75

Table 1 – Absorption Tank Design Results

4.0 Stormwater Quality

Rockdale Technical Specification – Stormwater Management 2011 specifies that to reduce the stormwater pollution loads coming from urban development on the waterways in the Botany Bay catchment all new development and redevelopment must meet stormwater pollution reduction targets.

As agreed upon with Council, as absorption tanks are being used as the method of stormwater discharge and the water table is below the bottom of the absorption tank, the sand layer at the bottom of the absorption tank is effectively a sand filter which will treat the stormwater runoff total nitrogen (TN) and total phosphorous (TP). As such stormwater treatment will be modelled targeting total suspended solids (TSS) and gross pollutants.

Stormwater quality analysis was undertaken and the catchment area has been modelled using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) to demonstrate that the proposed stormwater treatment devices achieve the stormwater treatment targets as stated below:

- 85% removal of total suspended solids (TSS)
- 90% removal of gross pollutants

In order to achieve these stormwater treatment targets seventeen (17) Ocean Protect Oceanguard pit filter inserts in conjunction with six (6) Rocla CDS Nipper units are being proposed to be implemented on the proposed development site prior to discharge into each catchments respective absorption tank.

The MUSIC modelling schematic layout and results are show in figure 9 and 10, respectively.

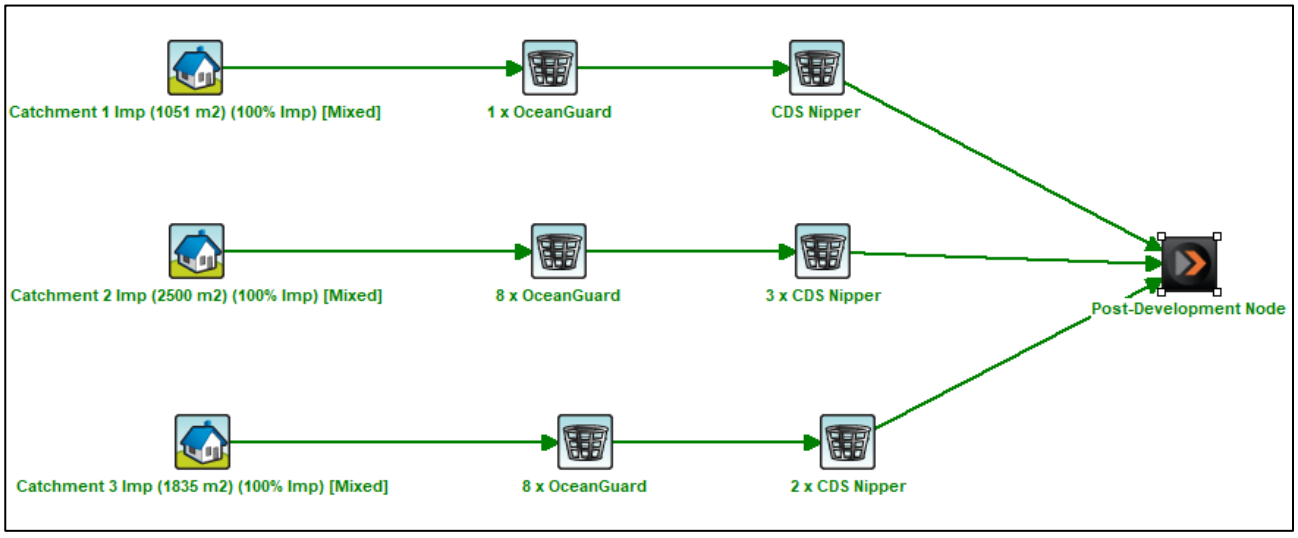
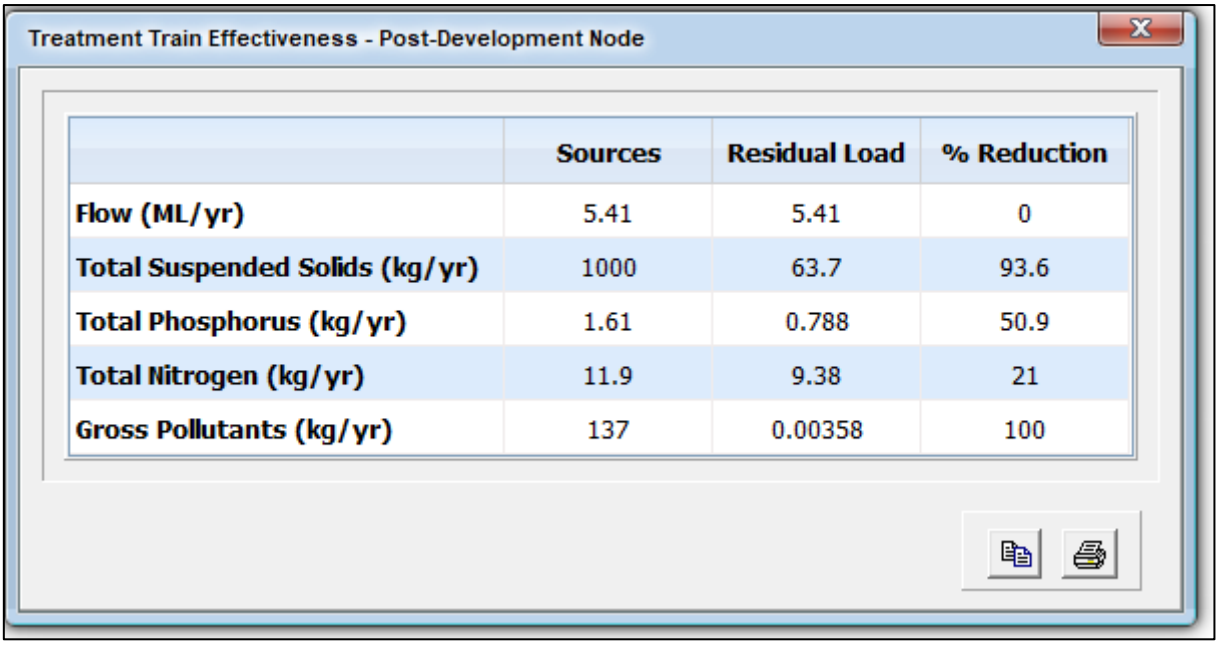


Figure 4 – MUSIC Model Proposed Schematic Layout



	Sources	Residual Load	% Reduction
Flow (ML/yr)	5.41	5.41	0
Total Suspended Solids (kg/yr)	1000	63.7	93.6
Total Phosphorus (kg/yr)	1.61	0.788	50.9
Total Nitrogen (kg/yr)	11.9	9.38	21
Gross Pollutants (kg/yr)	137	0.00358	100

Figure 5 – MUSIC Modelling Results with Proposed Water Quality Measures

5.0 Construction Phase – Erosion and Sediment Control

During the construction stage of the project, an erosion and sediment control plan is to be implemented to prevent sediment laden stormwater from flowing into adjoining properties, bushland, roadways or receiving water bodies. Stormwater controls onsite are detailed in an erosion and sediment control plan which is in accordance with relevant regulatory authority guidelines including Bayside Council's DCP and Landcom NSW's Managing Urban Stormwater, Soils and Construction ("Blue Book"). The proposed Erosion and Sediment Control Plan is included as drawing C100 in Appendix A.

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

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Civil Engineer

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Associate Director

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Appendix A

DA Civil Engineering Plans

SUMMITCARE MONTEREY
CIVIL ENGINEERING DRAWINGS

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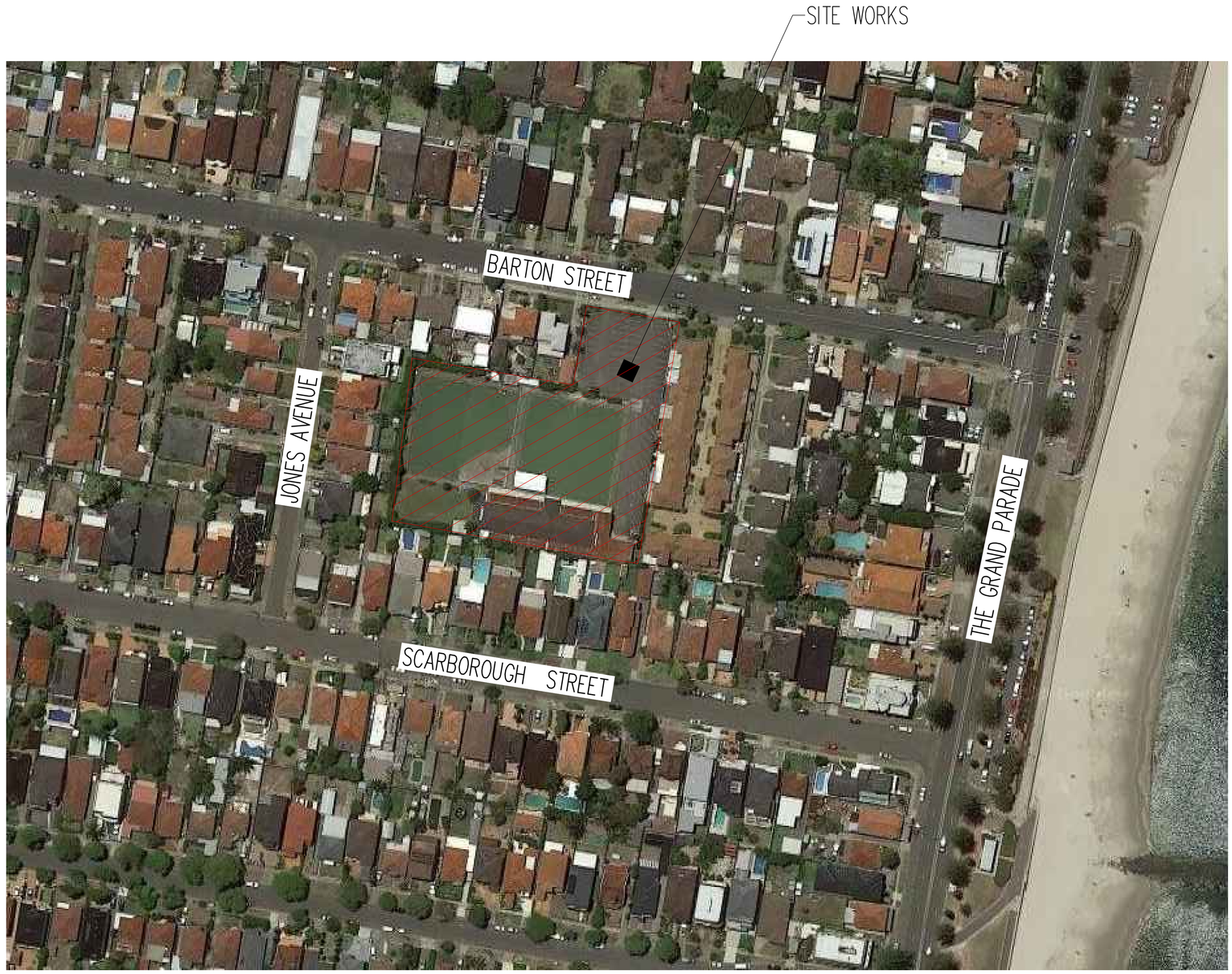


Rev	Description	Eng	Draft	Date
P2	ISSUE FOR APPROVAL	NB	AI	04.12.20
P1	ISSUE FOR INFORMATION	NB	AI	27.10.20

Rev	Description	Eng	Draft	Date

BEWARE OF UNDERGROUND SERVICES.
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN

Architect
BOFFA ROBERTSON GROUP
SUITE 7, LEVEL 1 EPICA,
9 RAILWAY STREET,
CHATSWOOD 2067

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

Project
SUMMITCARE MONTEREY
119 BARTON STREET
MONTEREY 2217

Sheet Subject
TITLE SHEET, DRAWING INDEX AND LOCALITY PLAN

Scale : A1 NTS
Drawn: AE

Job No	Drawing No	Revision
201718	C001	P2

Plot File Created: Dec 04, 2020 - 11:07am

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
PROJECT SURVEYOR	SURVEY	B1968-1	A	11.09.15
BOFFA ROBERTSON GROUP	GROUND FLOOR PLAN	DA00	P1	00.07.21
LandFX	LANDSCAPE PLAN			19.08.21

SURVEY AND SERVICES INFORMATION

Origin of levels : SSM 131745
Datum of levels : 4.286
Coordinate system : UNKNOWN
Survey prepared by : ---
Setout Points : Contact The Surveyor

Taylor Thomson Whitting does not guarantee that the survey information shown on these drawings is accurate and will accept no liability for any inaccuracies in the survey information provided to us from any cause whatsoever.

UNDERGROUND SERVICES - WARNING

The locations of underground services shown on Taylor Thomson Whittings drawings have been plotted from diagrams provided by service authorities. This information has been prepared solely for the authorities own use and may not necessarily be updated or accurate.

The position of services as recorded by the authority at the time of installation may not reflect changes in the physical environment subsequent to installation.

Taylor Thomson Whitting does not guarantee that the services information shown on these drawings shows more than the presence or absence of services, and will accept no liability for inaccuracies in the services information shown from any cause whatsoever.

The Contractor must confirm the exact location and extent of services prior to construction and notify any conflict with the drawings immediately to the Engineer/Superintendent.

The contractor is to get approval from the relevant state survey department, to remove/adjust any survey mark. This includes but is not limited to; State Survey Marks (SSM), Permanent Marks (PM), cadastral reference marks or any other survey mark which is to be removed or adjusted in any way.
Taylor Thomson Whitting plans do not indicate the presence of any survey mark. The contractor is to undertake their own search.

BOUNDARY AND EASEMENT NOTE

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

SITE SPECIFIC NOTES

1. All basecourse material to comply with current RTA and City of Rockdale specification and compacted to minimum 98% modified standard dry density in accordance with AS 1289 5.2.1.

STORMWATER DRAINAGE NOTES

1. Pipes 300 dia and larger to be reinforced concrete minimum Class " 2 " approved spigot and socket with rubber ring joints U.N.O.
3. Pipes up to 300 dia shall be sewer grade uPVC with solvent welded joints.
4. Equivalent strength VCP or FRP pipes may be used subject to approval.
5. Precast pits may be used external to the building subject to approval by the Superintendent
6. Enlargers, connections and junctions to be manufactured fittings where pipes are less than 300 dia.
7. Subsoil drains to be slotted flexible 100dia uPVC U.N.O.
8. Where subsoil drains are shown as unslotted, unslotted 100dia uPVC sewer grade pipe is to be used.
9. Subsoil drains to be located behind all retaining walls and new kerbing be connected to nearest stormwater pit.
10. Grates and covers shall conform with AS 3996-2006, and AS 1428.1 for access requirements.
11. Pipes are to be installed in accordance with AS 3725. All bedding to be type H2 U.N.O.
12. Care is to be taken with levels of stormwater lines. Grades shown are not to be reduced without approval.
13. All stormwater pipes to be 150 dia at 1.0% min fall U.N.O.
14. Adopt invert levels for pipe installation (grades shown are only nominal).
15. All drains and other service infrastructure trenches beneath road pavements, driveways, footpaths or concrete structures & slabs, or within 1m of concrete structures or other Council assets, including kerb, footpath, drains, etc must be backfilled with DGB20, watered compacted and tested to the satisfaction of the Superintendent.
15. Litter traps to be installed in all new grated pits

CONCRETE FINISHING NOTES

1. All exposed concrete pavements are to be broomed finished U.N.O Refer architectural/landscape architect drawings for pavement finishes
2. All edges of the concrete pavement including keyed and dowelled joints are to be finished with an edging tool.
3. Concrete pavements with grades greater than 1:10 shall be heavily broomed finished.
4. Carborundum to be added to all stair treads and ramped crossings U.N.O.

KERBING NOTES

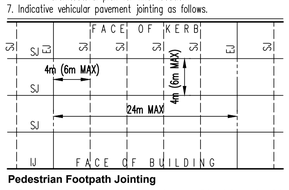
Includes all kerbs, gutters, spoon drains, crossings and edges.

1. All kerbs, gutters, spoon drains and crossings to be constructed on minimum 100mm granular basecourse compacted to minimum 98% modified maximum dry density in accordance with AS 1289 5.2.1.
2. Expansion joints (EJ) to be formed from 10mm compressible cork filler board for the full depth of the section and cut to profile. Expansion joints to be located at drainage pits, on tangent points of curves and elsewhere at 12m centres except for integral kerbs where the expansion joints are to match the joint locations in slabs.
3. Saw cut joints to be min 3mm wide and located at 3m centres except for integral kerbs where weakened plane joints are to match the joint locations in slabs.
4. Broomed finished to all ramped and vehicular crossings, all other kerbing or dish drains to be steel float finished.
5. In the replacement of kerbs –
   Existing road pavement is to be sawcut 350mm from lip of gutter. Upon completion of new kerbs, new basecourse and surface is to be laid 350mm wide to match existing materials and thicknesses.
   Existing allotment drainage pipes are to be built into the new kerb with a 100mm dia hole.
   Existing kerbs are to be completely removed where new kerbs are shown.
6. All works within road reserve to be completed in accordance with City of Rockdale standards and specifications

JOINTING NOTES

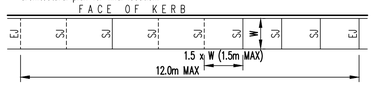
Vehicular Pavement Jointing

1. All vehicular pavements to be jointed as shown on drawings and in accordance with council standards
2. Keyed construction joints should generally be located at a maximum of 6m centres.
3. Saw cut joints should generally be located at a maximum of 6m centres or 1.5 x the spacing of keyed joints, where key joint spacing is less than 4m, with dowelled expansion joints at maximum of 24m centres.
4. Provide 10mm wide full depth expansion joints between buildings and all concrete or unit pavers.
5. The timing of the saw cut is to be confirmed by the contractor on site. Site conditions will determine how many hours after the concrete pour before the saw cuts are commenced. Refer to the specification for weather conditions and temperatures required.
6. Joints spacing are indicative only and the contractor to refer landscape architectural plan for final location.
7. Indicative vehicular pavement jointing as follows.



Pedestrian Footpath Jointing

1. Expansion joints are to be located where possible at tangent points of curves and elsewhere at max 6.0m centres and in accordance with council standards
2. Saw cut joints are to be located at a max 1.5 x width of the pavement.
3. Where possible joints should be located to match kerbing and / or adjacent pavement joints.
4. All pedestrian footpath jointings as follows (uno)
5. Joints spacing are indicative only and the contractor to refer landscape architectural plan for final location.



BULK EARTHWORKS NOTES

1. All bulk earthworks setout from grid lines U.N.O.
2. All batters at a maximum slope of 1 (H) :2 (V) U.N.O. Refer Geotechnical report for details
3. Excavated material may be used as structural fill provided,
   (i) it complies with the specification requirements for fill material,
   (ii) the placement moisture content complies with the Geotechnical Consultants requirements, and allows filling to be placed and proofrolled in accordance with the specification. Where necessary the Contractor must moisture condition the excavated material to meet these requirements.
4. Compact fill areas and subgrade to not less than:

Location	Standard dry density (AS 1289 5.1.1.)	Moisture (OMC)
Under building slabs on ground:	98%	±2%
Under roads and carparks:	98%	±2%
Landscaped areas:	95%	±2%

5. Before placing fill, proof roll exposed subgrade with a 10 tonne minimum roller to test subgrade and then remove soft spots (areas with more than 3mm movement under roller). Soft spots to be replaced with **GRANULAR** fill U.N.O.
6. Contractor shall place safety barriers around excavations in accordance with relevant safety regulations.
7. For interpretation of bulk earthworks foot print line shown on the bulk earthworks drawings refer to the bulk earthworks construction legend.
8. Bulk earthwork drawings are not to be used for detailed excavation.
9. Refer to Geotechnical Report –
To be advised

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,
2. Erosion and sediment control **drawings and notes are** are to be provided for the whole of the works by the contractor. 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.

PIT SCHEDULE

Note: Grate size does not necessarily reflect pit size, refer pit type details, shown on detail sheets – **C400**
Final internal pit dimensions are to comply with AS3500

Type	Description	Cover (Clear Opening)	Number
A	Surface inlet pit	900 x 900 Class D galvanised mild steel grate hinged to frame with Ocean Protect Oceanguard filter insert	2,3,3A,5, 7–11,13–17,19–21
B	Absorption tank access lid	900 x 900 Class D galvanised mild steel grate hinged to frame	22–29
C	Gross pollutant trap	Rocla CDA nipper GPT unit	1,3B,4,6, 12,18

SERVICE TRENCHES

EXCAVATION

1. Before excavating trenches, saw-cut existing concrete and bituminous surfaces on each side of the trench to provide a straight even joint. Lift and store unit paving for later reinstatement.
2. Excavate for underground services, to required lines, levels and grades. Generally make the trenches straight between manholes, inspection points and junctions, with vertical sides and uniform grades. Excavation of service trenches shall be completed prior to lime stabilisation of the subgrade. Notify the contract administrator if any trenches are be to excavated in stabilised ground. Any trenches in stabilised ground to be backfilled as specified in BACKFILL NOTES.
3. Keep trench widths to the minimum consistent with the laying and bedding of the relevant service and construction of personnel access ways and pits.
4. Excavate trenches in sections of suitable length.
5. Trench depths to be constructed as required by the relevant service and its bedding method.
6. If excavation is necessary below the level of adjacent footings, give notice, and provide necessary support for the footings.
7. Clear trenches of sharp projections. Cut back roots encountered in trenches to at least 600mm clear of services. Remove other obstructions including stumps and boulders which may interfere with services or bedding.
8. Keep trenches free of water. Place bedding material, services and backfilling on firm ground free of surface water.
9. If trench excavation exceeds the correct depth, reinstate to the correct depth and bearing value using compacted bedding material or grade N20 concrete.

BACKFILLING

1. These requirements apply to backfill to service trenches and service access points. Bedding and overlay to a minimum depth of 200 mm above the service shall be Pipe Bedding as specified below unless specified otherwise in relevant service specification. Trench backfill above this level shall be backfill material as specified below. Bedding, overlay and trench backfill to be compacted in accordance with the compaction schedule. Place filling in layers not exceeding 200 mm compacted layer thickness.

Pipe Bedding:

U.N.O in "Stormwater Notes" pipe bedding to be Granular material (clean sharp washed river sand or clean unweathered hard basaltic or sedimentary DGB, free of salt, clay or organic contaminants) or cementitious material (mortar or concrete) as specified.

Crushed Rock:

Sieve Aperture (mm) to AS1152	Percentage Passing (by mass)
9.5	98 to 100
6.7	50 to 100
4.75	15 to 75
2.36	0 to 40
1.18	0 to 5

Cement Mortar Bedding: 1 Portland cement: 4 sand.
Concrete Bedding: Not less than 20 MPa.

Backfill material

General: General fill except with no stones greater than 25 mm occurring within 150 mm of the service, or other materials as required for particular services or locations. Well graded, inorganic, non-perishable material, maximum size 75 mm, plasticity index * 55% and classified as Class A or Class S material in Table 2.1 of AS 2870. Fill material to have a minimum 4 day soaked CBR of 4% in accordance with AS 1239.6.1.1 unless noted otherwise on drawings. Material to be non-dispersive (a rating of nil as defined by the dispersion test AS 1239.3.8.1).

Under roads and paved areas: Coarse sand, DGB, or 3% cement stabilised sand.

In topsoil areas: Complete the backfilling with topsoil for at least the top 50 mm.

AREA	COMPACTION RATIO % OF MAXIMUM DRY DENSITY OR DENSITY INDEX (DI)	MOISTURE % FROM OPTIMUM*
Landscape Areas		
– bedding and overlay	70 (DI)	-2, +2
– trench backfill	70 (DI) or 95% standard	-2, +2
Under or within line of influence of pavements, structures or building slabs		
– bedding and overlay	80 (DI)	-2, +2
– trench backfill	80 (DI) or 98% standard	-2, +2
– pavement zone	98% modified	-2, +2

SIGNS AND LINE MARKING NOTES

1. All traffic and parking signs to be installed with a minimum ground clearance of 2.2m measured to the underside of the sign.
2. All road line marking, stencils and, symbols etc. to be in accordance with AS1742
3. Accessible parking bays and shared zones must be in accordance with AS2890.6 (2009)
4. Where galvanised posts are to be installed within a concrete surface area (e.g. traffic island) the galvanised posts are to be supported in a 675mm long galvanised sleeve and anchored securely into position with a post wedge. The sleeve is to be installed within a 250mm minimum diameter by 700mm deep, 20Mpa, 75mm slump concrete.
5. Where galvanised posts are to be installed within a grassed area (e.g. nature strip) the galvanised posts are to be anchored into the ground using a 750mm long spike. Spike manufacturer and supplier to be sourced by Contractor and submitted to the Superintendent for approval.
6. All signs shall be in accordance with AS1742–1,2&3.
7. Posts not to protrude above the top of the sign and to have caps
8. Signs in paved areas to have sleeves and bolt through.
9. All signs to be installed in accordance with AustRoads Guide to Traffic Management Part 10: Traffic Control and Communication Devices
10. All signs to be designed in accordance with AS1742.2 and AS1744
11. All sign posts to be located a minimum of 600mm behind back of kerb.
12. All parking signs to be rotated 30° to the kerb alignment.
13. All existing signs noted as "to be removed" are to be removed and stored off-site in accordance with Council's requirements.
14. Linemarking dimensions from kerb are to be taken from invert of kerb.

SAFETY IN DESIGN

Contractor to refer 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 [T.B.A]

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 practises as per relevant authority to be adopted and appropriate PPE to be used when handling all hazardous materials. Refer to geotechnical/environmental report by [T.B.A] 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.

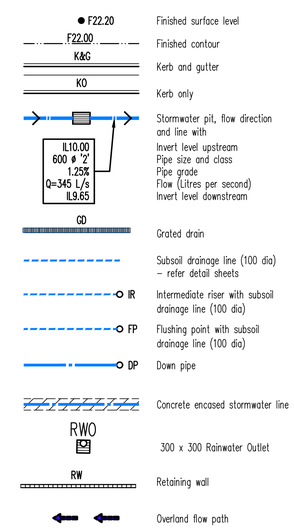
VEHICLE MOVEMENT

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.

DESIGN DEVELOPMENT/TENDER NOTES

1. These drawings are preliminary drawings issued for development application as an indication of the extent of works only and design intent and it is not fully coordinated and there are not a complete set of construction drawings.
2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents.
   Allow for all items shown on architectural and other drawings as not all items are shown on the structural/civil works drawings.
3. Should any ambiguity, error, omissions, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify in writing to the Superintendent.
4. Rates shown on the drawings are for the final structure/civil works in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements. etc.

SITEWORKS LEGEND



EXISTING SERVICES LEGEND

S Existing sewer
W Existing water
EU Existing underground electrical
EA Existing aerial electrical
T Existing communications
G Existing gas
SW Existing stormwater

Rev	Description	Eng	Draft	Date
P3	ISSUE FOR APPROVAL	NB	AI	23.08.21
P2	ISSUE FOR APPROVAL	NB	AI	04.12.20
P1	ISSUE FOR INFORMATION	NB	AI	27.10.20

BEWARE OF UNDERGROUND SERVICES.
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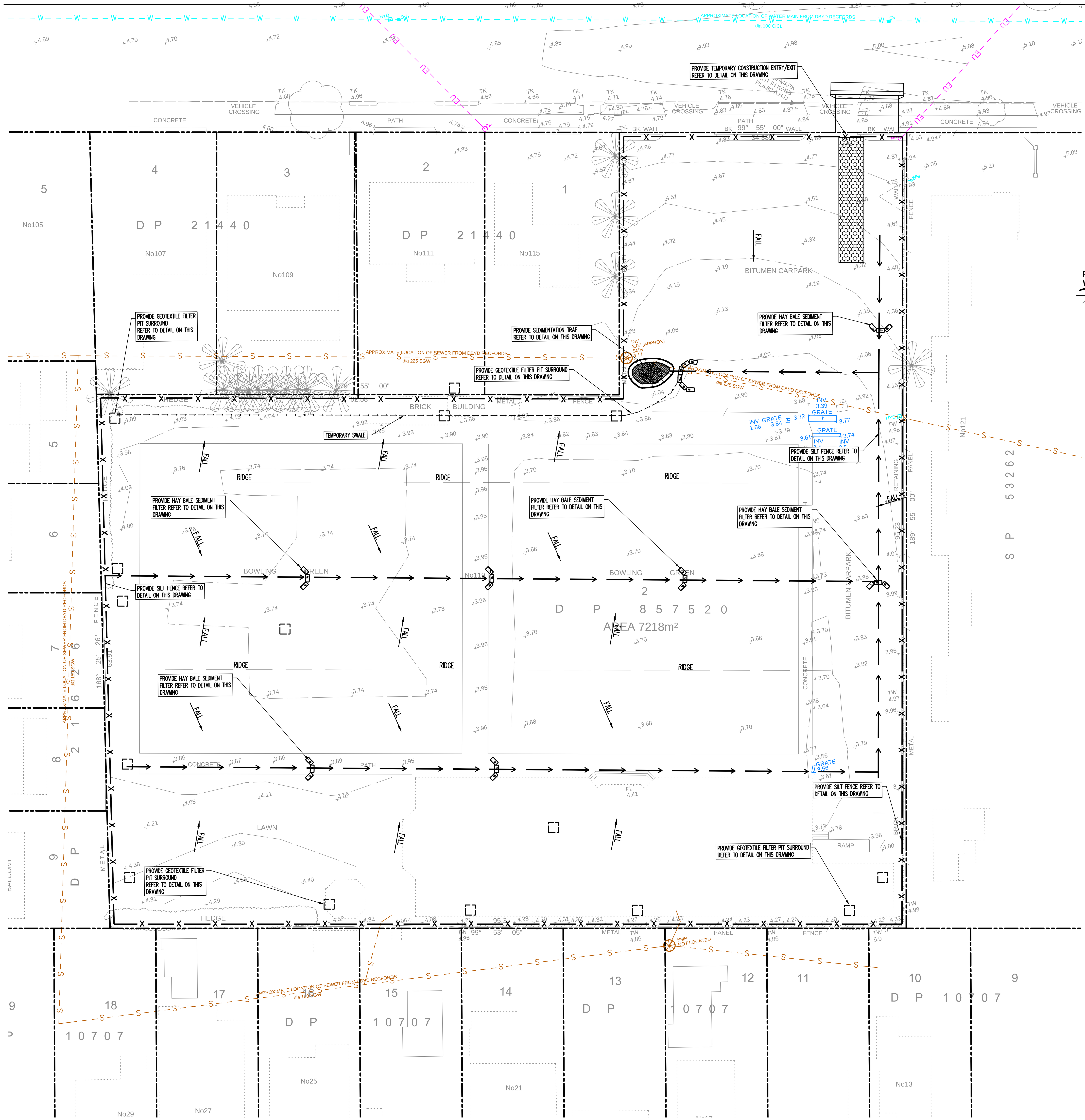
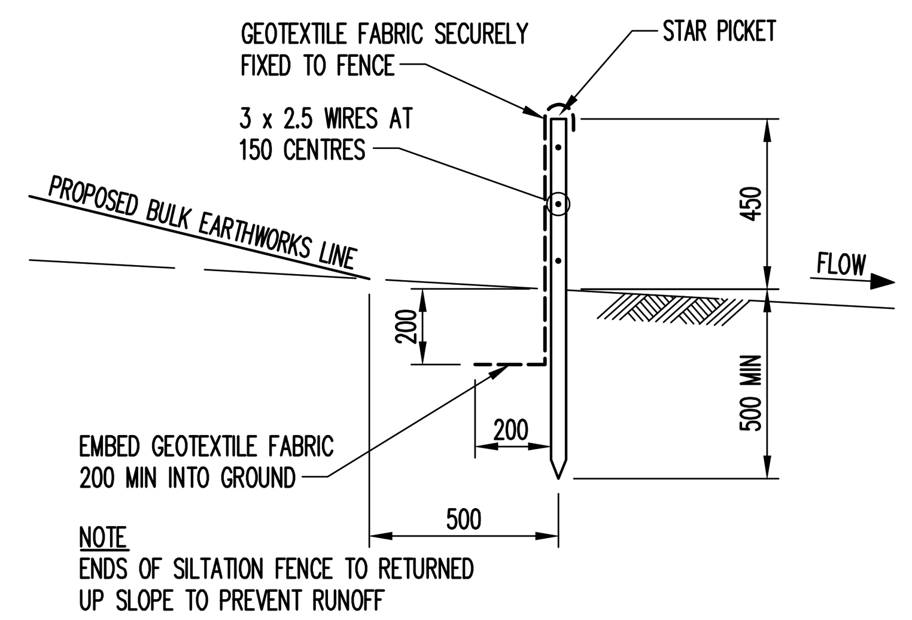
Project
SUMMITCARE MONTEREY
119 BARTON STREET
MONTEREY 2217

Sheet Subject
GENERAL NOTES AND LEGENDS

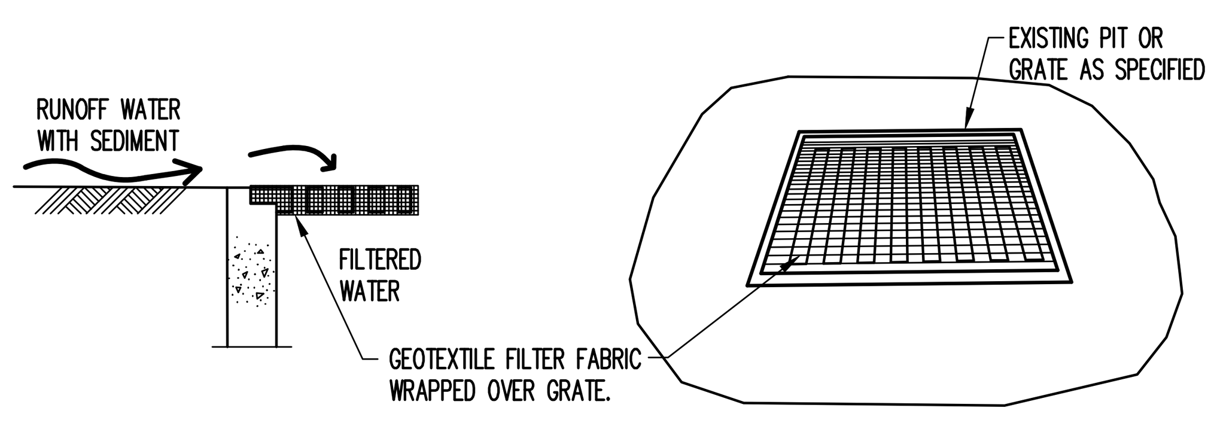
Scale : A1 Drawn: AE
-
Job No 201718
Drawing No C002
Revision P3
Plot File Created: Aug 23, 2021 - 2:18pm





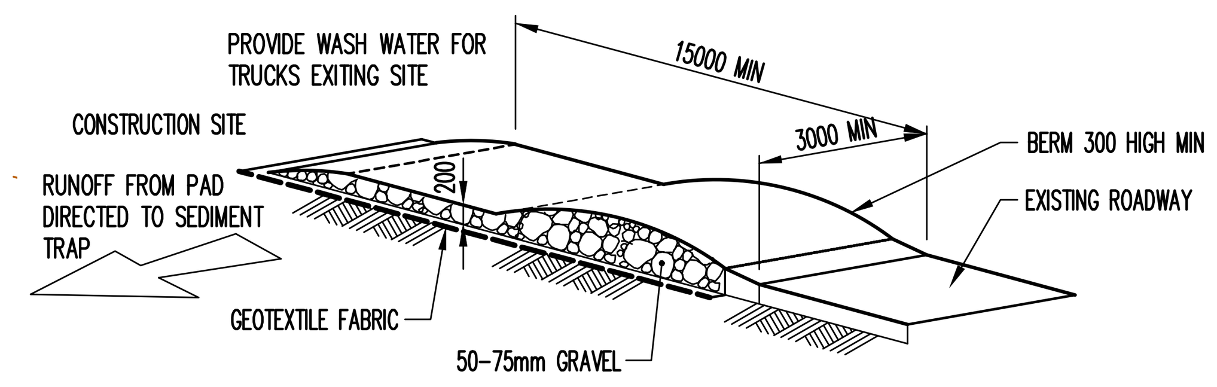
SILTATION FENCE DETAIL

SCALE 1: 20



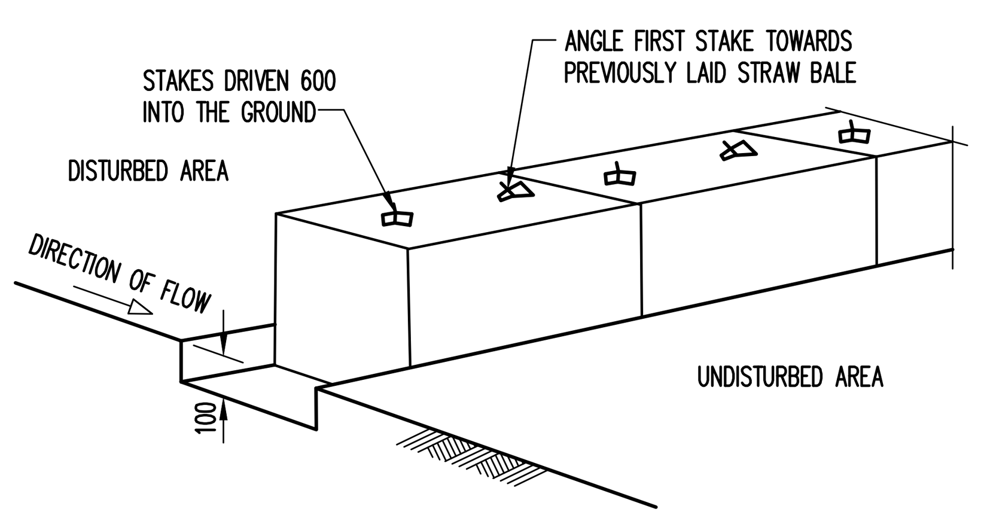
GEOTEXTILE PIT FILTER

NTS



TEMPORARY CONSTRUCTION EXIT

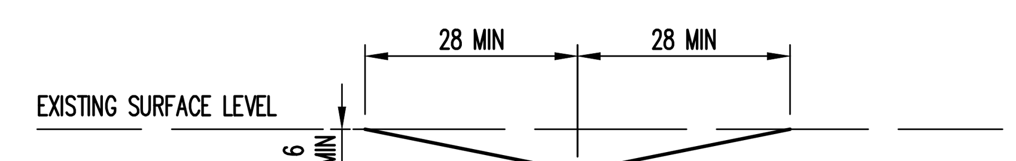
NTS

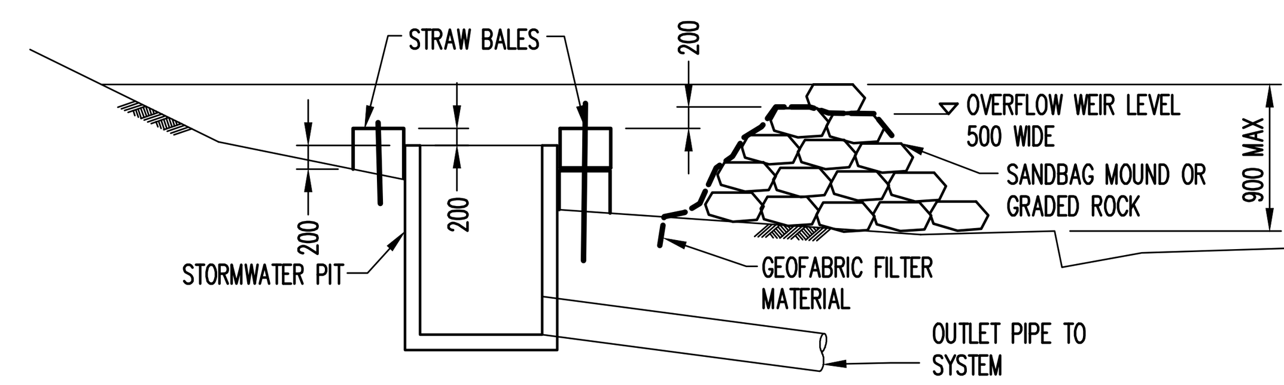


HAY BALE SEDIMENT FILTER

NTS

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





SEDIMENTATION TRAP

NTS

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.

EROSION AND SEDIMENT CONTROL LEGEND

Batter
Siltation fence
Geotextile PIT filter
Catch drain

SCALE 1:250 0 2.5 5 7.5 10 12.5 m
AT ORIGINAL SIZE

Rev	Description	Eng	Draft	Date
P2	ISSUE FOR APPROVAL	NB	AI	04.12.20
P1	ISSUE FOR INFORMATION	NB	AI	27.10.20

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Project
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119 BARTON STREET
MONTEREY 2217

Sheet Subject
EROSION AND SEDIMENT CONTROL PLAN

Scale : A1 1:250
Drawn: AE
Job No 201718
Drawing No C100
Revision P2
Plot File Created: Dec 04, 2020 - 11:07am

SITEWORKS LEGEND

- ● F22.20 — Finished surface level
- F22.00 — Finished contour
- K&G — Kerb and gutter
- KO — Kerb only
- Stormwater pit, flow direction and line with
  - IL10.00 — Invert level upstream
  - 600 ø 'Z' — Pipe size and class
  - 1.25% — Pipe grade
  - Q=345 L/s — Flow (Litres per second)
  - IL9.65 — 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
- Concrete encased stormwater line
- RWO — 300 x 300 Rainwater Outlet
- RW — Retaining wall
- Overland flow path
- Landscaping with sandy loamy soils

ROCLA CDS NIPPER GPT UNIT
57m³ ABSORPTION TANK 1
PIPE CONNECTION FROM BASEMENT DRAINAGE PUMP
75m³ ABSORPTION TANK 3
ROCLA CDS NIPPER GPT UNIT
ROCLA CDS NIPPER GPT UNIT
GROUND FLOOR FFL 4.50
50m³ ABSORPTION TANK 2A
EXISTING RETAINING WALL
ROCLA CDS NIPPER GPT UNIT
ROCLA CDS NIPPER GPT UNIT
50m³ ABSORPTION TANK 2B
ROCLA CDS NIPPER GPT UNIT
EXISTING RETAINING WALL
APPROXIMATE LOCATION OF SEWER FROM DBYD RECORDS dia 225 SGW
APPROXIMATE LOCATION OF SEWER FROM DBYD RECORDS dia 150 SGW
SMH NOT LOCATED
BENCHMARK CUT IN KERB RL4.88 A.H.D

SCALE 1:250 0 2.5 5 7.5 10 12.5 m
AT ORIGINAL SIZE

Rev	Description	Eng	Draft	Date
P4	ISSUE FOR COORDINATION	NB	AI	23.08.21
P3	ISSUE FOR COORDINATION	NB	AI	20.08.21
P2	ISSUE FOR APPROVAL	NB	AI	04.12.20
P1	ISSUE FOR INFORMATION	NB	AI	27.10.20

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Project
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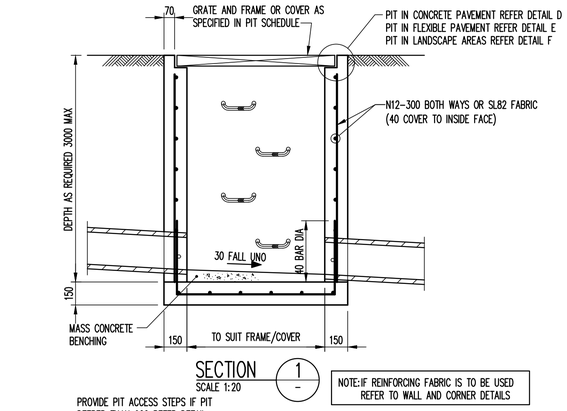
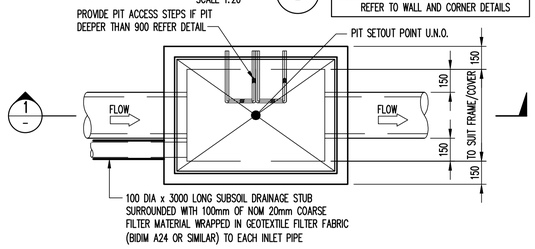
Sheet Subject
CIVIL SITE PLAN

Scale : A1 — 1:250
Drawn: AE
Job No 201718
Drawing No C200
Revision P4
Plot File Created: Aug 23, 2021 - 2:13pm



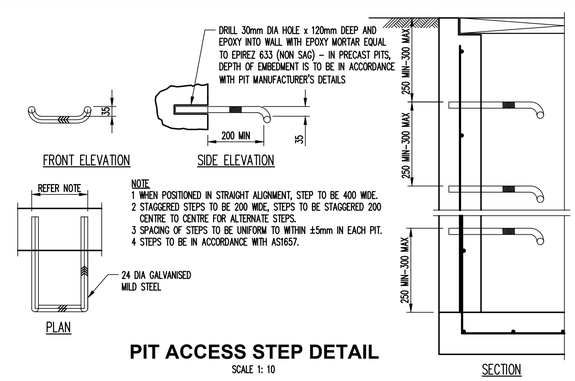
SECTION 1/- SCALE 1:20

NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS



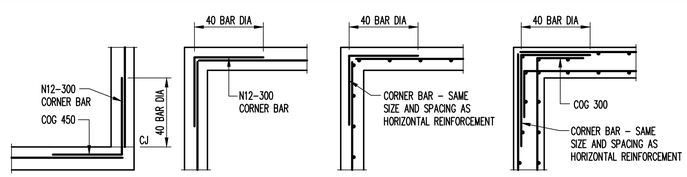
PLAN
SCALE 1: 20

PIT TYPE A



NOTE
1 WHEN POSITIONED IN STRAIGHT ALIGNMENT, STEP TO BE 400 WIDE.
2 STAGGERED STEPS TO BE 200 WIDE, STEPS TO BE STAGGERED 200 CENTRE TO CENTRE FOR ALTERNATE STEPS.
3 SPACING OF STEPS TO BE UNIFORM TO WITHIN ±5mm IN EACH PIT.
4 STEPS TO BE IN ACCORDANCE WITH AS1657.

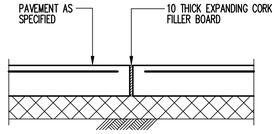
PIT ACCESS STEP DETAIL
SCALE 1: 10



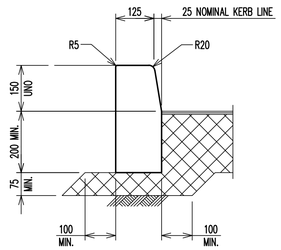
ELEVATION AT BASE | PLAN | PLAN-SINGLE LAYER | PLAN-DOUBLE LAYER

FABRIC | REINFORCEMENT

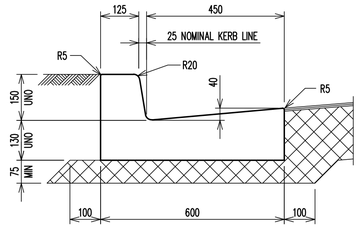
PIT CORNER DETAILS
SCALE 1: 20



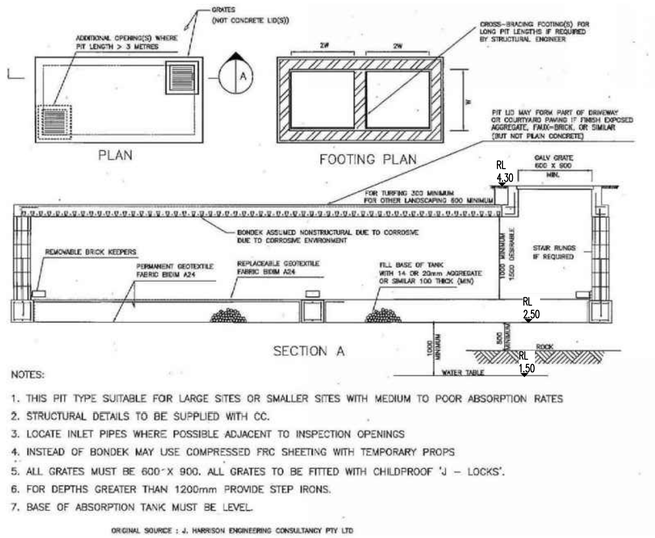
EXPANSION JOINT (EJ)
SCALE 1: 20



KERB ONLY (KO)
SCALE 1:10



KERB AND GUTTER (K&G)
SCALE 1:10

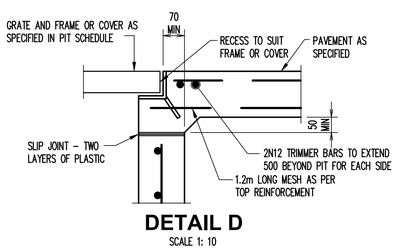


NOTES:
1. THIS PIT TYPE SUITABLE FOR LARGE SITES OR SMALLER SITES WITH MEDIUM TO POOR ABSORPTION RATES
2. STRUCTURAL DETAILS TO BE SUPPLIED WITH CC.
3. LOCATE INLET PIPES WHERE POSSIBLE ADJACENT TO INSPECTION OPENINGS
4. INSTEAD OF BONDEK MAY USE COMPRESSED FRC SHEETING WITH TEMPORARY PROPS
5. ALL GRATES MUST BE 600 X 900. ALL GRATES TO BE FITTED WITH CHILDPROOF 'J - LOCKS'.
6. FOR DEPTHS GREATER THAN 1200mm PROVIDE STEP IRONS.
7. BASE OF ABSORPTION TANK MUST BE LEVEL.

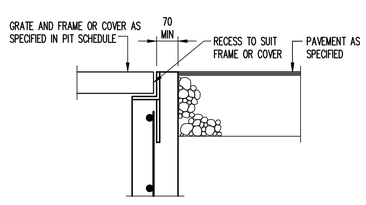
ORIGINAL SOURCE : J. HARRISON ENGINEERING CONSULTANCY PTY LTD

TYPICAL ABSORPTION TANK DETAIL

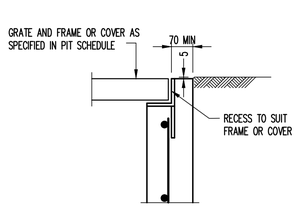
DRAWING C.4
COVERED TANK TYPE ABSORPTION PIT



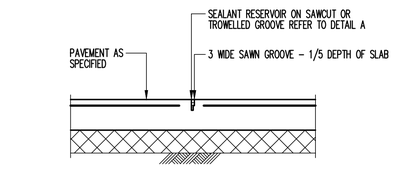
DETAIL D
SCALE 1: 10



DETAIL E
SCALE 1: 10

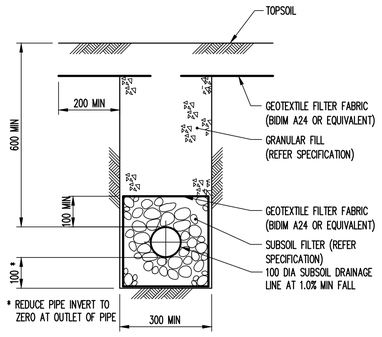


DETAIL F
SCALE 1: 10

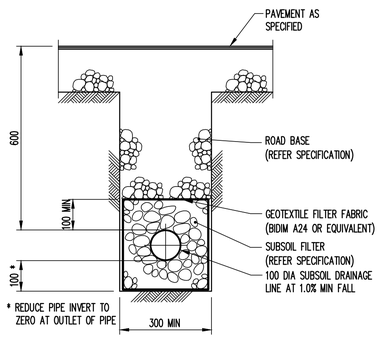


WEAKENED PLANE JOINT (WPJ)
SCALE 1: 20

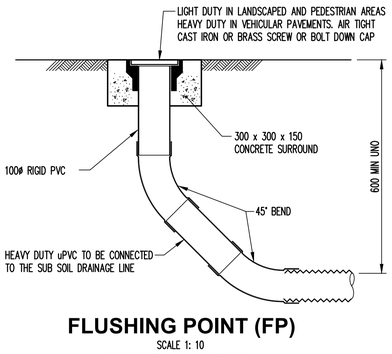
NOTE:REFER TO JOINTING NOTES, POINT 5 FOR TIMING OF SAW CUTS.



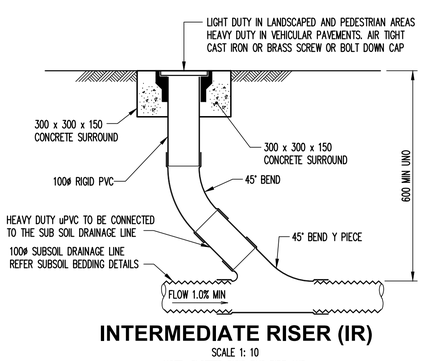
SUBSOIL IN LANDSCAPED AREAS
SCALE 1: 10



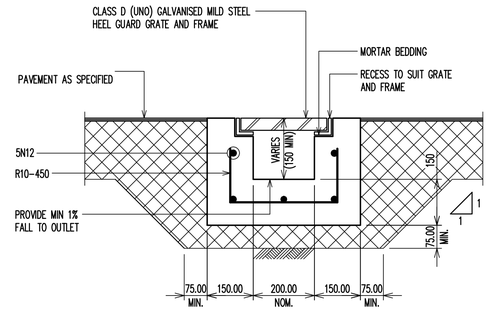
SUBSOIL IN PAVED AREAS
SCALE 1: 10



FLUSHING POINT (FP)
SCALE 1: 10
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



INTERMEDIATE RISER (IR)
SCALE 1: 10
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



GRATED DRAIN TYPE A (GDA)
SCALE 1:10

Rev	Description	Eng	Draft	Date
P3	ISSUE FOR APPROVAL	NB	AI	23.08.21
P2	ISSUE FOR APPROVAL	NB	AI	04.12.20
P1	ISSUE FOR INFORMATION	NB	AI	27.10.20

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Project
SUMMITCARE MONTEREY
119 BARTON STREET
MONTEREY 2217

Sheet Subject
DETAILS PAGE

Scale : A1 | Drawn: AE
AS SHOWN

Job No	Drawing No	Revision
201718	C400	P3

Plot File Created: Aug 23, 2021 - 2:12pm

1V : 1H TEMPORARY BATTER (TYP)
TEMPORARY BATTER REQUIREMENTS TO BE INVESTIGATED AND CONFIRMED BY THE GEOTECHNICAL ENGINEER

SHORING WALL REQUIRED BETWEEN BASEMENT LEVEL AND GROUND FLOOR LEVEL

SHORING WALL REQUIRED (TYP)

APPROXIMATE LOCATION OF SEWER FROM DBYD RECORDS dia 225 SGW

APPROXIMATE LOCATION OF SEWER FROM DBYD RECORDS dia 150 SGW

SMH NOT LOCATED

BENCHMARK CUT IN KERB RL4.80 A.H.D

BULK EARTHWORKS CUT AND FILL LEGEND

Lower_value		Upper_value		Colour
-99999	to	-5	m	
-5	to	-4.5	m	
-4.5	to	-4	m	
-4	to	-3.5	m	
-3.5	to	-3	m	
-3	to	-2.5	m	
-2.5	to	-2	m	
-2	to	-1.5	m	
-1.5	to	-1	m	
-1	to	-.5	m	
-.5	to	0.00	m	
0.000	to	0.2	m	
0.2	to	.4	m	
.4	to	.6	m	
.6	to	.8	m	
.8	to	1	m	
1	to	1.2	m	
1.2	to	1.4	m	
1.4	to	1.6	m	
1.6	to	1.8	m	
1.8	to	2	m	
2	to	9999	m	

CUT = 11,900 m^3
FILL = 500 m^3
BALANCE = 11,400 m^3

BASEMENT 1 BULK EARTHWORKS LEVEL = RL -0.30

GROUND FLOOR BULK EARTHWORKS LEVEL = RL 4.20

NOTE: BULK EARTHWORKS VOLUMES SHOWN IS FOR BUILDING WORKS ONLY

SCALE 1:250 0 2.5 5 7.5 10 12.5 m
AT ORIGINAL SIZE

Rev	Description	Eng	Draft	Date
P2	ISSUE FOR APPROVAL	NB	AI	04.12.20
P1	ISSUE FOR INFORMATION	NB	AI	10.11.20

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Sheet Subject
BULK EARTHWORKS CUT/FILL PLAN

Scale : A1 1:250
Drawn: AE
Job No 201718
Drawing No C500
Revision P2
Plot File Created: Dec 04, 2020 - 11:08am

Appendix B

Absorption Design Calculation Sheets

ABSORPTION TANK 1 CALCULATION SHEET

IMPERVIOUS AREA =	1261	m2
SURFACE AREA OF PIT =	57	m2
NOMINAL ABRORPTION RATE =	0.4	l/m2/sec
REDUCTION FACTOR	0.75	
DESIGN ABSORPTION RATE =	0.3	l/m2/sec

Time (mins) T	Rainfall Intensity (mm/hr) I	Runoff (L/s) R	Runoff Volume (m3) RV	Infiltration Volume (m3) IV	Required Absorption System Volume (m3) RV-IV
5	264	92.47	27.742	5.13	22.612
6	248	86.87	31.2728	6.156	25.1168
7	235	82.32	34.57241667	7.182	27.39041667
8	224	78.46	37.66186667	8.208	29.45386667
9	215	75.31	40.66725	9.234	31.43325
10	207	72.51	43.5045	10.26	33.2445
12	194	67.95	48.9268	12.312	36.6148
15	178	62.35	56.1145	15.39	40.7245
20	159	55.69	66.833	20.52	46.313
25	144	50.44	75.66	25.65	50.01
30	132	46.24	83.226	30.78	52.446
40	114.6	40.14	96.3404	41.04	55.3004
45	107.6	37.69	101.7627	46.17	55.5927
50	101.6	35.59	106.7646667	51.3	55.46466667
55	96.3	33.73	111.314775	56.43	54.884775
60	91.7	32.12	115.6337	61.56	54.0737
65	87.5	30.65	119.5322917	66.69	52.84229167
70	83.7	29.32	123.13665	71.82	51.31665
75	80.3	28.13	126.572875	76.95	49.622875
80	77.1	27.01	129.6308	82.08	47.5508
85	74.3	26.03	132.7307583	87.21	45.52075833
90	71.7	25.11	135.62055	92.34	43.28055
100	67.1	23.50	141.0218333	102.6	38.42183333
120	59.6	20.88	150.3112	123.12	27.1912

MAXIMUM REQUIRED ABSORPTION SYSTEM VOLUME (m3)	**55.5927**

ABSORPTION TANK 2 CALCULATION SHEET

IMPERVIOUS AREA =	3000	m2
SURFACE AREA OF PIT =	105	m2
NOMINAL ABRORPTION RATE =	0.7	l/m2/sec
REDUCTION FACTOR	0.75	
DESIGN ABSORPTION RATE =	0.525	l/m2/sec

Time (mins) T	Rainfall Intensity (mm/hr) I	Runoff (L/s) R	Runoff Volume (m3) RV	Infiltration Volume (m3) IV	Required Absorption System Volume (m3) RV-IV
5	264	220.00	66	16.5375	49.4625
6	248	206.67	74.4	19.845	54.555
7	235	195.83	82.25	23.1525	59.0975
8	224	186.67	89.6	26.46	63.14
9	215	179.17	96.75	29.7675	66.9825
10	207	172.50	103.5	33.075	70.425
12	194	161.67	116.4	39.69	76.71
15	178	148.33	133.5	49.6125	83.8875
20	159	132.50	159	66.15	92.85
25	144	120.00	180	82.6875	97.3125
30	132	110.00	198	99.225	98.775
40	114.6	95.50	229.2	132.3	96.9
45	107.6	89.67	242.1	148.8375	93.2625
50	101.6	84.67	254	165.375	88.625
55	96.3	80.25	264.825	181.9125	82.9125
60	91.7	76.42	275.1	198.45	76.65
65	87.5	72.92	284.375	214.9875	69.3875
70	83.7	69.75	292.95	231.525	61.425
75	80.3	66.92	301.125	248.0625	53.0625
80	77.1	64.25	308.4	264.6	43.8
85	74.3	61.92	315.775	281.1375	34.6375
90	71.7	59.75	322.65	297.675	24.975
100	67.1	55.92	335.5	330.75	4.75
120	59.6	49.67	357.6	396.9	-39.3

MAXIMUM REQUIRED ABSORPTION SYSTEM VOLUME (m3)	**98.775**

ABSORPTION TANK 3 CALCULATION SHEET

IMPERVIOUS AREA =	2202	m2
SURFACE AREA OF PIT =	75	m2
NOMINAL ABRORPTION RATE =	0.7	l/m2/sec
REDUCTION FACTOR	0.75	
DESIGN ABSORPTION RATE =	0.525	l/m2/sec

Time (mins) T	Rainfall Intensity (mm/hr) I	Runoff (L/s) R	Runoff Volume (m3) RV	Infiltration Volume (m3) IV	Required Absorption System Volume (m3) RV-IV
5	264	161.48	48.444	11.8125	36.6315
6	248	151.69	54.6096	14.175	40.4346
7	235	143.74	60.3715	16.5375	43.834
8	224	137.01	65.7664	18.9	46.8664
9	215	131.51	71.0145	21.2625	49.752
10	207	126.62	75.969	23.625	52.344
12	194	118.66	85.4376	28.35	57.0876
15	178	108.88	97.989	35.4375	62.5515
20	159	97.26	116.706	47.25	69.456
25	144	88.08	132.12	59.0625	73.0575
30	132	80.74	145.332	70.875	74.457
40	114.6	70.10	168.2328	94.5	73.7328
45	107.6	65.82	177.7014	106.3125	71.3889
50	101.6	62.15	186.436	118.125	68.311
55	96.3	58.90	194.38155	129.9375	64.44405
60	91.7	56.09	201.9234	141.75	60.1734
65	87.5	53.52	208.73125	153.5625	55.16875
70	83.7	51.20	215.0253	165.375	49.6503
75	80.3	49.12	221.02575	177.1875	43.83825
80	77.1	47.16	226.3656	189	37.3656
85	74.3	45.45	231.77885	200.8125	30.96635
90	71.7	43.86	236.8251	212.625	24.2001
100	67.1	41.04	246.257	236.25	10.007
120	59.6	36.46	262.4784	283.5	-21.0216

MAXIMUM REQUIRED ABSORPTION SYSTEM VOLUME (m3)	**74.457**

Appendix C

Geotechnical Investigation Report

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SYDNEY NSW 2000

Project 85348.00
4 March 2016
R.001.Rev0
PAV:dh

Attention: Mr Richard Pajor

Email: richard.pajor@dcwc.com.au

Dear Sirs

Geotechnical Assessment of Nominal Absorption Rate
Proposed Residential Development
119 Barton Street, Monterey

1. Introduction

This letter report describes the results of a geotechnical assessment undertaken by Douglas Partners Pty Ltd (DP) at 119 Barton Street, Monterey. The investigation was commissioned by Monterey Equity Pty Limited.

It is understood that the proposed development will include the construction of townhouses, which will include a stormwater management system.

The assessment included eight boreholes and constant-head permeability tests to assess the subsurface profile and soil permeability at potential locations of the absorption pits. The permeability testing was carried out in accordance with the requirements of Section 5.2 of Rockdale City Council's Technical Specification: Stormwater Management, dated 2011. Details of the field work are provided together with comments on stormwater management.

2. Site Description and Geology

The site is currently occupied by Francis Drake Bowling Club, which includes a single-storey building (club house), two synthetic grass bowling greens, grassed areas, garden beds and an on-grade asphaltic concrete car park. One and two-storey buildings surround the site, except where the car park adjoins Barton Street.

The ground surface slopes gently down from the site boundaries towards the central area of the site, with reduced levels ranging from approximately RL 4.9 m to RL 3.7 m relative to Australian Height Datum (AHD).

Reference to the Sydney 1:100 000 Geological Series Sheet indicates that the site is located in an area underlain by wind-blown sand (Aeolian), with some silt and shells also present.

3. Field Work

3.1 Field Work Methods

The field work for the investigation comprised:

- Eight boreholes drilled to 3 m depth or prior refusal or hole collapse using a 100 mm diameter hand-auger. The boreholes were located at the possible locations for absorption pits, as nominated by Heymann-Cohen Pty Ltd;
- Logging and collection of soil samples and observation of the soil moisture condition;
- Eight constant-head permeability tests at depths of 0.5 m or 0.55 m within each borehole and carried out in accordance with Australian Standard *AS 1547 On site domestic waste water management - 2012 - Appendix G*. For the constant-head test, the borehole was initially filled with water to saturate the soil prior to testing. A water-filled standpipe (permeameter) was then inserted into the water-filled borehole to maintain a constant head of 0.3 – 0.35 m above the base of the borehole. The water level in the standpipe was measured and recorded at regular time intervals until total water loss from the permeameter had occurred.

Surface levels at the test locations were interpolated from Survey Drawing No. B1968-1, dated 11 September 2015, by Project Surveyors Pty Ltd. The locations of the tests are shown on the attached Drawing No. 1.

3.2 Field Work Results

The detailed borehole logs and permeability test results are attached, together with notes defining classification methods and descriptive terms.

3.2.1 Boreholes

The ground conditions encountered in the boreholes can be summarised as follows:

- **Artificial Grass** – 0.01 m thick in BH1 and BH2;
- **Filling (Topsoil)** – 0.1 m thick root-affected silty sand topsoil layer in BH5 to BH8;
- **Filling** – predominantly sand and silty sand filling extending to depths of between 0.6 m and 1.2 m in all boreholes. Gravel and cobble sized inclusions of sandstone, charcoal and slag were encountered in the filling. Borehole BH4 was discontinued at 1.2 m depth due to practical refusal of the hand auger on buried concrete;

- **Sand/Sandy Gravel** – medium to coarse grained sand with traces of shells extending to the final depths (i.e. 2.7 m to 3 m) of boreholes BH1, BH3 and BH5 to BH8. Borehole BH2 had sand to 2.4 m depth underlain by sandy gravel, with auger refusal at 2.5 m depth.

Above the groundwater table, the moisture condition of the filling and natural soil was variably humid to wet, with the degree of saturation generally increasing with depth. Free groundwater was observed in BH1, BH3 and BH5 to BH8 at depths of between 2.5 m and 2.8 m.

3.2.2 Permeability Tests

The saturated hydraulic conductivity (K_{sat}) results of the eight constant-head permeability tests are summarised in Table 1.

Table 1: Results of Constant Head Permeability Tests

Permeability Test Location	Hydraulic Conductivity (K_{sat}) (m/s)
BH1	4.2×10^{-4}
BH2	1.1×10^{-3}
BH3	8.7×10^{-5}
BH4	3.5×10^{-4}
BH5	4.2×10^{-4}
BH6	7.0×10^{-4}
BH7	2.3×10^{-4}
BH8	7.0×10^{-4}

4. Comments

4.1 Proposed Development

It is understood that the proposed development will include the construction of townhouses, which will include a stormwater management system. The feasibility and potential locations of absorption pits for the stormwater system is being assessed for the development.

4.2 Soil Category and Nominal Absorption Rate

Based on the results of the constant-head tests, the 'soil category' has been correlated in accordance with Table 5.1 of AS 1547 – 2012. For all eight tests, the soil texture correlates to 'Gravels and Sands' and the (soil horizon) structure correlates to 'Structureless (Massive)'.

In accordance with Section 5.2 of Rockdale City Council's Technical Specification: Stormwater Management, dated 2011, the hydraulic conductivity for each permeability test has been calculated in terms of a nominal absorption rate (litres/square metre/second), as shown in Table 2. The nominal absorption rate has been calculated by assuming a hydraulic gradient of 1 for sandy soil. The calculated results have been rounded to the nearest 0.1 of a decimal place.

Table 2: Nominal Absorption Rate

Permeability Test Location	Nominal Absorption Rate (L/s/m^2)
BH1	0.4
BH2	1.1
BH3	0.1
BH4	0.4
BH5	0.4
BH6	0.7
BH7	0.2
BH8	0.7

5. Conclusion

Council's Specification indicates that absorption may not be practical where the nominal absorption rate is less than 0.05 L/s/m^2 or where physical limitations such as a high water table, bedrock close to ground surface or contaminated soils exist.

It should be noted that the hydraulic conductivity is dependent on the density and the degree of saturation of the soil, and therefore, it is likely to decrease with depth and vary according to weather conditions. The nominal absorption rate is also dependent upon the hydraulic gradient, that is, the rate will change with changes of the depth to the underlying water table.

Based on the permeability test results, the nominal absorption rates are greater than Council's nominal absorption rate of 0.05 L/s/m^2 and as such the use of on-site absorption pits is considered to be feasible from a hydrogeoligical point of view. It is noted that an impermeable layer such as bedrock was not encountered within the depths of the boreholes (up to 3 m deep). A relatively shallow groundwater table, however, was encountered 2.5 m to 2.8 m below the current ground surface levels. DP has not carried out a contamination assessment of soils for this site.

6. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at 119 Barton Street, Monterey in accordance with DP's proposal (SYD160043.P.001.Rev1 dated 1 February 2016 and acceptance received from Monterey Equity Pty Limited dated 9 February 2016. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Monterey Equity Pty Limited and their agents for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of

potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the geotechnical components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully
Douglas Partners Pty Ltd

Peter Valenti
Geotechnical Engineer

Reviewed by

Bruce McPherson
Principal

Attachments: About this Report
Borehole Logs
Constant Head Test Results
Drawing No. 1 – Location of Tests

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base


Concrete


Filling

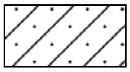
Soils


Topsoil

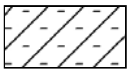

Peat


Clay

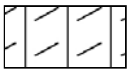

Silty clay

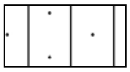

Sandy clay

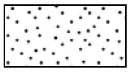

Gravelly clay

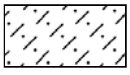

Shaly clay

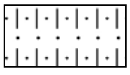

Silt


Clayey silt


Sandy silt

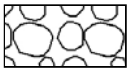

Sand

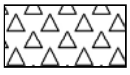

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

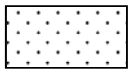

Talus

Sedimentary Rocks

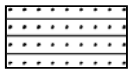

Boulder conglomerate

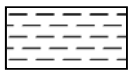

Conglomerate


Conglomeratic sandstone

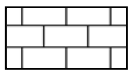

Sandstone


Siltstone


Laminite

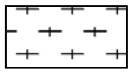

Mudstone, claystone, shale

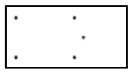

Coal


Limestone

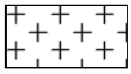
Metamorphic Rocks

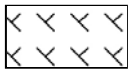

Slate, phyllite, schist

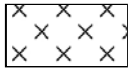

Gneiss

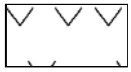

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Monterey Equity Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 119 Barton Street, Monterey

SURFACE LEVEL: 3.7 AHD
EASTING: 329004
NORTHING: 6239143
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 85348.00
DATE: 15/2/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.01	ARTIFICIAL GRASS		A	0.05				
		FILLING - brown, fine, gravelly, medium to coarse sand filling, humid			0.1				
		0.07m: becoming light yellow-brown		A	0.3				
		0.22m: becoming grey			0.4				
	0.45			A	0.45				
		FILLING - dark brown, medium to coarse silty sand filling with some fine to medium gravel, damp			0.5				
		0.8m: with some medium to coarse slag gravel							
	1.0	SAND - brown, medium to coarse sand with some silt, damp		A	1.1				
					1.2				
				A	1.9				
					2.0				
	2.3	SAND - light grey-brown and orange, medium to coarse sand, wet becoming saturated		A	2.4			▼	
					2.5				
	2.75	Bore discontinued at 2.75m - hole collapsed							

RIG: Hand tools **DRILLER:** MB/JS **LOGGED:** MB/JS **CASING:** Uncased

TYPE OF BORING: Hand augered to 2.75m

WATER OBSERVATIONS: Free groundwater observed at 2.55m

REMARKS: Permeability test carried out at 0.55m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Monterey Equity Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 119 Barton Street, Monterey

SURFACE LEVEL: 3.7 AHD
EASTING: 328999
NORTHING: 6239113
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 85348.00
DATE: 15/2/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.01	ARTIFICIAL GRASS		A	0.05				
		FILLING - brown, fine, gravelly, medium to coarse sand filling, humid			0.1				
		0.07m: becoming light yellow-brown							
		0.22m: becoming grey		A	0.4				
					0.5				
	0.6	SAND - brown, medium to coarse sand with some fine gravel and silt, damp		A	0.6				
					0.7				
		1.4m: becoming light grey-brown		A	1.5				
					1.6				
	1.8	SAND - light brown, medium to coarse sand, damp							
				A	2.1				
					2.2				
	2.4	SANDY GRAVEL - dark grey and brown, medium to coarse, sandy, fine to medium gravel with some shells		A	2.4				
	2.5	Bore discontinued at 2.5m - practical refusal on medium to coarse gravel			2.5				

RIG: Hand tools **DRILLER:** MB/JS **LOGGED:** MB/JS **CASING:** Uncased

TYPE OF BORING: Hand augered to 2.5m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Permeability test carried out at 0.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Monterey Equity Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 119 Barton Street, Monterey

SURFACE LEVEL: 4.1 AHD
EASTING: 328935
NORTHING: 6239114
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 85348.00
DATE: 15/2/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
4		FILLING - dark brown-grey, medium to coarse silty sand filling with some rootlets, humid		A	0.1				
					0.2				
		0.3m: with some fine to medium sandstone and charcoal gravel							
		0.4m: becoming moist		A	0.5				
					0.6				
3	1 1.0	SAND - brown, medium to coarse sand with some shells, moist		A	1.0				1
					1.1				
				A	1.4				
					1.5				
2	2			A	1.9				2
					2.0				
				A					
	2.6	SAND - light brown, medium to coarse sand, wet becoming saturated						▼	
1	3 3.0	Bore discontinued at 3.0m - target depth reached			3.0				3
0	4								4

RIG: Hand tools **DRILLER:** MB/JS **LOGGED:** MB/JS **CASING:** Uncased

TYPE OF BORING: Hand augered to 3.0m

WATER OBSERVATIONS: Free groundwater observed at 2.7m

REMARKS: Permeability test carried out at 0.55m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Monterey Equity Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 119 Barton Street, Monterey

SURFACE LEVEL: 4.3 AHD
EASTING: 328935
NORTHING: 6239105
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 85348.00
DATE: 15/2/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - dark brown-grey, medium to coarse silty sand filling with some rootlets, humid			0.1				
				A	0.2				
					0.4				
				A	0.5				
		0.8m: with some charcoal gravel							
	1	0.9m: becoming light brown			0.9				1
				A	1.0				
					1.1				
	1.2			A	1.2				
		Bore discontinued at 1.2m - refusal on buried concrete							
	2								2
	3								3
	4								4

RIG: Hand tools **DRILLER:** MB/JS **LOGGED:** MB/JS **CASING:** Uncased
TYPE OF BORING: Hand augered to 1.2m
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Permeability test carried out at 0.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Monterey Equity Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 119 Barton Street, Monterey

SURFACE LEVEL: 4.2 AHD
EASTING: 328922
NORTHING: 6239137
DIP/AZIMUTH: 90°/--

BORE No: 5
PROJECT No: 85348.00
DATE: 16/2/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - dark brown, silty, fine to medium sand filling with trace of rootlets, humid (topsoil to 0.1m)		A	0.1 0.2				
		0.5m: becoming grey-brown		A	0.5 0.6				
	1.0	SAND - pale brown, medium to coarse sand with trace of shells, moist		A	1.1 1.2				
	2.5	SAND - dark brown mottled red-brown, medium to coarse sand with trace of shells, saturated		A	2.5 2.6			▼	
	2.7	Bore discontinued at 2.7m - hole collapsed							

RIG: Hand tools **DRILLER:** MB/JS **LOGGED:** MB/JS **CASING:** Uncased

TYPE OF BORING: Hand augered to 2.7m

WATER OBSERVATIONS: Free groundwater observed at 2.5m

REMARKS: Permeability test carried out at 0.55m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Monterey Equity Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 119 Barton Street, Monterey

SURFACE LEVEL: 4.0 AHD
EASTING: 328927
NORTHING: 6239160
DIP/AZIMUTH: 90°/--

BORE No: 6
PROJECT No: 85348.00
DATE: 16/2/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
4		FILLING - dark brown, silty, fine to medium sand filling with trace of rootlets, humid (topsoil to 0.1m)			0.1				
				A	0.2				
		0.5m: becoming grey-brown							
	0.8	SAND - pale brown, medium to coarse sand with traces of shells, moist			0.8				
3	1			A	0.9				1
		1.4m: becoming grey			1.4				
				A	1.5				
2	2	2.4m: becoming pale brown mottled red							2
	2.8	SAND - pale brown mottled red, medium to coarse sand with trace of shells, saturated						▼	
1	3	3.0 Bore discontinued at 3.0m - target depth reached							3
0	4								4

RIG: Hand tools **DRILLER:** MB/JS **LOGGED:** MB/JS **CASING:** Uncased

TYPE OF BORING: Hand augered to 3.0m

WATER OBSERVATIONS: Free groundwater observed at at 2.8m

REMARKS: Permeability test carried out at 0.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Monterey Equity Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 119 Barton Street, Monterey

SURFACE LEVEL: 4.0 AHD
EASTING: 328951
NORTHING: 6239158
DIP/AZIMUTH: 90°/--

BORE No: 7
PROJECT No: 85348.00
DATE: 16/2/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
4		FILLING - dark brown, silty, fine to medium sand filling with trace of rootlets, humid (topsoil to 0.1m)		A	0.1 0.2				
		0.25m: with some fine to medium slag and sandstone gravel							
		0.4m: becoming grey-brown							
	0.6	SAND - light grey, medium to coarse sand, moist		A	0.7 0.8				
3	1								1
		1.2m: becoming brown							
		1.7m: becoming yellow-brown							
2	2								2
		2.5m: becoming light brown-grey		A	2.4 2.5				
	2.7	SAND - light brown-grey, medium to coarse sand, saturated						▼	
1	3	3.0 Bore discontinued at 3.0m - target depth reached							3
0	4								4

RIG: Hand tools **DRILLER:** MB/JS **LOGGED:** MB/JS **CASING:** Uncased

TYPE OF BORING: Hand augered to 3.0m

WATER OBSERVATIONS: Free groundwater observed at 2.7m

REMARKS: Permeability test carried out at 0.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Monterey Equity Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 119 Barton Street, Monterey

SURFACE LEVEL: 3.9 AHD
EASTING: 328977
NORTHING: 6239157
DIP/AZIMUTH: 90°/--

BORE No: 8
PROJECT No: 85348.00
DATE: 16/2/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - dark brown, silty, fine to medium sand filling with trace of rootlets, humid (topsoil to 0.1m)		A	0.1 0.2				
		0.2m: with some fine to medium sandstone gravel and brick fragments							
		0.4m: becoming grey-brown							
	0.8	SAND - brown, medium to coarse sand, moist		A	0.8 0.9				
		1.3m: becoming light brown grey							
				A	2.5 2.6				
	2.8	SAND - light brown-grey, medium to coarse sand, saturated						▼	
	3.0	Bore discontinued at 3.0m - target depth reached							

RIG: Hand tools **DRILLER:** MB/JS **LOGGED:** MB/JS **CASING:** Uncased

TYPE OF BORING: Hand augered to 3.0m

WATER OBSERVATIONS: Free groundwater observed at 2.8m

REMARKS: Permeability test carried out at 0.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

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Constant Head Permeameter Test Report [AS1547:2012 App G]

Client:	Monterey Equity Pty Ltd	Project No:	85348
Project:	Proposed Residential Development	Date:	15/2/16
Location:	119 Barton Street, Monterey	Tested by:	MB

Test Location

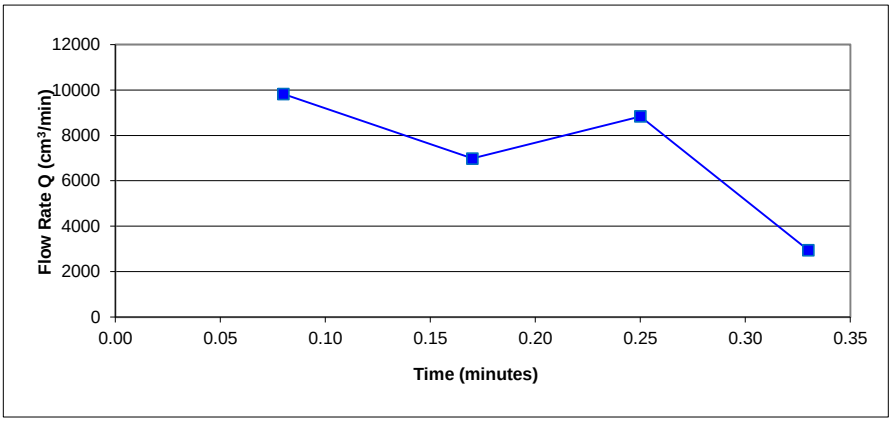
Description:	Bowling Green	**Test No.**	BH1	
Material type:	Sand Filling	Easting:	329004	m
Condition of ground surface before test: Artificial Grass		Northing	6239143	m
Weather during test: 29º, Cloudy		Surface Level:	3.7	m AHD

Details of Bore Installation

Depth of augered hole	550	mm	Depth to impermeable layer	>3	m
Depth of constant water below permeameter	350	mm	Time from filling to start	0	minutes
Diameter of hole	100	mm			

Test Results

Time (minutes)	Level below top (mm)	Flow Volume (cm^3)	Rate of Loss [Q] (cm^3/min)
0.00	300		
0.08	200	785	9817
0.17	120	628	6981
0.25	30	707	8836
0.33	0	236	2945
Average		589	7145



Saturated Hydraulic Conductivity - Over total duration of test

k =	**2.54E+00**	cm/min	where $K = 4.4Q[0.5 \sinh^{-1}(H/2r)-\sqrt{[(r/H^2)+0.25]}+r/H]/2\pi H^2$
=	**4.23E-04**	m/sec	ref. AS1547-2012 App G
=	**36.56**	m/day	

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Constant Head Permeameter Test Report [AS1547:2012 App G]

Client:	Monterey Equity Pty Ltd	Project No:	85348
Project:	Proposed Residential Development	Date:	15/2/16
Location:	119 Barton Street, Monterey	Tested by:	MB

Test Location

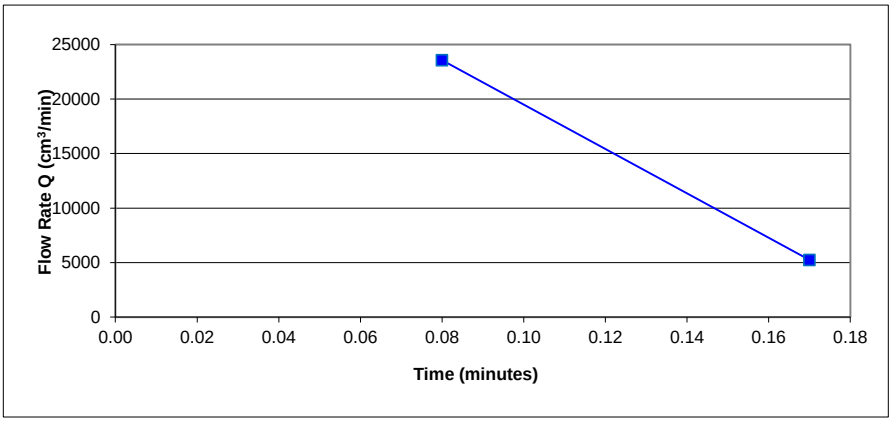
Description:	Bowling Green	**Test No.**	BH2	
Material type:	Sand Filling	Easting:	328999	m
Condition of ground surface before test: Artificial Grass		Northing	6239113	m
Weather during test: 29°, Cloudy		Surface Level:	3.7	m AHD

Details of Bore Installation

Depth of augered hole	500	mm	Depth to impermeable layer	>3	m
Depth of constant water below permeameter	300	mm	Time from filling to start	0	minutes
Diameter of hole	100	mm			

Test Results

Time (minutes)	Level below top (mm)	Flow Volume (cm^3)	Rate of Loss [Q] (cm^3/min)
0.00	300		
0.08	60	1885	23562
0.17	0	471	5236
Average		1178	14399



Saturated Hydraulic Conductivity - Over total duration of test

k =	**6.39E+00**	cm/min	where $K = 4.4Q[0.5 \sinh^{-1}(H/2r)-\sqrt{[(r/H^2)+0.25]}+r/H]/2\pi H^2$
=	**1.07E-03**	m/sec	ref. AS1547-2012 App G
=	**92.02**	m/day	

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Constant Head Permeameter Test Report [AS1547:2012 App G]

Client:	Monterey Equity Pty Ltd	Project No:	85348
Project:	Proposed Residential Development	Date:	15/2/16
Location:	119 Barton Street, Monterey	Tested by:	MB

Test Location

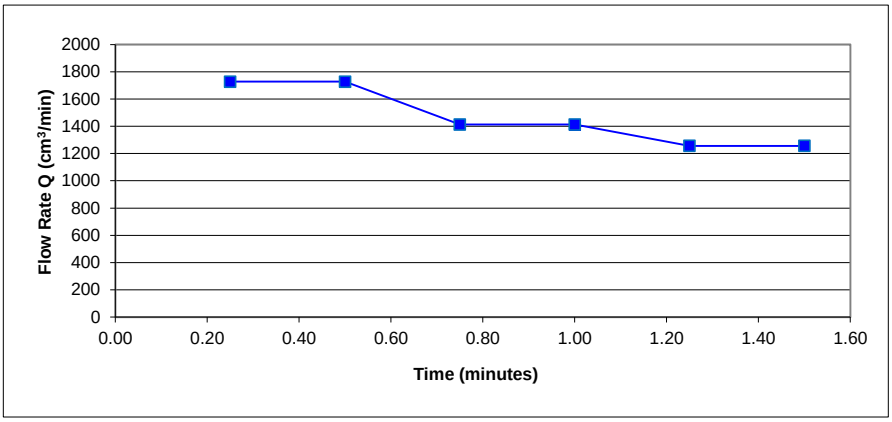
Description:	Lawn	**Test No.**	BH3	
Material type:	Silty Sand Filling	Easting:	328935	m
Condition of ground surface before test: Topsoil		Northing	6239114	m
Weather during test: 29°, Cloudy		Surface Level:	4.1	m AHD

Details of Bore Installation

Depth of augered hole	550	mm	Depth to impermeable layer	>3	m
Depth of constant water below permeameter	350	mm	Time from filling to start	0	minutes
Diameter of hole	100	mm			

Test Results

Time (minutes)	Level below top (mm)	Flow Volume (cm^3)	Rate of Loss [Q] (cm^3/min)
0.00	300		
0.25	245	432	1728
0.50	190	432	1728
0.75	145	353	1414
1.00	100	353	1414
1.25	60	314	1257
1.50	20	314	1257
Average		367	1466



Saturated Hydraulic Conductivity - Over total duration of test

k =	**5.21E-01**	cm/min	where $K = 4.4Q[0.5 \sinh^{-1}(H/2r)-\sqrt{[(r/H^2)+0.25]}+r/H]/2\pi H^2$
=	**8.68E-05**	m/sec	ref. AS1547-2012 App G
=	**7.50**	m/day	

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Constant Head Permeameter Test Report [AS1547:2012 App G]

Client:	Monterey Equity Pty Ltd	Project No:	85348
Project:	Proposed Residential Development	Date:	15/2/16
Location:	119 Barton Street, Monterey	Tested by:	MB

Test Location

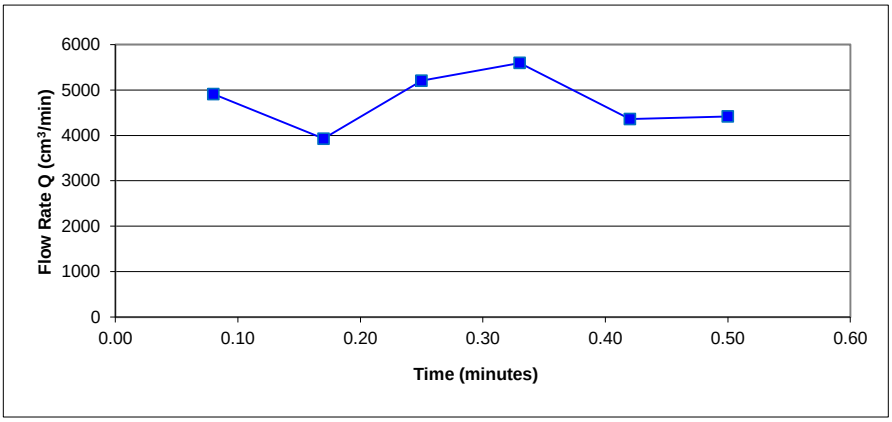
Description:	Lawn	**Test No.**	BH4	
Material type:	Silty Sandy Filling	Easting:	328935	m
Condition of ground surface before test: Topsoil		Northing	6239105	m
Weather during test: 29°, Cloudy		Surface Level:	4.3	m AHD

Details of Bore Installation

Depth of augered hole	500	mm	Depth to impermeable layer	>3	m
Depth of constant water below permeameter	300	mm	Time from filling to start	0	minutes
Diameter of hole	100	mm			

Test Results

Time (minutes)	Level below top (mm)	Flow Volume (cm^3)	Rate of Loss [Q] (cm^3/min)
0.00	300		
0.08	250	393	4909
0.17	205	353	3927
0.25	152	416	5203
0.33	95	448	5596
0.42	45	393	4363
0.50	0	353	4418
Average		393	4736



Saturated Hydraulic Conductivity - Over total duration of test

k =	**2.10E+00**	cm/min	where $K = 4.4Q[0.5 \sinh^{-1}(H/2r)-\sqrt{[(r/H^2)+0.25]}+r/H]/2\pi H^2$
=	**3.50E-04**	m/sec	ref. AS1547-2012 App G
=	**30.27**	m/day	

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Constant Head Permeameter Test Report [AS1547:2012 App G]

Client:	Monterey Equity Pty Ltd	Project No:	85348
Project:	Proposed Residential Development	Date:	16/2/16
Location:	119 Barton Street, Monterey	Tested by:	MB

Test Location

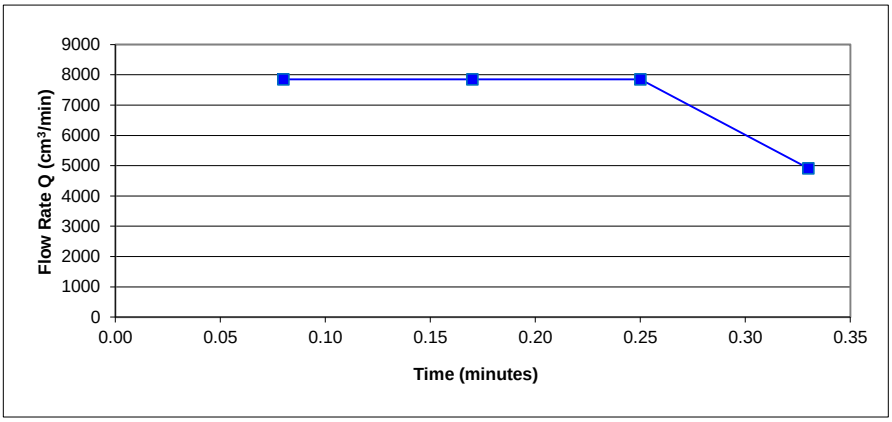
Description:	Lawn	**Test No.**	BH5	
Material type:	Silty Sandy Filling	Easting:	328922	m
Condition of ground surface before test:	Topsoil	Northing	6239137	m
Weather during test:	28°, Sunny	Surface Level:	4.2	m AHD

Details of Bore Installation

Depth of augered hole	550	mm	Depth to impermeable layer	>3	m
Depth of constant water below permeameter	350	mm	Time from filling to start	0	minutes
Diameter of hole	100	mm			

Test Results

Time (minutes)	Level below top (mm)	Flow Volume (cm^3)	Rate of Loss [Q] (cm^3/min)
0.00	300		
0.08	220	628	7854
0.17	130	707	7854
0.25	50	628	7854
0.33	0	393	4909
Average		589	7118



Saturated Hydraulic Conductivity - Over total duration of test

k =	**2.53E+00**	cm/min	where $K = 4.4Q[0.5 \sinh^{-1}(H/2r)-\sqrt{[(r/H^2)+0.25]}+r/H]/2\pi H^2$
=	**4.22E-04**	m/sec	ref. AS1547-2012 App G
=	**36.42**	m/day	

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Constant Head Permeameter Test Report [AS1547:2012 App G]

Client:	Monterey Equity Pty Ltd	Project No:	85348
Project:	Proposed Residential Development	Date:	16/2/16
Location:	119 Barton Street, Monterey	Tested by:	MB

Test Location

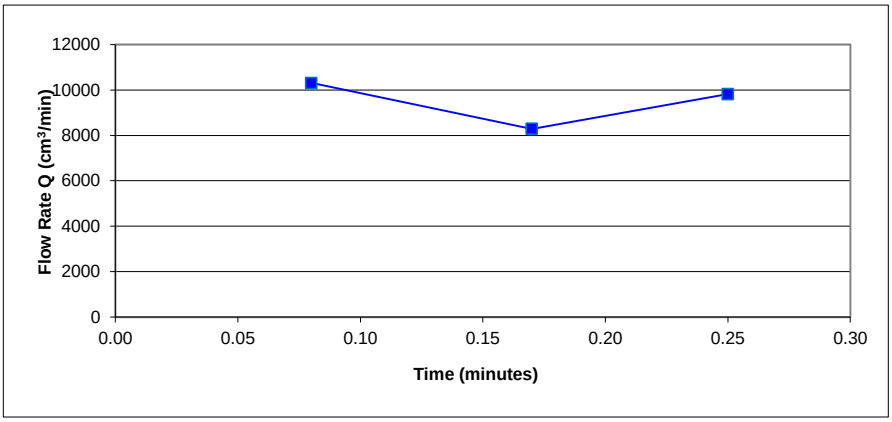
Description:	Lawn	**Test No.**	BH6	
Material type:	Silty Sandy Filling	Easting:	328927	m
Condition of ground surface before test:	Topsoil	Northing	6239160	m
Weather during test:	28°, Sunny	Surface Level:	4	m AHD

Details of Bore Installation

Depth of augered hole	500	mm	Depth to impermeable layer	>3	m
Depth of constant water below permeameter	300	mm	Time from filling to start	0	minutes
Diameter of hole	100	mm			

Test Results

Time (minutes)	Level below top (mm)	Flow Volume (cm^3)	Rate of Loss [Q] (cm^3/min)
0.00	300		
0.08	195	825	10308
0.17	100	746	8290
0.25	0	785	9817
Average		785	9472



Saturated Hydraulic Conductivity - Over total duration of test

k =	**4.20E+00**	cm/min	where $K = 4.4Q[0.5 \sinh^{-1}(H/2r)-\sqrt{[(r/H^2)+0.25]}+r/H]/2\pi H^2$
=	**7.01E-04**	m/sec	ref. AS1547-2012 App G
=	**60.53**	m/day	

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Constant Head Permeameter Test Report [AS1547:2012 App G]

Client:	Monterey Equity Pty Ltd	Project No:	85348
Project:	Proposed Residential Development	Date:	16/2/16
Location:	119 Barton Street, Monterey	Tested by:	MB

Test Location

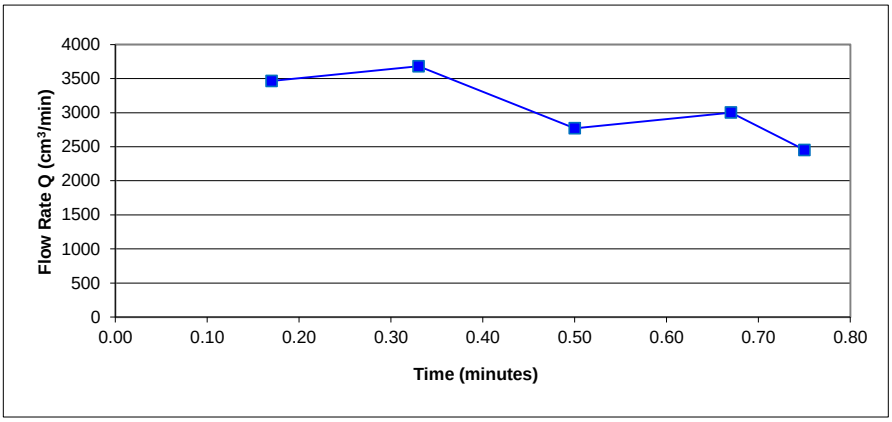
Description:	Lawn	**Test No.**	BH7	
Material type:	Silty Sandy Filling	Easting:	328951	m
Condition of ground surface before test:	Topsoil	Northing	6239158	m
Weather during test:	28°, Sunny	Surface Level:	4	m AHD

Details of Bore Installation

Depth of augered hole	500	mm	Depth to impermeable layer	>3	m
Depth of constant water below permeameter	300	mm	Time from filling to start	0	minutes
Diameter of hole	100	mm			

Test Results

Time (minutes)	Level below top (mm)	Flow Volume (cm^3)	Rate of Loss [Q] (cm^3/min)
0.00	300		
0.17	225	589	3465
0.33	150	589	3682
0.50	90	471	2772
0.67	25	511	3003
0.75	0	196	2454
Average		471	3075



Saturated Hydraulic Conductivity - Over total duration of test

k =	**1.36E+00**	cm/min	where $K = 4.4Q[0.5 \sinh^{-1}(H/2r)-\sqrt{[(r/H^2)+0.25]}+r/H]/2\pi H^2$
=	**2.27E-04**	m/sec	ref. AS1547-2012 App G
=	**19.65**	m/day	

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Constant Head Permeameter Test Report [AS1547:2012 App G]

Client:	Monterey Equity Pty Ltd	Project No:	85348
Project:	Proposed Residential Development	Date:	16/2/16
Location:	119 Barton Street, Monterey	Tested by:	MB

Test Location

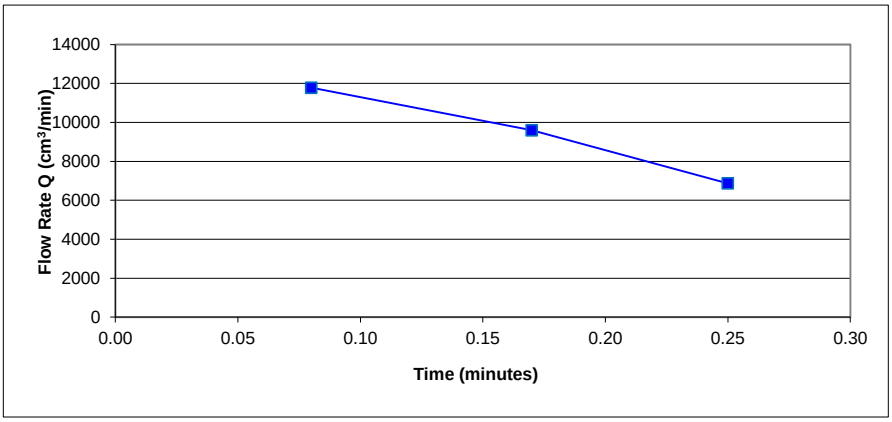
Description:	Flower Bed	**Test No.**	BH8	
Material type:	Silty Sandy Filling	Easting:	328977	m
Condition of ground surface before test:	Topsoil	Northing	6239157	m
Weather during test:	28°, Sunny	Surface Level:	3.9	m AHD

Details of Bore Installation

Depth of augered hole	500	mm	Depth to impermeable layer	>3	m
Depth of constant water below permeameter	300	mm	Time from filling to start	0	minutes
Diameter of hole	100	mm			

Test Results

Time (minutes)	Level below top (mm)	Flow Volume (cm^3)	Rate of Loss [Q] (cm^3/min)
0.00	300		
0.08	180	942	11781
0.17	70	864	9599
0.25	0	550	6872
Average		785	9418



Saturated Hydraulic Conductivity - Over total duration of test

k =	**4.18E+00**	cm/min	where $K = 4.4Q[0.5 \sinh^{-1}(H/2r)-\sqrt{[(r/H^2)+0.25]}+r/H]/2\pi H^2$
=	**6.97E-04**	m/sec	ref. AS1547-2012 App G
=	**60.18**	m/day	

Locality Plan

NOTE:

1: Base drawing from Project Surveyors (Dwg B1968-1, dated 11.9.2015)
2: Test locations are approximate only and are shown with reference to existing features.

LEGEND

Borehole and Soil Permeabilty Test Location

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Monterey Equity Pty Limited	TITLE: **Location of Tests** **Proposed Residential Development** **119 Barton Street, Monterey**	PROJECT No: 85348.00
	OFFICE: Sydney / DRAWN BY: PSCH		DRAWING No: 1
	SCALE: 1:800 @ A3 / DATE: 22.2.2016		REVISION: 0