

NOTICE OF MEETING



ARAKWAL MEMORANDUM OF UNDERSTANDING ADVISORY COMMITTEE MEETING

An Arakwal Memorandum of Understanding Advisory Committee Meeting
of Byron Shire Council will be held as follows:

Venue	Conference Room, Station Street, Mullumbimby
Date	Thursday, 13 September 2018
Time	9.00am

A handwritten signature in black ink, which appears to read 'James Brickley', is located below the meeting details table.

James Brickley
Acting Director Corporate and Community Services

I2018/1696
Distributed 06/09/18

CONFLICT OF INTERESTS

What is a “Conflict of Interests” - A conflict of interests can be of two types:

Pecuniary - an interest that a person has in a matter because of a reasonable likelihood or expectation of appreciable financial gain or loss to the person or another person with whom the person is associated.

Non-pecuniary – a private or personal interest that a Council official has that does not amount to a pecuniary interest as defined in the Local Government Act (eg. A friendship, membership of an association, society or trade union or involvement or interest in an activity and may include an interest of a financial nature).

Remoteness – a person does not have a pecuniary interest in a matter if the interest is so remote or insignificant that it could not reasonably be regarded as likely to influence any decision the person might make in relation to a matter or if the interest is of a kind specified in Section 448 of the Local Government Act.

Who has a Pecuniary Interest? - a person has a pecuniary interest in a matter if the pecuniary interest is the interest of the person, or another person with whom the person is associated (see below).

Relatives, Partners - a person is taken to have a pecuniary interest in a matter if:

- The person's spouse or de facto partner or a relative of the person has a pecuniary interest in the matter, or
- The person, or a nominee, partners or employer of the person, is a member of a company or other body that has a pecuniary interest in the matter.

N.B. “Relative”, in relation to a person means any of the following:

- (a) the parent, grandparent, brother, sister, uncle, aunt, nephew, niece, lineal descends or adopted child of the person or of the person's spouse;
- (b) the spouse or de facto partners of the person or of a person referred to in paragraph (a)

No Interest in the Matter - however, a person is not taken to have a pecuniary interest in a matter:

- If the person is unaware of the relevant pecuniary interest of the spouse, de facto partner, relative or company or other body, or
- Just because the person is a member of, or is employed by, the Council.
- Just because the person is a member of, or a delegate of the Council to, a company or other body that has a pecuniary interest in the matter provided that the person has no beneficial interest in any shares of the company or body.

Disclosure and participation in meetings

- A Councillor or a member of a Council Committee who has a pecuniary interest in any matter with which the Council is concerned and who is present at a meeting of the Council or Committee at which the matter is being considered must disclose the nature of the interest to the meeting as soon as practicable.
- The Councillor or member must not be present at, or in sight of, the meeting of the Council or Committee:
 - (a) at any time during which the matter is being considered or discussed by the Council or Committee, or
 - (b) at any time during which the Council or Committee is voting on any question in relation to the matter.

No Knowledge - a person does not breach this Clause if the person did not know and could not reasonably be expected to have known that the matter under consideration at the meeting was a matter in which he or she had a pecuniary interest.

Participation in Meetings Despite Pecuniary Interest (S 452 Act)

A Councillor is not prevented from taking part in the consideration or discussion of, or from voting on, any of the matters/questions detailed in Section 452 of the Local Government Act.

Non-pecuniary Interests - Must be disclosed in meetings.

There are a broad range of options available for managing conflicts & the option chosen will depend on an assessment of the circumstances of the matter, the nature of the interest and the significance of the issue being dealt with. Non-pecuniary conflicts of interests must be dealt with in at least one of the following ways:

- It may be appropriate that no action be taken where the potential for conflict is minimal. However, Councillors should consider providing an explanation of why they consider a conflict does not exist.
- Limit involvement if practical (eg. Participate in discussion but not in decision making or vice-versa). Care needs to be taken when exercising this option.
- Remove the source of the conflict (eg. Relinquishing or divesting the personal interest that creates the conflict)
- Have no involvement by absenting yourself from and not taking part in any debate or voting on the issue as if the provisions in S451 of the Local Government Act apply (particularly if you have a significant non-pecuniary interest)

RECORDING OF VOTING ON PLANNING MATTERS

Clause 375A of the Local Government Act 1993 – Recording of voting on planning matters

- (1) In this section, **planning decision** means a decision made in the exercise of a function of a council under the Environmental Planning and Assessment Act 1979:
 - (a) including a decision relating to a development application, an environmental planning instrument, a development control plan or a development contribution plan under that Act, but
 - (b) not including the making of an order under Division 2A of Part 6 of that Act.
- (2) The general manager is required to keep a register containing, for each planning decision made at a meeting of the council or a council committee, the names of the councillors who supported the decision and the names of any councillors who opposed (or are taken to have opposed) the decision.
- (3) For the purpose of maintaining the register, a division is required to be called whenever a motion for a planning decision is put at a meeting of the council or a council committee.
- (4) Each decision recorded in the register is to be described in the register or identified in a manner that enables the description to be obtained from another publicly available document, and is to include the information required by the regulations.
- (5) This section extends to a meeting that is closed to the public.

BYRON SHIRE COUNCIL

ARAKWAL MEMORANDUM OF UNDERSTANDING ADVISORY COMMITTEE MEETING

BUSINESS OF MEETING

1. APOLOGIES

2. DECLARATIONS OF INTEREST – PECUNIARY AND NON-PECUNIARY

3. ADOPTION OF MINUTES FROM PREVIOUS MEETINGS

- 3.1 Arakwal Memorandum of Understanding Advisory Committee Meeting held on 31 May 2018

4. STAFF REPORTS

Corporate and Community Services

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Infrastructure Services

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5. OTHER BUSINESS

- 5.1 Ti Tree Lake
5.2 Byron Bay Town Centre Masterplan

STAFF REPORTS - CORPORATE AND COMMUNITY SERVICES**Report No. 4.1 Environmental Protection and Improvement Works at the Sandhills Estate**

Directorate: Corporate and Community Services
Report Author: Belle Arnold, Community Project Officer
File No: I2018/1665
Theme: Corporate Management
Community Development

Summary:

This report outlines the progress of the Environmental Protection and Improvement Works at the Sandhills Estate in Byron Bay and the work of the Arakwal Elders in initiating this important work to protect country. The report also confirms the role in the Arakwal Regeneration team in carrying out the works with Council.

RECOMMENDATION:

That the Arakwal Memorandum of Understanding Advisory Committee:

- 1. Note the progress of this project and provide any feedback to Council.**
- 2. Provide feedback on the Sandhills Estate Environmental Protection and Improvement Plan.**

Attachments:

- 1 Sandhills crown land application Arakwal support letter, E2018/71643 , page 7** [↓](#)

Report

The Arakwal Memorandum of Understanding States:

5 **4.2.2 Protecting Wetlands**

Arakwal have identified ongoing concerns regarding important environmental and cultural wetland sites and have requested that Council rectify existing drainage issues in Byron Bay.

10 *This matter is carried over from the original 1998 Aboriginal Heads of Agreement and involves objectives from point 3 of the Agreement, Aranga Development and Paterson Street water runoff into Cibus Margill swamp. The Corporation is also concerned that polluted water currently runs from the Cowper Street drainage system onto Main Beach. A solution that has been identified is the construction of a wetland, filtration system, or artificial wetland at the Cowper Street drainage system onto Main Beach.*

15 This report relates to protection and rehabilitation works in the Sandhills Estate behind Cowper Street in Byron Bay and is a direct result from this ongoing request from Arakwal which originated in 1998 from the Elders Lorna Kelly, Linda Vidler and Yvonne Graham.

20 Council have been successful in obtaining a licence from Crown Lands to commence Environmental Protection and Improvement works in the Sandhills Estate in Byron Bay. The Bundjalung of Byron Bay were consulted in the obtaining of this license and the initial support letter is attached (Attachment 1).

25 The project is to rehabilitate the open stormwater channels that flow through the Sandhills Estate, as well as general native revegetation of the Sandhill Estate. The current condition of the area is poor with weed infestations, littering and a degraded open stormwater channels. The stormwater flowing through the open channel can be of poor quality with frequently high faecal coliforms found at the Clarkes Beach outlet. The project aims to restore and enhance instream water quality, the condition of the existing waterways and the general amenity of the site.

30 The project has been initiated as part of Council's stormwater planning and has been identified as a key priority area for the Byron Bay Town Centre Masterplan.

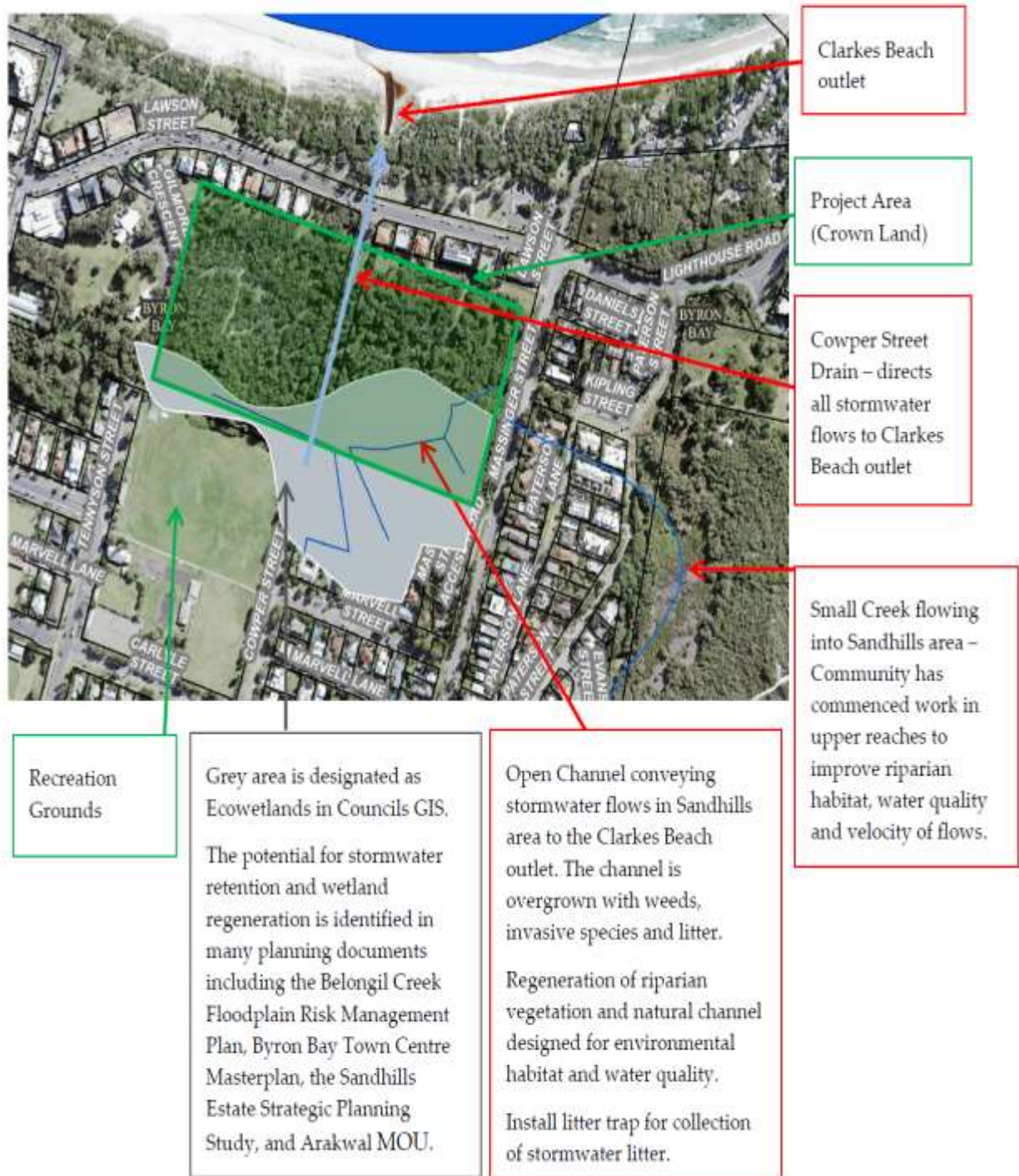
35 Aims and Objectives of the Project include:

1. Implement natural channel design along the creek and open channel
2. Improve water quality at Clarkes Beach outlet
3. Protect the Aboriginal cultural values of the area
- 40 4. Native regeneration of bushland, including bush tucker plantings
5. Improve the overall visual and environmental amenity of the site
6. Create and build on community partnerships
7. Commence works as identified in the Byron Bay Masterplan for the Sandhills Scrubland

45 Council's licence from Crown Lands Trust includes weed removal and rehabilitation but does not include any construction works.

50 Council's Infrastructure Services Team representatives have met with Sharon Sloane on behalf of the Arakwal Corporation and have confirmed that the Arakwal bush regeneration team will be contracted to do the bush regeneration work.

Council's Manager Infrastructure Services has developed the Sandhills Estate Environmental Protection and Improvement Project Plan and seeks feedback from the Arakwal MoU Advisory Committee (to be tabled at the meeting).



5 *Figure 1: Sandhills Environmental Protection and Rehabilitation Works Overview*

Financial Implications

Nil from this report

10 Statutory and Policy Compliance Implications

Arakwal MoU 2013

Local Government Act 1993

Native Act 1993

BYRON SHIRE COUNCIL

STAFF REPORTS - CORPORATE AND COMMUNITY SERVICES

4.1 - ATTACHMENT 1



BUNDJALUNG OF BYRON BAY ABORIGINAL CORPORATION (ARAKWAL) ICN: 2663
PO Box 1555, Byron Bay, NSW, 2481
Phone: 0266858746 Fax: 0266 858726
ABN: 99 508 925 629

29th September 2017

Belle Arnold
Jessica Huxley
Byron Shire Council
PO Box 219
MULLUMBIMBY NSW 2482

Dear Belle/Jessica,

Thank you for emails dated 27th September and relative information relating to the Environmental Protection and Improvement Proposal for Sandhills Estate.

Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) (BOBBAC) support the Byron Shire Council (BSC) application to obtain a licence to undertake rehabilitation and environmental protection works in the Sandhills area as this area has been identified previously through the Arakwal MoU.

BOBBAC request that any Bush Regeneration works that is to be required for the Sandhills Estate is to be consulted with Arakwal Corporation and for our expert team of Arakwal Bush Re-Gen team to be involved. We have an experienced team of Arakwal members that have the required conservation and management certificates in bushland regeneration and we seek for the BSC to undertake this project with Arakwal.

At this moment, the Corporation nominates Sharon Sloane to liaise with the BSC on the development of this Project, until a Board Member is identified to do so.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Sharon Sloane', is positioned above the typed name.

Sharon Sloane
Acting General Manager
Bundjalung of Byron Bay Aboriginal Corporation (Arakwal)

Report No. 4.2 **Australia Day 2019**
Directorate: Corporate and Community Services
Report Author: Deborah Stafford, Community Projects Officer (Generalist)
File No: I2018/1570
5 **Theme:** Corporate Management
 Community Development

Summary:

10 Input is sought from the Arakwal MoU Committee to inform Council's Australia Day 2019 activities.

RECOMMENDATION:

That input provided by the Arakwal MoU Committee informs the planning and delivery of Council's Australia Day 2019 activities.

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Report

At the April 2018 Council meeting, it was resolved (18-273) in relation to Australia Day 2019:

- 5 *“That the custodians via the Arakwal MoU Committee be requested to provide input as to how best and culturally appropriate Council celebrates this event.”*

Overview of previous Australia Day (2018) activities

- 10 In accordance with Resolution 17-065, Council invited organisations to nominate representatives to be a member on the Australia Day 2018 Project Reference Group (PRG). The Australia Day PRG coordinates Australia Day activities throughout the Shire on an annual basis.

The PRG consisted of representatives from the following organisations:

- 15 • Byron Bay Rural Fire Brigade, Suffolk Park
 • Rotary Club of Byron Bay
 • Rotary Club of Mullumbimby, representing the Combined Services Clubs of Brunswick Valley
 20 • Brunswick Mullumbimby Lions Club
 • Ocean Shores Community Association
 • Brunswick Valley Historical Society
 • Sisters for Reconciliation
 • Byron Bay Surf Club representing Australia Day Paddle

- 25 The PRG met on three occasions prior to Australia Day and held a debrief meeting in February 2018.

- 30 In accordance with resolution 09-680 which states, in part, that the official ceremony is to alternate each year to different locations within the Shire, the official ceremony for 2018 was held at the Ocean Shores Country Club and coordinated by the Ocean Shores Community Association in conjunction with Council.

- 35 The Official ceremony was conducted with the assistance of an Auslan interpreter. There were approximately 70 invited guests plus spectators in attendance. The following people and events were included:

- 40 • Cr Simon Richardson as MC
 • Welcome to Country by Sonia Woods
 • Musical performance by Ocean Shores Public School students
 • Speech by the Australia Day Address Giver, Frank Mills OAM
 • Speech by Byron Shire’s Australia Day Ambassador, Corey Payne
 • Local Australia Day Awards
 • Citizenship Ceremony
 45 • Sit down lunch for invited guests

Nominations were received for the award categories listed below (with the recipient noted in brackets):

- 50 • Citizen of the Year (Barbara Upson-Shaw)
 • Special Mention (Gill and Barry Lomath)
 • Senior Citizen of the Year (Margaret Fisher)
 • Volunteer of the Year (Heather McQuilty)
 • Community Event of the Year (Mullumbimby Music Festival)

Other nomination categories where no nominations were received included:

- Young Citizen of the Year
- Sports Person of the Year
- 5 • Environmental Volunteer Project of the Year

Other Australia Day events were planned and delivered by the community group members of the PRG with the details of these events noted below.

- 10 • *Brunswick Heads Breakfast in the Park (Rotary Club of Mullumbimby representing the Combined Services Clubs)*: This event was held at Banner Park. There were approximately 700 people in attendance for this 30th year of the event.
- *Byron Bay Breakfast in the Park (Rotary Club of Byron Bay)*: This event was held in Apex Park with small numbers people attending over the duration of the event and all aspects of the day
- 15 • *Celebration of the Survival of Aboriginal and Torres Strait Islander Peoples and Culture (Sisters for Reconciliation)*: This event was held at Apex Park and included speakers, dancers and music. The event was delivered despite difficulties with the location and it was identified that additional volunteers and shade will be required for the 2019 event.
- 20 • *Suffolk Park Fun Afternoon (Byron Bay Rural Fire Brigade, Suffolk Park and Suffolk Park Progress Association)*: This event was held at Gaggin Park with approximately 200 attendees. All activities proceeded well however there was a noted decrease in numbers from previous years, the cause of which is unknown.
- 25 • *Ocean Shores Family Afternoon (Ocean Shores Community Association)*: This event was held at the Ocean Shores Public School and included the mullet throwing competition and rainforest walk. All activities proceeded well however there was a noted decrease in numbers from previous years (80 last year).

Australia Day 2019

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Organisations invited to participate on the 2019 PRG include:

- Byron Bay Rural Fire Brigade, Suffolk Park
- Rotary Club of Byron Bay
- 35 • Rotary Club of Mullumbimby, representing the Combined Services Clubs of Brunswick Valley
- Brunswick Mullumbimby Lions Club
- Ocean Shores Community Association
- Brunswick Valley Historical Society
- 40 • Sisters for Reconciliation
- Byron Bay Surf Club representing Australia Day Paddle
- Red Cross Bangalow

45 The Byron Bay Rural Fire Brigade, Suffolk Park has declined to participate. Confirmation of participation is yet to be received from Red Cross Bangalow.

The Australia Day PRG will meet in accordance with its adopted Constitution. The objectives outlined in the PRG's Constitution are generally described as:

- 50 1. Organise Australia Day Events
- 2. Australia Day Address – Local Resident
- 3. Local Australia Day Awards
- 4. Australia Day Ambassador – Participation in Program

It is anticipated the first meeting of this PRG will be held in mid-September 2018. The location of the 2019 Australia Day Official Ceremony will be determined by the PRG at its first meeting.

- 5 Any input provided by the Arakwal MoU Committee will be fed into the PRG to inform planning and delivery.
In addition this matter will be referred to the Aboriginal Cultural Heritage Steering Committee to broaden the consultation with the Byron Shire Aboriginal Community on this matter of cultural significance.

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Financial Implications

- 15 The draft 2018-2019 Budget has an allocation of \$13,400 for the purpose of Australia Day 2019. This funding is proposed to be used to provide activities throughout the Shire as informed by the coordination of previous years with any opportunities for improvement identified and implemented. Existing budget will be used to implement activities or actions proposed by the Arakwal MoU Committee.

Statutory and Policy Compliance Implications

- 20 In Council's Delivery Program 2017-2021, SC2.1 states that Council is required to *"support a range of inclusive events that encourage broad community participation and promote social inclusion"*.

- 25 It also states that Council is to *"deliver agreed outcomes from the Arakwal MoU"*.

Report No. 4.3 **Byron Shire Council and Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) Memorandum of Understanding intended Review**

Directorate: Corporate and Community Services
Report Author: Belle Arnold, Community Project Officer
File No: I2018/1668
Theme: Corporate Management
Community Development

Summary:

This report discusses the upcoming Arakwal MoU review and evaluation and introduces the emerging needs of the partnership between Council and the Arakwal Corporation.

RECOMMENDATION:

That the Arakwal MoU Advisory Committee note the intended review and evaluation of the Arakwal MoU and provide preliminary feedback for the process.

Report

The Arakwal Memorandum of Understanding Review states:

5 Meetings and Reporting

Council will provide the administrative resource and support to facilitate the Arakwal Memorandum of Understanding Advisory Committee.

The Arakwal Memorandum of Understanding Advisory Committee will continue to meet bi monthly or four times per year.

- 10 *The Arakwal Memorandum of Understanding Advisory Committee will provide an annual progress report on the achievements of the Memorandum of Understanding and the associated Action Plan. The Arakwal Memorandum of Understanding Advisory Committee will provide a review of the Memorandum of Understanding to the parties five years from the signing of the agreement.*

- 15 The Arakwal MoU was signed in July 2013 by Arakwal Representatives Anette Kelly and Yvonne Stewart. Since that time the Arakwal MoU Committee have implemented 18 of the key projects identified in the projects MoU.

- 20 The 2013 Arakwal MoU was built on the founding work of the Arakwal elders in the 1998 Heads of Agreement and some of the projects carried on from this historic agreement.

During this time Council and Arakwal's partnership has evolved and now there are greater consultation requirements and emerging and evolving needs for both organisations. These changes have been due to changes in legislation.

- 25 Council staff are preparing a detailed review of the 2013 Arakwal MoU including an evaluation of the MoU outcomes and recommendations for the future direction of the MoU and the partnership between Council and Arakwal.

- 30 Over the past twelve months, the Arakwal MoU Committee has become a vehicle for Council to conduct consultation with the Arakwal Corporation in regards to various projects. This has impacted the outcomes of the Arakwal MoU which was designed to implement specific and identified priority projects. As a result, Council are also developing internal processes to ensure consultation processes with Arakwal are prioritised in the design of project management plans.

- 35 These processes will also be reported with the evaluation and review of the Arakwal MoU.

Financial Implications

Nil from this report

- 40 **Statutory and Policy Compliance Implications**

Arakwal MoU 2013

Native Title Act 1993

- 45 Local Government Act 1993

Report No. 4.4 **Byron Aboriginal Services Coalition - Bagwa Bugalma - Update**
Directorate: Corporate and Community Services
Report Author: Belle Arnold, Community Project Officer
File No: I2018/1670
5 **Theme:** Corporate Management
 Community Development

Summary:

- 10 This report provides an update on the work of the Byron Shire Aboriginal Services Coalition – Bagwa Bugalma and presents the five year strategic plan to improve Aboriginal Service Delivery in the Byron Shire.
-

RECOMMENDATION:

That the Arakwal Memorandum of Understanding Advisory Committee:

1. **Note the progress of the work of the Aboriginal Services Coalition.**
2. **Provide feedback on the Bagwa Bugalma 5 Year Strategic plan (DRAFT) (E2018/72195).**

15 **Attachments:**

- 1 Bagwa Bugalma - 5 Year Strategic Plan - DRAFT, E2018/72195, page 16 [↓](#)
- 2 Bagwa Bugalma Promo Flyer 2018, E2018/72209 , page 29 [↓](#)

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Report

The Arakwal MoU states:

- 5 5.2.2 Aboriginal social, economic and community development projects
Arakwal and Council to work in partnership on Aboriginal social, economic and community development projects that have positive outcomes for the wider community.

10 The Aboriginal Services Coalition has continued to meet at the Mullumbimby Neighbourhood Centre on a fortnightly basis.

15 The Aboriginal Project Worker at the Mullumbimby and District Neighbourhood Centre has developed a regular Men's Group program. The group is part supported by a Tweed service funded by Prime Minister and Cabinet. The Men's group is a social and support group which is attracting regular attendance of between 5 and 25 men.

20 Bullina Aboriginal Health Service have confirmed that they are funded to deliver health services in Byron Shire. The Bullina Chief Executive Officer has sited that high rents have been a barrier in providing services in the Byron Shire. Bullina have commenced weekly outreach including a General Practitioner of Health and nurses through a mobile van clinic and consultation rooms Mondays 10am– 3pm at the Mullumbimby and District Neighbourhood Centre.

25 The Byron Shire Aboriginal Services Coalition has been requesting a name in local Bundjalung language for over 12 months. Dave Kapeen from Tweed Byron Community Transport has worked with Delta Kay and Uncle Roy Gordon to provide the name Bagwa Bugalma which means to heal and to do correctly. This name has been adopted for the work done by the Coalition.

30 The Bagwa Bugalma 5 Year Strategic plan (DRAFT) has been developed and is attached for the consideration of the Arakwal MoU Advisory Committee. Bagwa Bugalma seeks feedback from Arakwal on this document before finalising and releasing to the broader community (Attachment 1). In addition a promotional flyer was developed to inform the broader community of the objectives of this project. (Attachment 2).

35 On 24 July 2018 Bagwa Bugalma (Aboriginal Services Coalition) held a meeting about the dire need for culturally appropriate Service Delivery with funding providers including representatives from:

- 40
 - Department of Family Services
 - Department of Aboriginal Affairs Coffs Harbour and Sydney
 - Department of Premier and Cabinet, Department of Prime Minister and Cabinet (Indigenous Affairs)
 - Local Health District Health Executive

45 The outcome from this meeting was positive with all agencies committing to improving the delivery of services to the Byron Shire Aboriginal community. There will be a follow up meeting to confirm outcomes on 6 September and a verbal update can be provided at the 13 September Arakwal MoU Advisory Committee meeting.

50 **Financial Implications**

Nil from this report

Statutory and Policy Compliance Implications

55 Arakwal MoU 2013
 Local Government Act 1993



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Bagwa Bugalma

Byron Shire Aboriginal Community Organisation

5 Year Strategic Plan

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Bagwa Bugalma Five Year Strategic Plan 2018-2023

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Acknowledgement to Country:

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Bagwa Bugalma is located at the Mullumbimby and District Neighbourhood Centre situated in Bundjalung country and offers community support and empowerment to communities in the ancestral homelands of the Arakwal, Widjabal and Minjimbul peoples. Bagwa Bugalma offers deep respect to the traditional owners and extends this respect to other Aboriginal and Torres Strait Islander peoples living in the area.

25

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Background:

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Goal: The purpose of this strategic plan is to develop an autonomous Aboriginal community organisation, with culturally appropriate management structure, delivering a diverse range of services and programs to the Aboriginal and Torres Strait Islander community in the Byron Shire and/or supporting organisations to deliver services to the Byron Shire to ensure an integrated service system to meet the unique needs of this community.

5 **Objectives:**

10 To work in collaboration with northern NSW Health and partners to contribute to meet the strategic goals of the 2023 Strategic Plan - Implementation Strategies 1 to 3:

- 15 1. Building trust through partnerships
2. Implementing what works and building the evidence
3. Ensuring integrated planning and service delivery

To encourage belonging and inclusiveness

- 20 • To increase provision of integrated health and community services to the Aboriginal and Torres Strait Islander community in the Byron Shire,
- Ensure culturally appropriate, authentic engagement and consultation with our community,
- 25 • To have open access to existing funding provided by government and streamlined integrated services.

To build a service system of accessible community services in the Byron Shire through developing partnerships with funded organisations, attracting new and additional funding to cover service gaps, and increasing engagement with the Aboriginal community.

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10 **Abbreviations:**

Arakwal- Bundjalung of Byron Bay Arakwal People

ATSI- Aboriginal and Torres Strait Islander

15

TBCT- Tweed Byron Community Transport

BSASC - Byron Shire Aboriginal Services Coalition Strategies

BSC - Byron Shire Council

FACS- Department of Family and Services

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NCAH- North Coast Area Health

PHN- Primary Health Network

TBLALC -Tweed Byron Local Area Land Council

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MDNC- Mullumbimby & District Neighbourhood Centre

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Key Strategies:

1. Building trust through partnerships
2. Implementing what works and building the evidence
3. Ensuring integrated planning and service delivery

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Year	Goals	Actions
Year 1 2/18	Employ a designated worker Aboriginal Project Worker to facilitate the delivery of the Bagwa Bugalma 5 Year Strategic Plan and ensure, with the support of the steering group, the ongoing sustainability of the organization,	
	Identify organisations currently funded to deliver services to the ATSI community in Byron Shire. Identify locations where those organisations are delivering in the Byron Shire.	Work with organisations and funded services to deliver Indigenous services and programs in Byron Shire based at the MNDC at the MNDC
	Increased participation in existing program to accessible at the MDNC. Increased participation in existing funded and unfunded programs through improved accessibility at MNDC. Increase recognition in the community of the work of the coalition and promotion of services and programs.	Increased community engagement and participation in community projects and conversations. Engage ATSI community to participate in existing programs at the MNDC • Men's groups • Women's group • Activities to build trust, access, and information about accessible services including NAIDOC, Close the Gap and other community activities

		• the emerging service/ organisation name • logo • signage/ mural for the cottage • promotional material
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Year	Goals	Actions
	Secure sustainable funding	Identify funding streams Make contact with key funders to identify Contact the Department of Aboriginal Affairs – Coffs Harbour (State)
		Research OCHRE funding (State)
		Department of Family & Community Service
		Contact Department of Indigenous Affairs- Lismore (Federal)
	BSASC to meet regularly to implement strategic plan	Review KPIs quarterly
	Establish Byron Shire Aboriginal Transport Steering Committee	4 Meetings identifying specific areas of need for various target groups,
		Identify priorities and provide feedback to government
		Work regionally to identify regional priorities and funding strategies

	Secured and sustainable position for Aboriginal Project Coordinator and Services Engagement Officer based at MNDC	Advocate project to government funding agencies. Continue to gather data and evidence to support the need of the community.
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Year	Goals	Actions
Year 2 2019	Increased services delivered to ATSI community at MNDC managed by the Aboriginal Coalition/ Management Committee	Apply for funding for three projects from identified priority areas – health and community outcomes
		Engage and support community to participate in services at the MDNC in more broadly in the Byron Shire
		Promote new programs at community events and through information referral system
	Improved community access to funded programs and services	Work with FAGS to deliver community development program
	Continued improvements of transparent outcomes	Develop and apply for funding for projects delivering ATSI transport outcomes Continue to facilitate the Byron Shire Aboriginal Transport Steering Committee and develop key strategies to address
		Work regionally on broader transport outcomes for the region
	improve employment opportunities and outcomes for ATSI community	Work with Job Network agencies to improve employment programs available to ATSI community members

Bagma Bugalma

Year	Goals	Actions
	Improve ATSI housing in the Byron Shire	Work with housing providers to clarify and streamline ATSI housing in the Byron Shire
	Improved access to the 'Close the Gap' federal funding scheme	Engage with PHN to promote program to service providers and in the wider community
	Secured and sustainable position for Aboriginal Project Coordinator and Services Engagement Officer based at MNDC	Advocate project to government funding agencies
	Increased service presence and provision in the Byron Shire	Promote available space at the MNDC
		Engage with service providers staff and management committees on the unserved need in Byron Shire
	Strengthen community networks through cultural activities	Hold NAIDOC Week community celebration at MNDC
	Increased advocacy and awareness of Bagwa Bugalma's objectives for wider community	Promote the project to State and Federal representative politicians

Year	Goals	Actions
Year 3 2020	Autonomous Aboriginal service centre established at MDNC, with access to wrap around services and supports.	Procure a demountable or identify and access existing Council building
	Regular ATSI services provided at the MNDC	Coordinate with; ATSI community to deliver autonomous ATSI programs in the Byron Shire from MNDC, Providers to do outreach in Byron Shire and at MNDC, And Community volunteers, to facilitate weekly program Develop Memorandum of Understandings with key state and federal funding agencies for ATSI service delivery in the Byron Shire
	Establish regular culturally appropriate Mental Health programs at MNDC	
	Establish Aboriginal Interagency in the Byron Shire	
	Expand ATSI housing program sin the Byron Shire	
	Improved transport outcomes	Continue to support and deliver outcomes on the Byron Shire Aboriginal Transport Steering Committee

Year	Goals	Actions
5	10 Hold NAJDOC Week Community celebration	=====
15	Secured and sustainable position for Aboriginal Project Coordinator and Services Engagement Officer based at MNDC	Advocate project to government funding agencies
20	Continue to work with PHN to improve access and uptake of 'Close the Gap' programs through mainstream GPs	
25	Review the management committee structure to increase community participation	Access governance training for management committee
30	Work with Job Network agencies to enable culturally appropriate employment support is provided	
35	Year4 2021 Work across community service sector to increase delivery to 4 days a week at MNDC and across Byron Shire	
40	Improve livability for ATSI community in Byron Shire	
45	Build opportunities to increase leadership and participation	
50	Mental Health to consult weekly at MNDC and across Byron Shire	
	Work with Job Network Agencies and Centrelink	

Year	Goals	Actions
	Work with NCAH to increase community based health programs in Byron Shire	
	Aboriginal Liaison Officer to work with Job Network agencies and Centrelink locally to support ATSI community, deliver cultural awareness training, support community and develop employment, education and training opportunities for ATSI community.	
Year5 2022	Shop frontage in Mullumbimby with program centre based in MNDC precinct	
	Programs in • Health • Housing • Transport • Employment • Education And are culturally appropriate available in the Byron Shire	
	Aboriginal Community Management Committee meeting regularly to steer organisation and support funding applications	

5

Bargwa Bugalma

|

Byron Shire Aboriginal Services

- Increase presence of ATSI service delivery in Byron Shire,
- Increased use of available space at Mullumbimby Neighbourhood Centre (MDNC) across all target areas,
- Deliver wholistic/ intergrated project based at MDNC early intervention for early childhood – supporting whole of family/ community wellbeing,
Secure sustainability of our work for the next 1 – 5 years.

Community owned Community controlled

We have developed our objectives through a series of meetings workshops and consultations.
We want to bring community together

WE DO NOT WANT:

- * to create divisions
- * Take funding away from existing ATSI programs or services
- *

* WE DO WANT to access mainstream funding and funding streams we are currently ineligible for such as OCHRE

Self DETERMINATION

BAGWA BUGALMA

BYRON SHIRE ABORIGINAL COMMUNITY ORGANISATION

The Byron Shire Aboriginal Services Coalition are working together to create an Aboriginal Service based and operating in the Byron Shire.

For our mob, by our mob! Bagwa Bugalma

We know that our communities need support and, especially to survive the second wave of dispossession in the Byron Shire community.



Priority

Services for delivery

- * Health
- * Housing
- * Employment
- * Community
- * Transport
- * Cultural Revitalisation
- * Education
- * Wholistic and Intergrated



Our Objectives:

Establishing an organization for our people in our community to deliver culturally appropriate services in the Byron Shire

- Community owned and managed
- Responsive to community needs
- Wholistic and intergrated – health, community, housing and employment
- Reference point for government agencies to consult or access community
- Community reference point

Culturally based projects and programs

Targeted, well informed for men, women, children and youth, looking after the well being of our whole community

- Intergrated with other services
- Cultural revitalisation as an engagement tool
- Building a strong sense of cultural identity
- Mens business / women's business

Focus point for our community, centre point to build strength

- A place to come together and build on common grounds
- Grow and develop opportunities for our mob
- Encourage live-ability for ATSI people to stay in the Byron Shire

Clear consultation with our mob

Community access point for government to consult with community

Organisation that is 100% representative of ATSI community priorities

Creating relationships and partnerships to strengthen outcomes for our community

Report No. 4.5 **Byron Shire Aboriginal Cultural Heritage Steering Committee**
Directorate: Corporate and Community Services
Report Author: Belle Arnold, Community Project Officer
File No: I2018/1667
5 **Theme:** Corporate Management
 Community Development

Summary:

- 10 This report provides information to the Arakwal MoU Advisory Committee on the formation of a multi stakeholder Byron Shire Aboriginal Cultural Heritage Steering Committee, which will assist Council to meet the legal obligations required in protecting Aboriginal Cultural Heritage in the Byron Shire.

RECOMMENDATION:

- 15 **That the Arakwal MoU Advisory Committee note the formation of the Byron Shire Aboriginal Cultural Heritage Steering Committee as a multi stakeholder consultative group which brings together Aboriginal Stakeholders under the Land Rights Act and the Native Title Act.**

Report

The Byron Shire Aboriginal Cultural Heritage Study (Stage One) addressed three priority projects of the Arakwal Memorandum of Understanding (MoU). The Arakwal MoU states:

1.2.4 Ongoing Cultural Heritage Management and Land Management Rights

The development and implementation of a process to ensure ongoing recognition/consultation with Arakwal once Native Title Claims are granted and resolved that ensure ongoing Cultural Heritage Management and Land Management Rights.

1.2.3 Access to monitor important Aboriginal sites on private land

The development of a process that allows the Arakwal some level of access to monitor important sites on private land. Arakwal have identified some legislative changes which make it an offence to knowingly damage or destroy Aboriginal sites.

2.2.2 Consultation processes for development applications and other matters in regards to public lands

- Development of clear processes in regard to consultation and engagement with Arakwal on development applications and other planning mechanisms in lands within the Byron Shire.
- Development of frameworks for ongoing consultation processes.

In 2017 Council undertook an Aboriginal Cultural Heritage Study with representation from Arakwal, Tweed Byron Local Aboriginal Land Council and Jali Local Aboriginal Land Council.

A recommendation from the Byron Shire Aboriginal Cultural Heritage Study (Stage One) was for the formation of a Byron Shire Aboriginal Cultural Heritage Steering Committee. This committee would provide streamlined, resourced and well documented multi stakeholder consultation process for cultural heritage matters.

The Byron Shire Aboriginal Cultural Heritage Steering Committee will:

- provide guidance and expertise on projects that have overlapping Aboriginal stakeholder groups with different legislative obligations
- assist Council in the development of key policies, projects and strategic plans
- build upon Council's existing relationship with Aboriginal stakeholders
- seek to formalise relationships with a range of Aboriginal stakeholder groups.
- seek to further the Byron Shire Aboriginal Cultural Heritage Study through the development and implementation of a locally based action plan which responds to the rapidly changing legislative environment

The Aboriginal Cultural Heritage Steering Committee will invite membership as follows:

- Arakwal Representatives – x 3 (two paid board representatives)
- Tweed Byron Local Area Land Council members x 2 (one paid board representative)
- Jali Local Area Land Council members x 2 (one paid board representative)
- Ngulaingah Local Area Land Council members x 2 (one paid board representative)
- Local Arakwal Depot Aboriginal National Parks representatives x 2 (male and female representatives)
- Widjabal Claimants x 2 (two paid board representatives)

Council have now endorsed this committee and the requested resources to fund it. Council staff are in the process of developing a meeting schedule and membership invitation.

This Committee does not replace the Arakwal MoU Advisory Committee and Council will continue to work closely with the Arakwal Corporation as the primary native title group in the Byron Shire. The Byron Shire Aboriginal Cultural Heritage Steering Committee also seeks to meet Council's obligation to consult with Land Councils in the Byron Shire.

5

Financial Implications

Nil from this report

10 **Statutory and Policy Compliance Implications**

Native Title Act 1993

Land Rights Act 1984

National Parks and Wildlife Act 1974

15

Local Government Act 1993

STAFF REPORTS - INFRASTRUCTURE SERVICES

Report No. 4.6 Ironbark Avenue - Drainage Investigation

Directorate: Infrastructure Services

5 **Report Author:** James Flockton, Drain and Flood Engineer

File No: I2018/1663

Theme: Infrastructure Services
Local Roads and Drainage

10 **Summary:**

The Arakwal Corporation recently developed a community title subdivision at the end of Ironbark Avenue, Byron Bay. The entrance to this subdivision has been experiencing drainage problems since construction.

15

Arakwal Corporation have requested Council investigate a solution to the issues at Ironbark Avenue.

RECOMMENDATION:

That the Arakwal Corporation proceed to obtain relevant approvals for the proposed drainage solution and engage a suitable contractor to complete the works.

20 **Attachments:**

- 1 Ironbark Avenue Infiltration Test letter report from Coffey, E2018/71505, page 37 [↓](#)
- 2 Drawing 2663 Ironbark Avenue Drainage Remediation, E2018/71661, page 57 [↓](#)

25

Report

The Arakwal Corporation recently developed a community title sub-division at the end of Ironbark Avenue, Byron Bay.

The road drainage solution for the entrance and access roads within this subdivision involve two inlet pits with minimal infiltration, outflow and storage. This has resulted in water often ponding on the road at the entrance of the sub-division.

While these drainage assets are within Council's road reserve, Council do not own or maintain these assets because they are within the properties access road and provide minimal drainage to Council's road infrastructure. This aside, Council have agreed to investigate a solution to the drainage issues and provide this solution to the Arakwal Corporation.

The existing drainage design is two 600x600 inlet pits, with a 100mm sub-surface drain between the two pits. This sub-surface drain is designed to provide infiltration, with additional flows surcharging from the eastern pit to rock rip rap into the adjacent national park. Unfortunately this surcharge water has nowhere to go due to the flat nature of the land and National Park and Wildlife Service not wanting to receive regular flows from these pits. Additionally the system has minimal infiltration. This results in water ponding for extended periods.

Initial investigations involved Council contracting a geotechnical company named Coffey to investigate the permeability of the soil around Ironbark Avenue. Attachment 1 is the resulting permeability / infiltration test results and letter report, from Coffey for Ironbark Avenue.

The report shows the soil has good permeability of 432 to 514.8 mm/hr. Coffey excavated to 2.6m and did not encounter the water table, so the water table is low. The report also notes a top layer of clay that is preventing existing water from entering the sand layer naturally.

Therefore, the main cause of the water ponding is system capacity, with the clay layer on the surface being an additional reason why water is not infiltrating when the existing pit surcharges. However, the soil has good permeability and the water table is low, therefore, a suitably sized infiltration pit is likely to eliminate the ponding issues, except during prolonged heavy rain. Removal of the clay layer could also offer further relief.

Council's Comprehensive Guideline to stormwater states the maximum saturated hydraulic conductivity value that may be used for design purposes is 360mm/hr. The permeability results above are beyond this, but an infiltration pit still needs to be sized using the 360mm/hr rate.

Staff initially ran an 8 m³ infiltration tank through Council's Infiltration pit design check spread sheet. This size tank does not work, larger size tanks were ran until a solution was found.

Designing for the 20 year rainfall event provided the most cost effective and efficient solution. To control this water volume a 50 m³ infiltration tank would be needed. Various shapes and depth have been considered and the 1.8m deep 0.8m x 5m x 8m tank has been recommended. This depth and size makes construction and Work Health and Safety easier, while providing the volume required.

A 50m³ infiltration tank will not cater for the 100 year event in flows or volumes, for this size event we would need to go up to a 65 m³ tank. Nor will it result in ponding only happening once every 20 years.

This option results in an infiltration tank that should in theory empty in 3-4 hours, post rain up to the 20 year event and only ponding during heavy and prolonged rain. Ponding will also depend upon

the existing ground saturation and how much rain falls before and after each event. The low water table will reduce the ground saturation impact to a degree.

5 Council typically design to the 5, 10 or 20 year event for pipe flow, with overland flow beyond this size event. A 10 year event design does not reduce the tank size a great deal, therefore, it has been recommend to design for the 20 year event using a 50m³ infiltration tank for this location.

10 This infiltration tank manages water from the developments road only. Some minor alterations to the entrance off Ironbark, a 900mm wide dish drain, is recommended to further improve the design outcomes.

15 Attachment 2 provides the design drawings for this solution. The drawings are ready for construction purposes; however, no approvals have been obtained. The approval process is different for the Arakwal Corporation to complete the works, compared to Council completing them.

Council could complete the works as 'Development without consent' however the works are not within Council's current approved budget.

20 Arakwal Corporation would need to make a Section 68 application to Council, to complete works within the road reserve.

Financial Implications

25 Survey, service location, geotechnical advice and design costs have all be costed to Council's Byron Bay Drainage Maintenance Work Order number.

Staff have not prepared a cost estimate for the works but suggest that Indicative cost would be in the order of \$30,000.

30 Statutory and Policy Compliance Implications

Applicable approvals are required prior to proceeding with work on ground.



Unit 1, 5 Bugden Avenue
Alstonville
NSW 2477 Australia
t: 02 6628 3224
coffey.com

11 July 2018

Our ref: 754-LSYGE-220175-A

Byron Shire Council
Station Street
Mullumbimby NSW 2482

Attention: Mr James Flockton

Dear Sir,

Infiltration Testing – Ironbark Avenue, Byron Bay

1. Introduction

Byron Shire Council (Council) requested Coffey to carry out infiltration testing at the south-western end of Ironbark Avenue, Byron Bay.

The infiltration testing was required to assess the permeability of the site soils, as Council proposes to construct a subsurface stormwater detention structure (stormwater pods) which will rely on subsurface infiltration to disperse collected stormwater into the subsoil.

The work was carried out in accordance with our proposal 754-LSYGE-P18034-B dated 27 June 2018.

2. Site Description

The proposed site for the stormwater infiltration pods are at the end of Ironbark Drive. At present, stormwater collects across the road within the road reserve, at a low point, as shown in Photograph 1 below.

A site sketch is enclosed.

The surface geology of the site comprises Pleistocene-age dune sand deposits. The Neranleigh-Fernvale beds are present to the west of the site as noted below Photograph 1.

Coffey Services Australia Pty Ltd
ABN: 55 139 460 521

1

Infiltration Testing – Ironbark Avenue, Byron Bay



Photograph 1: View of standing water across the roadway. The monitoring well was installed behind the camera. The geology of the low-lying area comprises a Pleistocene aged dune deposit (aeolian sand). Beyond the road, where the ground slope develops away from the camera, the underlying geology comprises the Neranleigh-Fernvale beds.

3. Monitoring Well Installation and Log

Coffey installed a monitoring well, comprising a standpipe with slotted screen, to a depth of 2.86m below ground level. A hand-auger was used to drill the borehole which received the standpipe casing. The well construction details and log of the encountered materials are enclosed.

Groundwater was not intersected within the 2.86m depth of the monitoring well.

The upper 250mm of the profile comprised gravelly clay fill, likely from nearby cuttings, and spread across the site for shaping of the ground surface or to provide a surface for car parking.

Aeolian sand was encountered to the investigation depth of 2.86m. The underlying Neranleigh-Fernvale beds were not intersected.

The well location is shown in Photograph 2 below.

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2

Infiltration Testing – Ironbark Avenue, Byron Bay



Photograph 2: Well Location looking south.

4. Infiltration Testing

Infiltration testing was conducted using a constant head approach, and municipal supply water was pumped to the borehole to maintain a constant head as far as was practicable.

Estimates of the flow rate were made by timing the filling of known volume containers.

Water pressure data loggers were used to measure the water head above the base of the borehole at one second intervals.

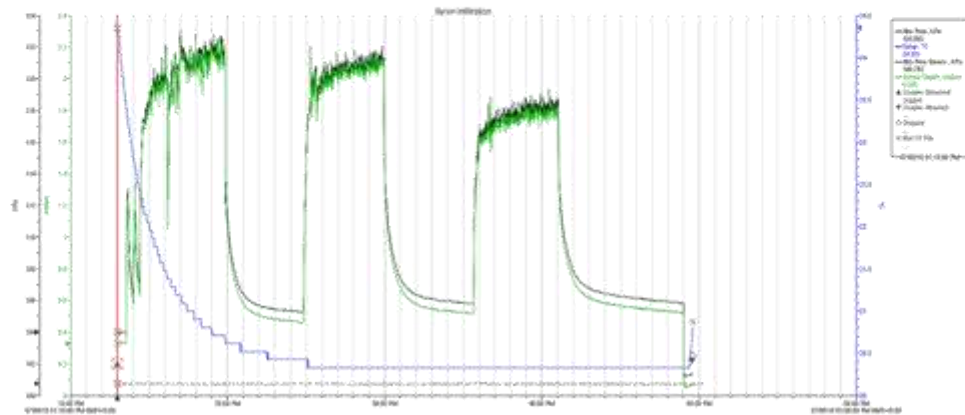
Three tests were conducted, by progressively reducing the pump revolutions from high to idle. Each test comprised a five-minute duration of water flow down the borehole. The three tests are shown in Graph 1 below and are called Test 1, Test 2 and Test 3.

More detailed level measurements of each Test are shown in Graphs 2 to 4.

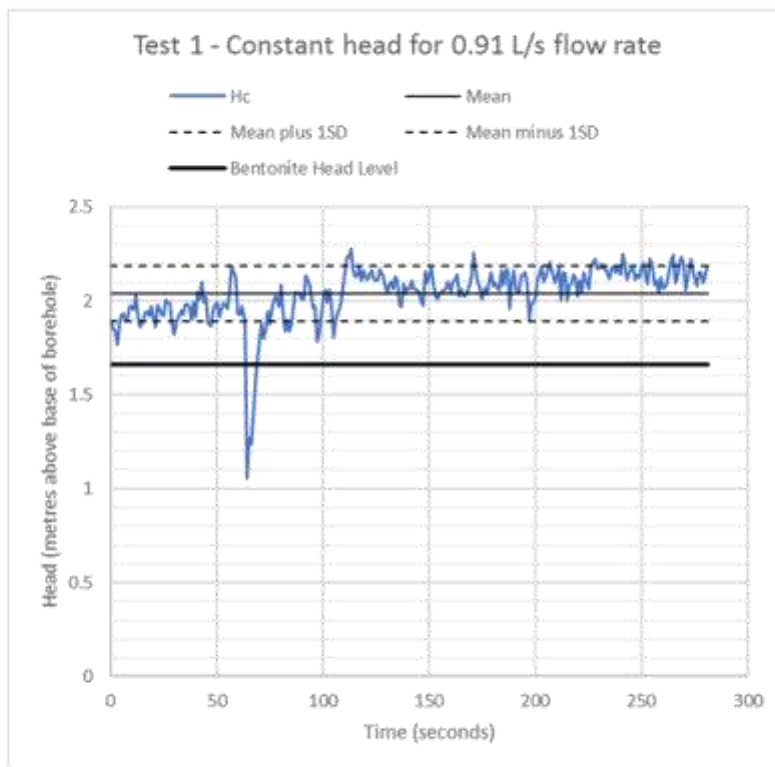
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3

Infiltration Testing – Ironbark Avenue, Byron Bay



Graph 1: Constant Head Infiltration Tests – showing the three tests (Test 1, Test 2 and Test 3), each of about 5 minutes duration. Each vertical gridline represents one minute, and the head achieved (above the base of the borehole) in Test 1 and Test 2 was about 2 m (to indicate the vertical scale). Note the rapid decay of the water head in about two minutes following cessation of water delivery to the borehole.

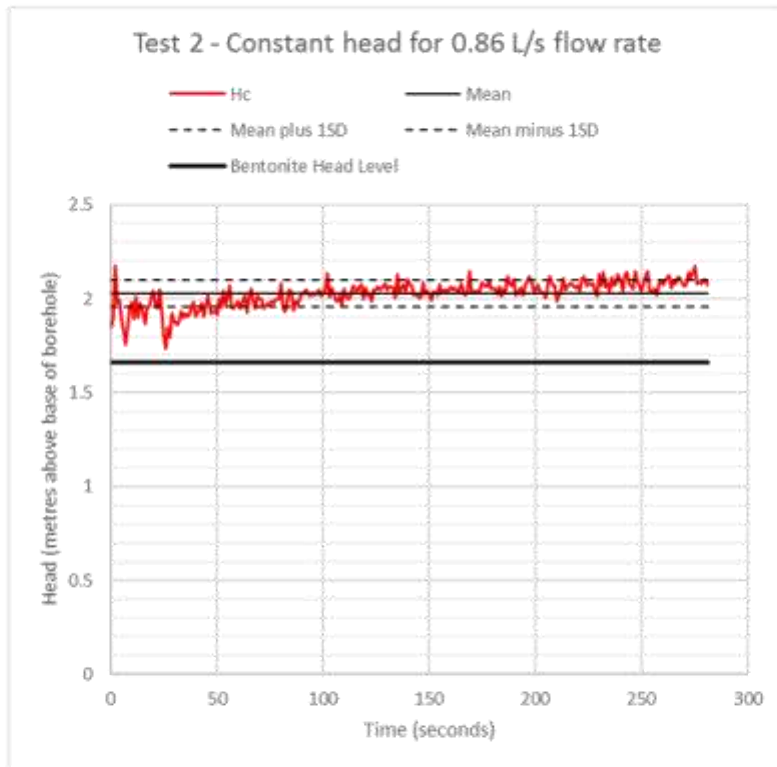


Graph 2: Detailed water level measurements for Test 1. Average head is 2.04m.

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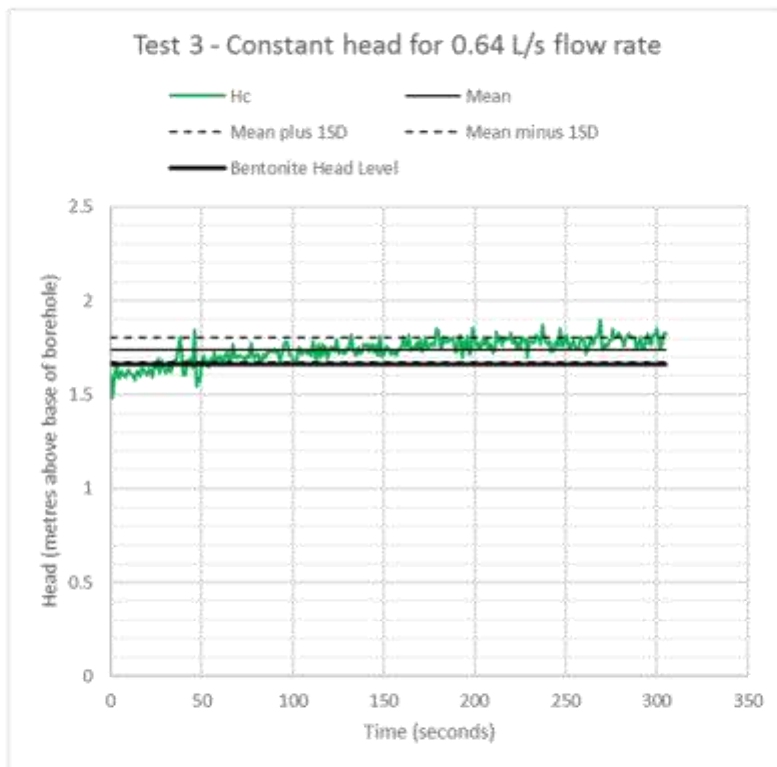
4

Infiltration Testing – Ironbark Avenue, Byron Bay



Graph 3: Detailed water level measurements for Test 2. Average head is 2.03m.

Infiltration Testing – Ironbark Avenue, Byron Bay



Graph 4: Detailed water level measurements for Test 3. Average head is 1.74m.

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6

Infiltration Testing – Ironbark Avenue, Byron Bay

5. Findings

We consider that the reason for the standing water at the location is the combination of the road being a sag/low point, and the presence of low permeability fill in the upper 250mm of the profile. The fill is preventing drainage of the runoff into the sand subgrade.

The permeability of the sand was estimated using a method guided by the US Department of Interior Groundwater Manual (US Department of the Interior, 1977). The calculation sheets are enclosed. The estimated permeability of the sand between 2.86m and 1.2m depth is shown in Table 5-1.

Table 5-1: Estimated Permeability of Sand from 1.2 – 2.86m depth based on Constant Head Tests

Test Number	Flow Rate	Maintained Head	Estimated Permeability
Test 1	Approximately 0.91 L/s	2.04m ± 0.15m	1.43 x 10 ⁻⁴ m/s
Test 2	Approximately 0.86 L/s	2.03m ± 0.07m	1.36 x 10 ⁻⁴ m/s
Test 3	Approximately 0.64 L/s	1.74m ± 0.07m	1.20 x 10 ⁻⁴ m/s

Note: Tolerance on the maintained head is shown to one standard deviation of the measurements over 5 minutes (Approximately 280 - 300 measurements depending on the test considered).

Infiltration Testing – Ironbark Avenue, Byron Bay

6. Recommendations

We recommend that:

- The design includes a sensitivity analysis to consider some natural variance in the permeability of the site soils, and the precision of head and flow measurements. A range of 10^{-3} m/s to 10^{-5} m/s is recommended.
- The subsurface soakage outlets within the stormwater pods should be serviceable, and/or clogging should be prevented (for example through pre-discharge clarifying/settlement chambers that are serviceable). Over time, the infiltration surface may become clogged by sediment suspended in stormwater. This sediment would then control (and likely substantially reduce) the rate of discharge from the stormwater pods, rather than the in-situ sands tested in our assessment. Removal of this sedimentation would be important in the long-term successful operation of the stormwater pods.
- Consideration be given to the further exploration of the site geology to observe the actual groundwater level, the response of this level to rainfall, and the level to the underlying residual soil. For instance, the infiltration test cannot predict whether groundwater rises would occur, for example, during sustained rainfall events. With shallow residual soil, it is possible that the groundwater level may increase significantly as the residual soil would impede downwards infiltration. If the groundwater level rises above the infiltration level of the stormwater pods, then infiltration from the pod will be limited until the groundwater level recedes again. Further to this, Council may monitor the existing borehole and standpipe over time, including a wet season, to assess this potential effect. We would be pleased to assist in this regard.

We draw your attention to the enclosed information sheets about your Coffey report.

I trust that this letter meets your current requirements. If you require further information please contact the undersigned on 02 6628 8350 (direct) or 042 339 3531.

For and on behalf of Coffey

Digitally signed by: Rian Vleggaar
Date: 2018.07.11 10:26:15 +10'00'



Rian Vleggaar
Senior Geotechnical Engineer

Attachments: References

Important Information about your Coffey Report
Site Sketch
Log with Explanation Sheets
Permeability Calculations

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8

Infiltration Testing – Ironbark Avenue, Byron Bay

7. References

US Department of the Interior. (1977). Ground Water Manual. Washington DC: Water Resources Technical Publication.

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9



Important information about your Coffey Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Coffey Australia and New Zealand
Issued: 9 March 2017

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

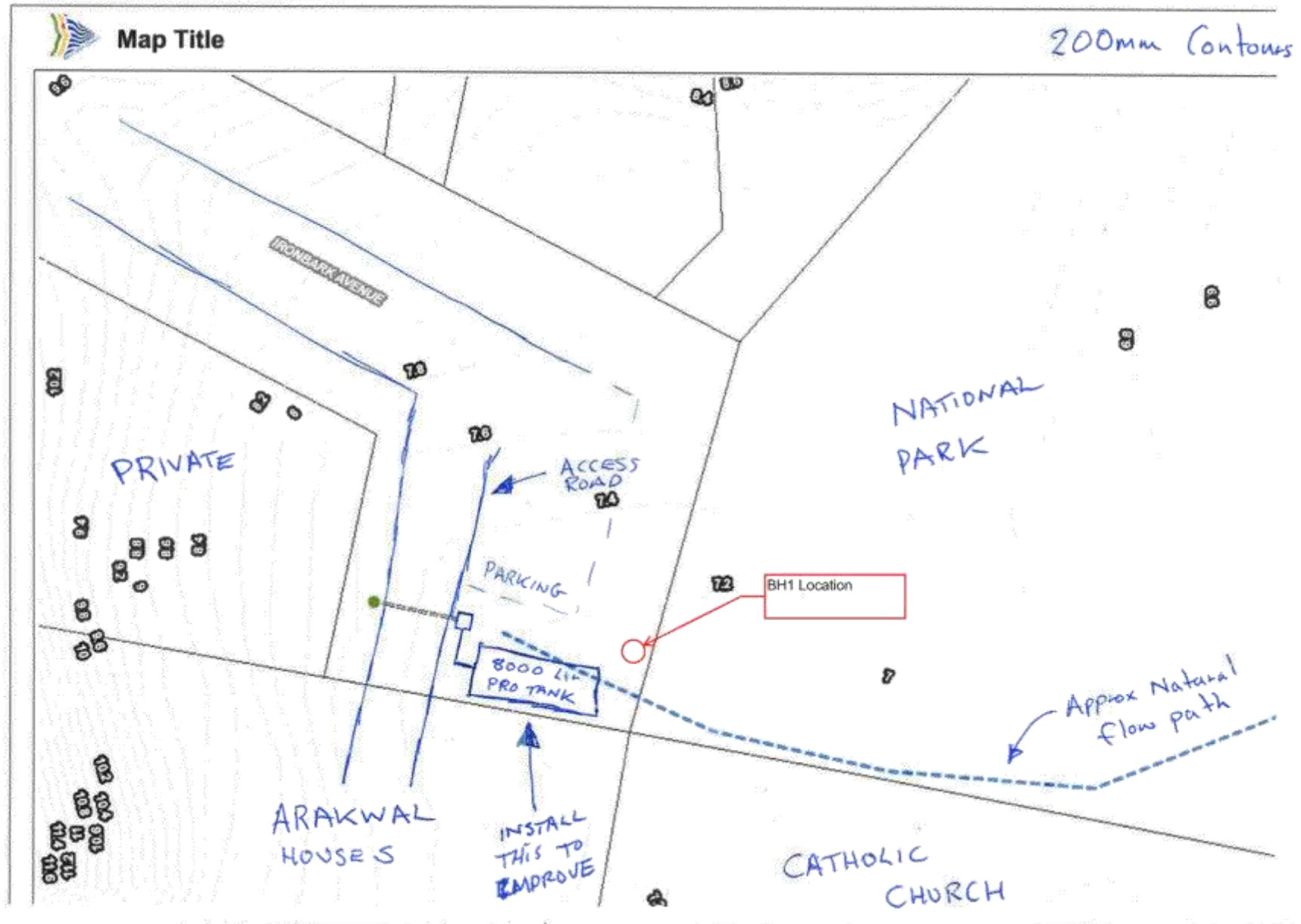
Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.





Engineering Log - Borehole

client: **BYRON SHIRE COUNCIL**

principal:

project: **INFILTRATION TESTING**

location: **SEE FIGURE 1**Hole ID. **BH1**

sheet: 1 of 1

project no. **754-LSYGE220175**

date started: 06 Jul 2018

date completed: **06 Jul 2018**

logged by: **RV**

checked by:

position: E: 560,191; N: 6,829,048 (Datum Not Specified)

surface elevation: 0.00 m (Datum Not Specified)

angle from horizontal: 90°

equipment type: Hand Auger

drilling fluid:

hole diameter : 75 mm

drilling information			well details		material substance							
method & support	penetration	water	samples & field tests	1	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	structure and additional observations
HA N	1 2 3	Not Encountered	D	1	0 0.5 1.0 1.5 2.0 2.5 3.0 3.5	0 0.5 1.0 1.5 2.0 2.5 3.0 3.5	 	CH	FILL: Gravelly CLAY: high plasticity, pale brown mottled white.	M		FILL
								SP	SAND: medium grained, grey-brown.	D		AEOLIAN
								Becoming white and fine to medium grained. Poor recovery on auger down to 2m due to dryness.				
					-3	3.0			Borehole BH1 terminated at 2.86 m Target depth			backfill details: 0.0-1.2m: Bentonite 1.2-2.86m: Sand standpipe 1 details: sickup: 1.01m 1.31-2.86m: screen
						3.5						

method

AD auger drilling*

AS auger screwing*

HA hand auger

W washbore

HA hand auger

support

M mud

N nil

C casing

penetration

no resistance

sloughing

refusal

water

10-12 water level on data shown

water inflow

water outflow

samples & field tests

B bulk disturbed sample

D disturbed sample

E environmental sample

SS split spoon sample

UM# undisturbed sample #mm diameter

HP hand penetrometer (kPa)

N standard penetration test (SPT)

N* SPT - sample recovered

Nc SPT with solid cone

VS vane shear; peak/remoulded (kPa)

R refusal

HB hammer bouncing

classification symbol & soil description

based on Unified Classification System

moisture

D dry

M moist

W wet

Wp plastic limit

WL liquid limit

consistency / relative density

VS very soft

S soft

F firm

St stiff

VSst very stiff

H hard

Fb friable

VL very loose

L loose

MD medium dense

D dense

VD very dense

* bit shown by suffix

4.5. ADT

B blank bit

T TC bit

V V bit



Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 µm to 2.36 mm
	medium	200 µm to 600 µm
	fine	75 µm to 200 µm

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	-	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING	CEMENTING
Layers Continuous across exposure or sample.	Weakly cemented Easily broken up by hand in air or water.
Lenses Discontinuous layers of lenticular shape.	Moderately cemented Effort is required to break up the soil by hand in air or water.
Pockets Irregular inclusions of different material.	

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material Structure and fabric of parent rock visible.

Residual soil Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil Deposited by wind.

Alluvial soil Deposited by streams and rivers.

Colluvial soil Deposited on slopes (transported downslope by gravity).

Fill Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.

Lacustrine soil Deposited by lakes.

Marine soil Deposited in ocean basins, bays, beaches and estuaries.



Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)				USC	PRIMARY NAME	
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	GRAVELS More than half of coarse fraction is larger than 2.0 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.	GW	GRAVEL	
			Predominantly one size or a range of sizes with more intermediate sizes missing.	GP	GRAVEL	
		GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)	GM	SILTY GRAVEL	
			Plastic fines (for identification procedures see CL below)	GC	CLAYEY GRAVEL	
	SANDS More than half of coarse fraction is smaller than 2.0 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes	SW	SAND	
			Predominantly one size or a range of sizes with some intermediate sizes missing.	SP	SAND	
		SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).	SM	SILTY SAND	
			Plastic fines (for identification procedures see CL below).	SC	CLAYEY SAND	
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm (A 0.075 mm particle is about the smallest particle visible to the naked eye)	IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
	SILTS & CLAYS Liquid limit less than 50	DRY STRENGTH	DILATANCY	TOUGHNESS		
		None to Low	Quick to slow	None	ML	SILT
		Medium to High	None	Medium	CL	CLAY
	SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low	OL	ORGANIC SILT
		Low to medium	Slow to very slow	Low to medium	MH	SILT
		High	None	High	CH	CLAY
	Medium to High	None	Low to medium	OH	ORGANIC CLAY	
HIGHLY ORGANIC SOILS	Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			Pt	PEAT	
● Low plasticity – Liquid Limit W_L less than 35%. ● Medium plasticity – W_L between 35% and 50%						

• Low plasticity – Liquid Limit W_L less than 35%. • Medium plasticity – W_L between 35% and 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM	TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.		SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.		TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.		TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.		INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

72610-03-02/2009



Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.			
DEFINITIONS: Rock substance, defect and mass are defined as follows: Rock Substance In engineering terms rock substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic. Defect Discontinuity or break in the continuity of a substance or substances. Mass Any body of material which is not effectively homogenous. It can consist of two or more substances without defects, or one or more substances with one or more defects.			
SUBSTANCE DESCRIPTIVE TERMS:		ROCK SUBSTANCE STRENGTH TERMS	
ROCK NAME	Simple rock names are used rather than precise geological classification.	Term	Abbreviation
PARTICLE SIZE	Grain size terms for sandstone are: Coarse grained Mainly 0.6mm to 2mm Medium grained Mainly 0.2mm to 0.6mm Fine grained Mainly 0.06mm (just visible) to 0.2mm	Point Load Index, I_{p50} (MPa)	Field Guide
FABRIC	Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are: Massive No layering or penetrative fabric. Indistinct Layering or fabric just visible. Little effect on properties. Distinct Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.	Very Low	VL
		Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
		Low	L
		0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm blows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
CLASSIFICATION OF WEATHERING PRODUCTS			
Term	Abbreviation	Definition	
Residual Soil	RS	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.	Medium
Extremely Weathered Material	XW	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.	M
Highly Weathered Rock	HW	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.	0.3 to 1.0
Moderately Weathered Rock	MW	The whole of the rock substance is discoloured, usually by iron staining or bleaching, to the extent that the colour of the fresh rock is no longer recognisable.	1 to 3
Slightly Weathered Rock	SW	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.	3 to 10
Fresh Rock	FR	Rock substance unaffected by weathering.	Extremely High
			EH
			More than 10
			Specimen requires many blows with geological pick to break; rock rings under hammer.
Notes on Rock Substance Strength:			
1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.			
2. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.			
3. The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fail across the planar anisotropy) is typically 10 to 25 times the point load index (I_{p50}). The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.			
Notes on Weathering:			
1. AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction, DW may be used with the definition given in AS1726.			
2. Where physical and chemical changes were caused by hot gases and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.			



Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES		Diagram	Map Symbol	Graphic Log (Note 1)	DEFECT SHAPE	TERMS
Term	Definition				Planar	The defect does not vary in orientation
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.				Curved	The defect has a gradual change in orientation
					Undulating	The defect has a wavy surface
					Stepped	The defect has one or more well defined steps
Joint	A surface or crack across which the rock has little or no tensile strength, but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.				Irregular	The defect has many sharp changes of orientation
					Note: The assessment of defect shape is partly influenced by the scale of the observation.	
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel, near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.				ROUGHNESS TERMS	
					Slickensided	Grooved or striated surface, usually polished
					Polished	Shiny smooth surface
					Smooth	Smooth to touch. Few or no surface irregularities
					Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.				Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.				COATING TERMS	
					Clean	No visible coating
					Stained	No visible coating but surfaces are discoloured
					Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.				Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formed by weathering of the rock substance in place.				BLOCK SHAPE TERMS	
					Blocky	Approximately equidimensional
					Tabular	Thickness much less than length or width
					Columnar	Height much greater than cross section
Notes on Defects:						
1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.						
2. Partings and joints are not usually shown on the graphic log unless considered significant.						
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.						

BYRON SHIRE COUNCIL

STAFF REPORTS - INFRASTRUCTURE SERVICES

4.6 - ATTACHMENT 1

HYDRAULIC CONDUCTIVITY - ABOVE WATER TABLE - CASED - OPEN Constant Head

Borehole Number

BH1

Office: **Alstonville**

Client : **Byron Shire Council**
Principal :
Project : **Ironbark Drive Infiltration pods**
Test Location : **End of Ironbark Drive**

Job Number : **754-LSYGE220175**
Test Date : **8/07/2018**
Tested By : **RV**
Checked By :



Test Method : Jarvis 1949, after page 270 in USGWM, 1977

Test Fluid : **Town Supply Water**

Height of Datum, HD : **0** m

Hole Radius, R : **0.038** m

Hole Depth, D : **2.86** m

Casing Radius, r : **0.25** m

Depth of Casing, d : **1.20** m

Test Length, L : **1.66** m

Depth to Water, w_c : **0.92** m

Constant Head, Hc : **2.04** m

Depth to Water Table, w : **4?** m

- date & time : **Estimate**

Constants :

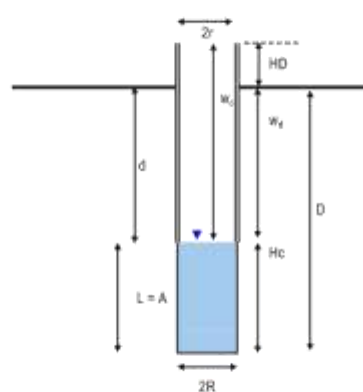
L / Hc : **0.81**

Hc / R : **54**

Cu : **82.9**

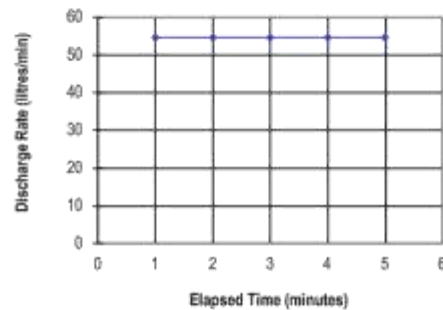
From Fig 10-7 in USGWM, 1977

Sketch of site conditions (not to scale)



Reading No.	Elapsed Time t (mins)	Time Interval Δt (mins)	Water Added per Δt (litres)	Discharge Rate (litres/min)
0	1	1	54.6	54.6
1	2	1	54.6	54.6
2	3	1	54.6	54.6
3	4	1	54.6	54.6
4	5	1	54.6	54.6
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19				
20				

Discharge Rate versus Time



Discharge Rate, Q = **54.6** litres/min

Hydraulic Conductivity, K

$$= \frac{Q}{C_u R H_c}$$

= **1.43E-04** m/sec
= **12.4** m/day

Notes: The flow rate in the test is adjusted such that the measured water level is below the casing, but not more than 3 times the diameter below the casing.

HYDRAULIC CONDUCTIVITY - ABOVE WATER TABLE - CASED - OPEN Constant Head

Borehole Number
BH1

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Client : **Byron Shire Council**
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Test Fluid : **Town Supply Water**

Height of Datum, HD : **0** m

Hole Radius, R : **0.038** m

Hole Depth, D : **2.86** m

Casing Radius, r : **0.25** m

Depth of Casing, d : **1.20** m

Test Length, L : **1.66** m

Depth to Water, w_c : **0.8347** m

Constant Head, Hc : **2.03** m

Depth to Water Table, w : **4?** m

- date & time : **Estimate**

Constants :

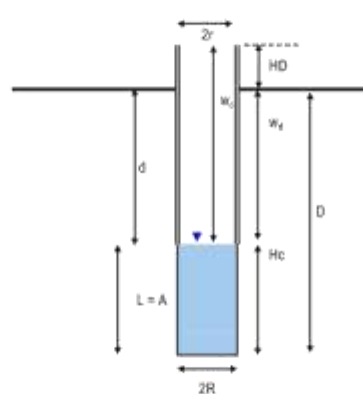
L / Hc : **0.82**

Hc / R : **54**

Cu : **83.5**

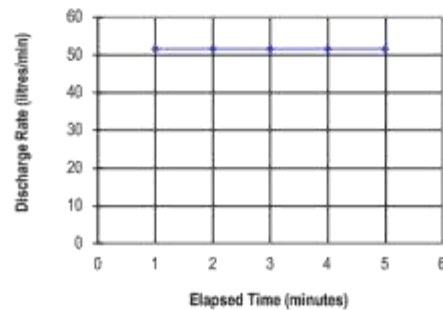
From Fig 10-7 in USGWM, 1977

Sketch of site conditions (not to scale)



Reading No.	Elapsed Time t (mins)	Time Interval Δt (mins)	Water Added per Δt (litres)	Discharge Rate (litres/min)
0	1	1	51.6	51.6
1	2	1	51.6	51.6
2	3	1	51.6	51.6
3	4	1	51.6	51.6
4	5	1	51.6	51.6
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Discharge Rate versus Time



Discharge Rate, Q = **51.6** litres/min

Hydraulic Conductivity, K

$$= \frac{Q}{C_u R H_c}$$

= **1.36E-04** m/sec
= **11.7** m/day

Notes: The flow rate in the test is adjusted such that the measured water level is below the casing, but not more than 3 times the diameter below the casing.

BYRON SHIRE COUNCIL

STAFF REPORTS - INFRASTRUCTURE SERVICES

4.6 - ATTACHMENT 1

HYDRAULIC CONDUCTIVITY - ABOVE WATER TABLE - CASED - OPEN Constant Head

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Height of Datum, HD : **0** m

Hole Radius, R : **0.038** m

Hole Depth, D : **2.86** m

Casing Radius, r : **0.25** m

Depth of Casing, d : **1.20** m

Test Length, L : **1.66** m

Depth to Water, w_c : **1.12** m

Constant Head, Hc : **1.74** m

Depth to Water Table, w : **4?** m

- date & time : **Estimate**

Constants :

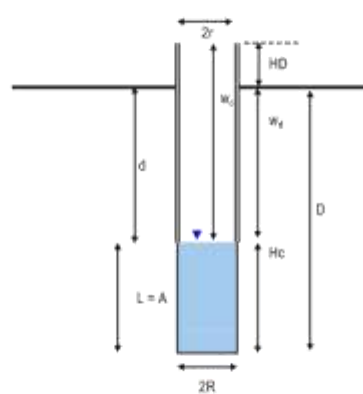
L / Hc : **0.95**

Hc / R : **46**

Cu : **81.8**

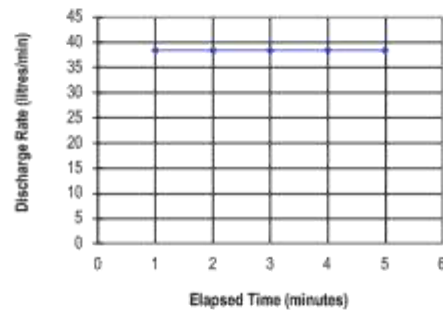
From Fig 10-7 in USGWM, 1977

Sketch of site conditions (not to scale)



Reading No.	Elapsed Time t (mins)	Time Interval Δt (mins)	Water Added per Δt (litres)	Discharge Rate (litres/min)
0	1	1	38.4	38.4
1	2	1	38.4	38.4
2	3	1	38.4	38.4
3	4	1	38.4	38.4
4	5	1	38.4	38.4
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20				

Discharge Rate versus Time



Discharge Rate, Q = **38.4** litres/min

Hydraulic Conductivity, K

$$= \frac{Q}{C_u R H_c}$$

= **1.20E-04** m/sec
= **10.4** m/day

Notes: The flow rate in the test is adjusted such that the measured water level is below the casing, but not more than 3 times the diameter below the casing.

DRAINAGE UPGRADE. IRONBARK AVENUE, BYRON BAY



**BYRON
SHIRE
COUNCIL**



INDEX

[illegible]

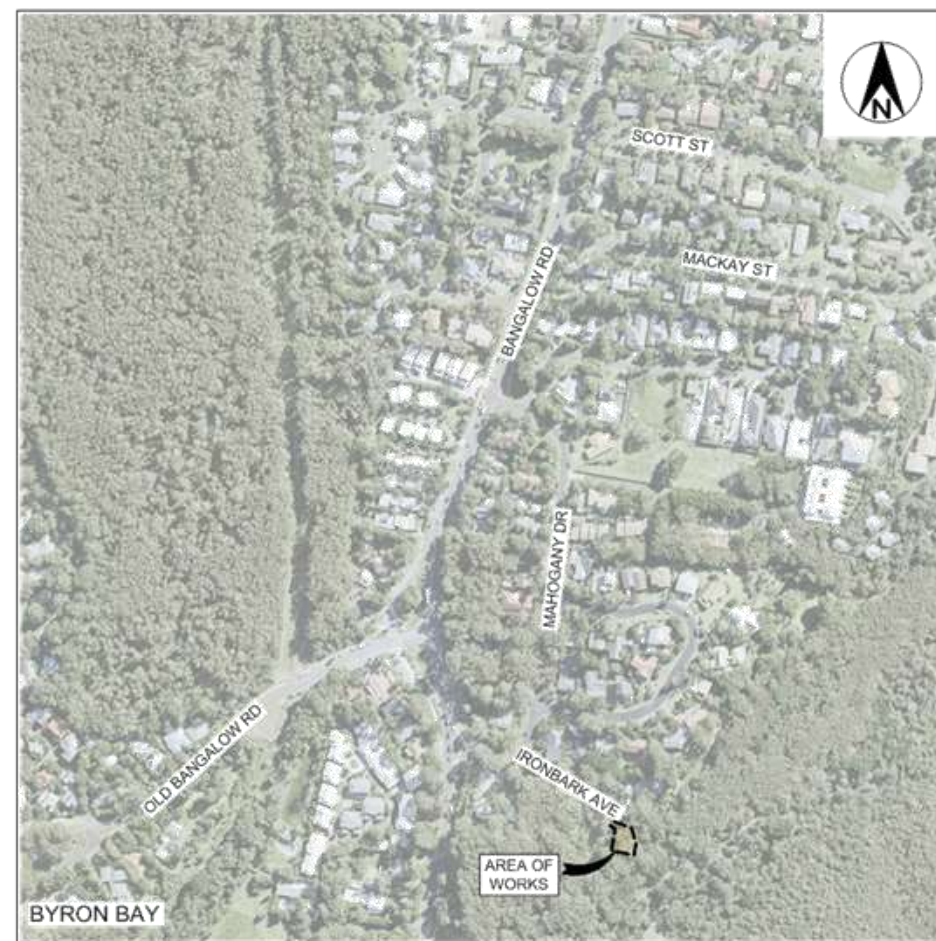
LEGEND

ISSUE A, B, C, etc. = PRELIMINARY APPROVALS / TENDER DRAWINGS (NOT FOR CONSTRUCTION)
ISSUE 1, 2, 3, etc. = CONSTRUCTION ISSUE DRAWINGS

Project No
2663

ISSUED FOR CONSTRUCTION
DATE 28.08.18

PROJECT NUMBER:	
2663	
DRAWING NUMBER	ISSUE
2663-01	1



LOCALITY SKETCH

ACAD FILE No: G:\Engineer\CAD\2010-2016\2015\Drainage upgrade- Ironbark Ave, Byron Bay\Civil Design\DWG\CONSTRUCTION\2015_IRONBARK_AVE_BASE.dwg

GENERAL

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE RELEVANT NORTHERN RIVERS LOCAL GOVERNMENT DEVELOPMENT DESIGN AND CONSTRUCTION MANUALS AND STANDARD DRAWINGS.
2. THIS NOTE AND THE FOLLOWING NOTES FORM AN INTEGRAL PART OF THIS DRAWING SET.
3. ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE.
4. DIMENSIONS SHALL NOT BE SCALED FROM THE DRAWINGS.
5. MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS, TOGETHER WITH THE REQUIREMENTS OF ALL APPLICABLE CODES OF PRACTICE, AUSTRALIAN STANDARDS AND STATUTORY AUTHORITIES.
6. SURVEY DATA HAS BEEN COMPILED FROM FIELD PICK-UPS AND OFFICE RECORDS. THE PROJECT MANAGER SHOULD ENSURE THAT SUFFICIENT DATA IS SHOWN TO ENABLE CONSTRUCTION WITHOUT DISTURBANCE TO FEATURES THAT ARE NOT SHOWN ON THE DRAWINGS.
7. SERVICES SHOWN HEREON HAVE BEEN LOCATED WHERE VISIBLE ON THE SITE, FROM INFORMATION RECEIVED FROM RELEVANT AUTHORITIES AND FROM HISTORICAL RECORDS HELD BY BYRON SHIRE COUNCIL.
8. PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON SITE, THE RELEVANT AUTHORITIES SHOULD BE CONTACTED FOR POSSIBLE LOCATION OF FURTHER UNDERGROUND SERVICES AND DETAILED LOCATION OF ALL SERVICES (DIAL BEFORE YOU DIG 1100).
9. THE TITLE BOUNDARIES SHOWN HEREON WERE NOT FIELD INVESTIGATED OR MARKED AT THE TIME OF SURVEY AND HAVE BEEN DETERMINED BY PLAN DIMENSIONS ONLY.
10. THE ORIGIN OF CO-ORDINATES IS MGA.
11. THE DATUM FOR LEVELS IS AHD.

SITE WORKS

1. ALL SOILS CONTAINING ORGANIC MATTER (E.G. ROOTS, GRASS ETC.) MUST BE STRIPPED FROM THE CONSTRUCTION SITE PRIOR TO FILLING / BUILDING WORKS AND MUST NOT BE USED AS FILL MATERIAL.
2. ALL EXPOSED SURFACES SHALL BE GRASSED OR PAVED TO PREVENT SCOUR AND EROSION DAMAGE.
3. THE CONSTRUCTOR IS RESPONSIBLE FOR IMPLEMENTING ALL NECESSARY SEDIMENTATION AND EROSION CONTROL MEASURES SPECIFIED OR DEEMED NECESSARY TO PROTECT THE WORKS AND ADJACENT AREAS.
4. THE CONSTRUCTOR IS RESPONSIBLE FOR THE MAINTENANCE AND MANAGEMENT OF A TEMPORARY AND / OR PERMANENT EROSION AND SEDIMENTATION CONTROLS DURING THE CONSTRUCTION AND MAINTENANCE PERIOD.
5. ALL OVERSIZED MATERIAL, WHICH MAY IMPEDE COMPACTION, MUST BE REMOVED FROM THE FILL PLATFORM.
6. FILL IS TO BE UNIFORMLY COMPACTED IN UP TO 200-300mm HORIZONTAL LAYERS AND MUST ACHIEVE A MINIMUM STANDARD OF COMPACTION OF GREATER THAN 95% STANDARD COMPACTION TO AS 1289 FOR COHESIVE SOILS, OR A DENSITY INDEX OF GREATER THAN 65% FOR COHESIONLESS SOILS. BENCHING OF THE NATURAL GROUND WILL BE REQUIRED ON SLOPING GROUND PRIOR TO COMMENCEMENT OF FILL OPERATIONS.
7. CLAYS OF HIGH PLASTICITY OR HIGH IN-SITU MOISTURE CONTENT ARE NOT TO BE USED AS FILL.
8. AN IMPORTED GRANULAR FILL WITH A PLASTICITY INDEX PREFERABLY LESS THAN 15%, WITH NO EXCESSIVE OVERSIZED MATERIAL, MAY BE USED.
9. FIELD DENSITY TESTS, OR EQUIVALENT, SHOULD BE CARRIED OUT TO VERIFY THAT THE STANDARD OF COMPACTION IS ACHIEVED. FIELD DENSITY TESTS ARE TO BE TAKEN OVER THE FULL DEPTH OF THE LAYER OR FROM THE BOTTOM OF THE LAYER.

RESTORATION OF SURFACES

1. THE CONSTRUCTOR SHALL CLEAN PAVEMENTS, LAWNS AND OTHER IMPROVED AREAS AND LEAVE THEM IN THE SAME ORDER AS THEY WERE AT THE COMMENCEMENT OF THE WORKS. THE CONSTRUCTOR SHALL RESTORE ANY FENCING REMOVED DURING CONSTRUCTION AND SHALL RESTORE LAWNS WITH TURF CUT AND SET ASIDE FROM THE ORIGINAL SURFACE AND WITH IMPORTED TURF FROM A SOURCE APPROVED BY THE CONSTRUCTION ENGINEER. (WSA 02 2002 PART 3, SECTION 25).
2. IMMEDIATELY AFTER BACKFILLING OF A TRENCH EXCAVATED THROUGH A PAVEMENT HAS BEEN COMPLETED, THE CONSTRUCTOR SHALL TEMPORARILY RESTORE THE PAVEMENT. WHERE THE TRENCH CROSSES BITUMEN OR CONCRETE PAVEMENT, THE SURFACE IS TO BE PROTECTED FROM DEGRADATION. A PRE-MIXED ASPHALTIC MATERIAL MAY BE USED FOR SUCH TEMPORARY RESTORATION. THE CONSTRUCTOR SHALL MAINTAIN THE TEMPORARY RESTORATION UNTIL FINAL RESTORATION IS CARRIED OUT. FINAL RESTORATION OF THE PAVEMENT SHALL BE CARRIED OUT TO RESTORE THE PAVEMENT AND ITS SUB-BASE TO NO LESS THAN THE ORIGINAL CONDITION. FINAL RESTORATION MAY INCLUDE, IF REQUIRED BY THE CONSTRUCTION ENGINEER, THE REMOVAL OF TEMPORARY RESTORATION.
3. IN OTHER THAN ROADWAYS, THE CONSTRUCTOR SHALL PLACE THE BACKFILL SUFFICIENTLY HIGH TO COMPENSATE FOR EXPECTED SETTLEMENT AND FURTHER BACKFILLING SHALL BE CARRIED OUT OR THE ORIGINAL BACKFILL TRIMMED AT THE END OF THE DEFECTS LIABILITY PERIOD IN ORDER THAT THE SURFACE OF THE COMPLETED TRENCH MAY THEN CONFORM WITH THE ADJACENT SURFACE. SURPLUS MATERIAL SHALL BE REMOVED AND DISPOSED OF TO AREAS ARRANGED BY THE CONSTRUCTOR. WHERE DRY WEATHER CONDITIONS HAVE PERSISTED AFTER THE ORIGINAL BACKFILLING, INCLUDING DURING THE DEFECTS LIABILITY PERIOD, THE CONSTRUCTOR SHALL TAKE ALL NECESSARY STEPS TO CONSOLIDATE THE TRENCH BEFORE REMOVING SURPLUS MATERIALS FROM THE SITE.
4. IN LOCATIONS WHERE, IN THE OPINION OF THE CONSTRUCTION ENGINEER, SURPLUS MATERIAL LEFT IN THE VICINITY OF THE TRENCH WOULD NOT BE OBJECTIONABLE, THE SURPLUS MATERIAL MAY BE DISPOSED BY SPREADING NEATLY IN THE VICINITY OF THE TRENCH TO THE SATISFACTION OF THE CONSTRUCTION ENGINEER IN SUCH A WAY AS TO AVOID FUTURE EROSION OF THE BACKFILL AND ADJACENT GROUND SURFACES. THE CONSTRUCTOR SHALL MAINTAIN THE BACKFILL AND ADJACENT GROUND UNTIL THE EXPIRY OF THE DEFECTS LIABILITY PERIOD.
5. WHERE, WITHIN PUBLIC OR PRIVATE PROPERTY, THE REASONABLE CONVENIENCE OF PERSONS WILL REQUIRE SUCH, THE CONSTRUCTION ENGINEER MAY ORDER THE CONSTRUCTOR TO LEVEL TRENCHES AT THE TIME OF BACKFILLING. THE CONSTRUCTOR SHALL MAKE GOOD ANY SUBSEQUENT SETTLEMENT, AS REQUIRED BY PLACING ADDITIONAL FILL.
6. THE CONSTRUCTOR SHALL IMMEDIATELY RESTORE ANY DAMAGED OR DISTURBED PRIVATE PROPERTY AND SERVICES.
7. SHOULD THE CONSTRUCTOR ELECT TO TUNNEL UNDER PAVING, KERB AND GUTTER OR OTHER IMPROVED SURFACES IN LIEU OF TRENCHING, BACKFILLING SHALL BE SO CARRIED OUT AS TO RESTORE FULL SUPPORT TO THOSE SURFACES. THE CONSTRUCTOR SHALL REMAIN RESPONSIBLE FOR THE REPAIR OF THE IMPROVED SURFACES, IF SUBSEQUENTLY DAMAGED DUE TO SUBSIDENCE OF THE BACKFILL, UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. THE CONSTRUCTOR SHALL PROVIDE NOTICE TO AFFECTED PROPERTY OWNERS OF ANY PENDING WORKS.

DRIVEWAYS

1. ALL EXISTING DRIVEWAYS AFFECTED BY NEW WORKS ARE TO BE CUT BACK, REMOVED & RECONSTRUCTED USING MATERIAL TO MATCH EXISTING.
2. THE CONSTRUCTOR SHALL LIAISE WITH THE PROPERTY OWNERS REGARDING ANY VARIATION TO THE ABOVE.
3. RECONSTRUCTION OF EXISTING CONCRETE DRIVEWAY OR PATHWAY IS TO BE IN ACCORDANCE WITH NORTHERN RIVERS LOCAL GOVERNMENT D139 AND D138 "HANDBOOK FOR DRIVEWAY ACCESS TO PROPERTY" AND RELEVANT STANDARD DRAWINGS.
4. RECONSTRUCTION OF EXISTING BITUMEN SEALED DRIVEWAY SHALL BE OF SIMILAR CONSTRUCTION TO THAT OF THE EXISTING WITH A COMPACTED GRAVEL BASE COURSE

EXISTING SERVICES

1. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF EXISTING SERVICES PRIOR TO COMMENCING WITH THE WORKS.
2. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT OF ANY EXISTING SERVICES DAMAGED DURING CONSTRUCTION WITH NEW SERVICES OF EQUIVALENT TYPE AND SPECIFICATIONS.
3. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR LIASING WITH TELECOMMUNICATIONS AND ELECTRICAL SUPPLY AUTHORITIES WITH SUPPLY AND FITMENT OF REPLACEMENT TELECOMMUNICATIONS AND ELECTRICITY PITS AND/OR LIDS TO SUIT HIS WORKS PROGRAM
4. WHEN CONSTRUCTING OR WORKING NEAR EXISTING PRESSURE MAINS IT SHOULD BE EXPECTED THAT THERE ARE CONCRETE THRUST BLOCKS LOCATED AT BENDS OR OTHER FITTINGS ON THE EXISTING MAIN. IT IS VERY IMPORTANT NOT TO DISTURB THE BEARING SOIL BEHIND THE THRUST BLOCK TO AVOID FAILURE OF THE EXISTING PRESSURE MAIN. IF EXCAVATION AROUND EXISTING THRUST BLOCKS CAN NOT BE AVOIDED THEN THE EXISTING PRESSURE MAIN SHALL BE TAKEN OFF LINE DURING THE EXCAVATION WORKS.

PROPOSED SERVICES

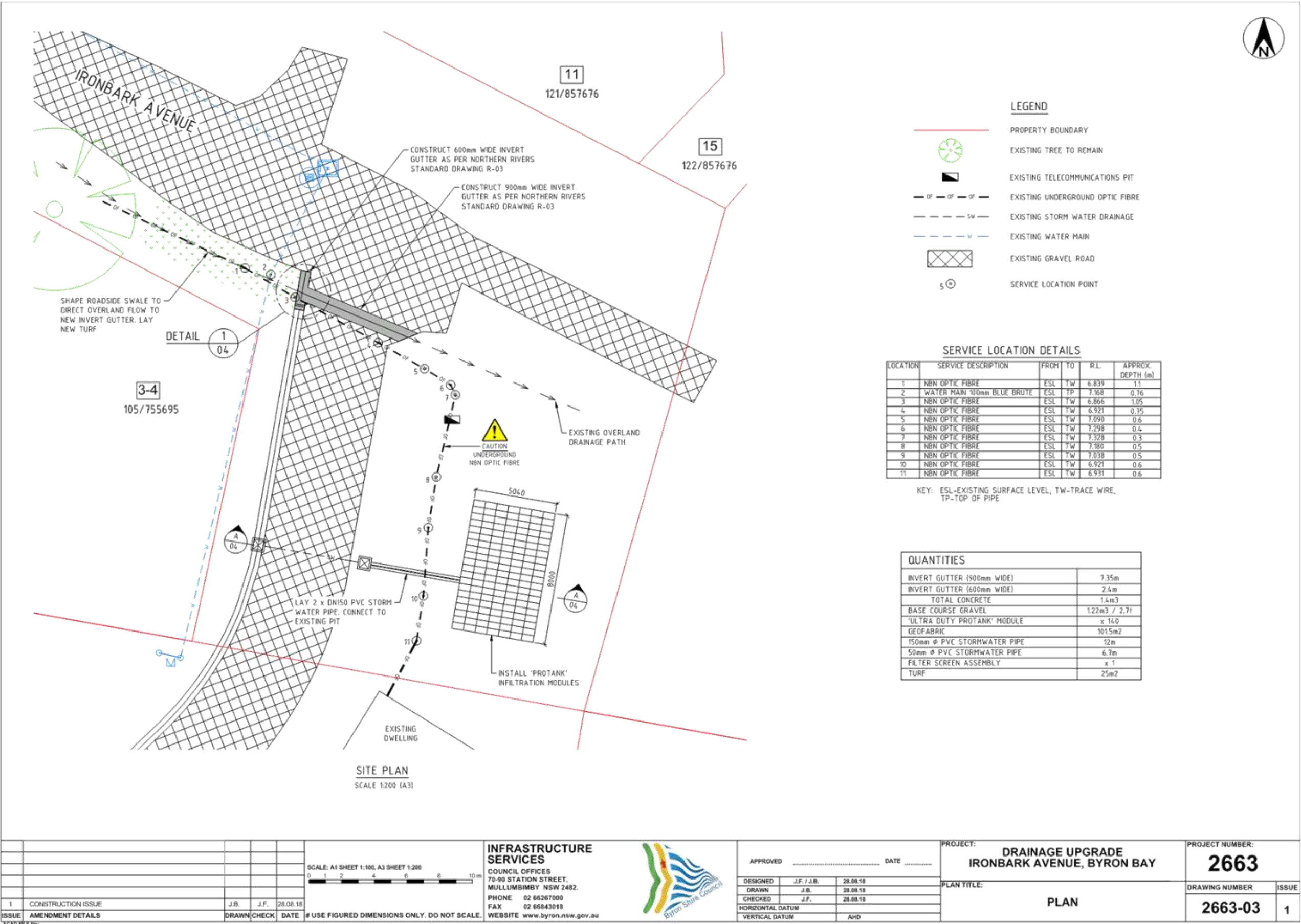
1. AFTER LAYING AND JOINTING OF A PIPELINE HAS BEEN COMPLETED THE CONSTRUCTOR SHALL PRESENT THE LAID AND JOINTED PIPES FOR INSPECTION BY THE CONSTRUCTION ENGINEER PRIOR TO COMMENCEMENT OF TRENCH BACKFILLING. (WSA 02 2002, SECTION 21).
2. BACKFILL SHALL NOT BE PLACED UNTIL THE CONSTRUCTION ENGINEER HAS GIVEN APPROVAL.
3. MATERIAL FOR THE SIDE SUPPORT AND OVERLAY OF THE PIPE SHALL BE AS FOR PIPE BEDDING SPECIFIED IN CLAUSE C402.23. THE MATERIAL SHALL BE COMPACTED IN LAYERS OF NOT MORE THAN 150mm TO 95 PER CENT OF THE STANDARD MAXIMUM DRY DENSITY OF THE MATERIAL USED WHEN DETERMINED IN ACCORDANCE WITH AS 1289.5.7.1. 4.
4. THE CONSTRUCTOR SHALL BACKFILL THE REMAINDER OF THE EXCAVATION AND COMPACT THE BACKFILL IN LAYERS OF NOT MORE THAN 150mm THICK IN ACCORDANCE WITH WSA 02-2002 PART 3, SECTION 21.1.
5. WHERE THE TRENCH IS WITHIN A ROADWAY, PROPOSED ROADWAY, OR FOOTPATH AREA, THE REMAINDER OF THE TRENCH SHALL BE:
 - BACKFILLED WITH A NON-COHESIVE GRANULAR MATERIAL, WITH A GRADING FALLING GENERALLY WITHIN THE LIMITS SHOWN IN TABLE C402.3, AND COMPACTED TO DENSITY INDEX OF 70 WHEN DETERMINED IN ACCORDANCE WITH AS 1289.5.4.1 FOR COHESIONLESS MATERIALS
 - A. BELOW 0.5m OF THE ROAD SURFACE
 - B. IN THE ROAD RESERVE, BUT EXCLUDING THE ROAD PAVEMENT
 - BACKFILLED WITH EXCAVATED MATERIAL, AND COMPACTED TO 100 PER CENT OF THE STANDARD MAXIMUM DRY DENSITY OF THE MATERIAL WHEN DETERMINED IN ACCORDANCE WITH AS 1289.5.7.1, TO WITHIN 0.5m OF THE ROAD SURFACE, BUT EXCLUDING THE PAVEMENT LAYERS.
 - BACKFILLED WITH ROAD BASE AND SUB-BASE MATERIAL AS PER EXISTING OR PROPOSED PAVEMENT LAYERS AND COMPACTED TO 100 PER CENT OF THE STANDARD MAXIMUM DRY DENSITY OF THE MATERIAL WHEN DETERMINED IN ACCORDANCE WITH AS 1289.5.7.1
 - ELSEWHERE, UNLESS STATED OTHERWISE, THE REMAINDER OF THE TRENCH SHALL BE BACKFILLED WITH ORDINARY EXCAVATED BACKFILL MATERIAL. WHERE SUITABLE MATERIAL IS NOT AVAILABLE, GRANULAR MATERIAL MAY BE USED FOR THE FULL DEPTH OF BACKFILLING. THE MATERIAL SHALL BE COMPACTED TO A DENSITY INDEX OF 70 WHEN DETERMINED IN ACCORDANCE WITH AS 1289.5.4.1 FOR COHESIONLESS MATERIALS OR 98 PER CENT OF THE STANDARD MAXIMUM DRY DENSITY OF THE MATERIAL WHEN DETERMINED IN ACCORDANCE WITH AS 1289.5.7.1 FOR COHESIVE MATERIALS.
6. THE CONSTRUCTOR SHALL CARRY OUT BACKFILLING AND COMPACTION WITHOUT DAMAGING THE PIPE OR ITS EXTERNAL COATING OR WRAPPING OR PRODUCING ANY MOVEMENT OF THE PIPE.
7. THE CONSTRUCTOR SHALL CARRY OUT COMPACTION TESTS 75mm TO 100mm BELOW THE LEVEL BEING TESTED (WSA 02-2002 PART 3, SECTION 22.3).
8. THE CONSTRUCTOR MAY COMPACT BACKFILL BY TRENCH FLOODING ONLY WHERE:
 - (A) THE GROUND AND BACKFILL MATERIAL IS COHESIONLESS AND
 - (B) WATER FOR FLOODING HAS BEEN SOURCED AT THE SITE.
 - (C) THE PROCESS WILL NOT CREATE MUD WHICH WOULD BE MOVED OFF SITE BY VEHICLES OR CONSTRUCTION PLANT.
 - (D) ADDITIVES ARE NOT USED.

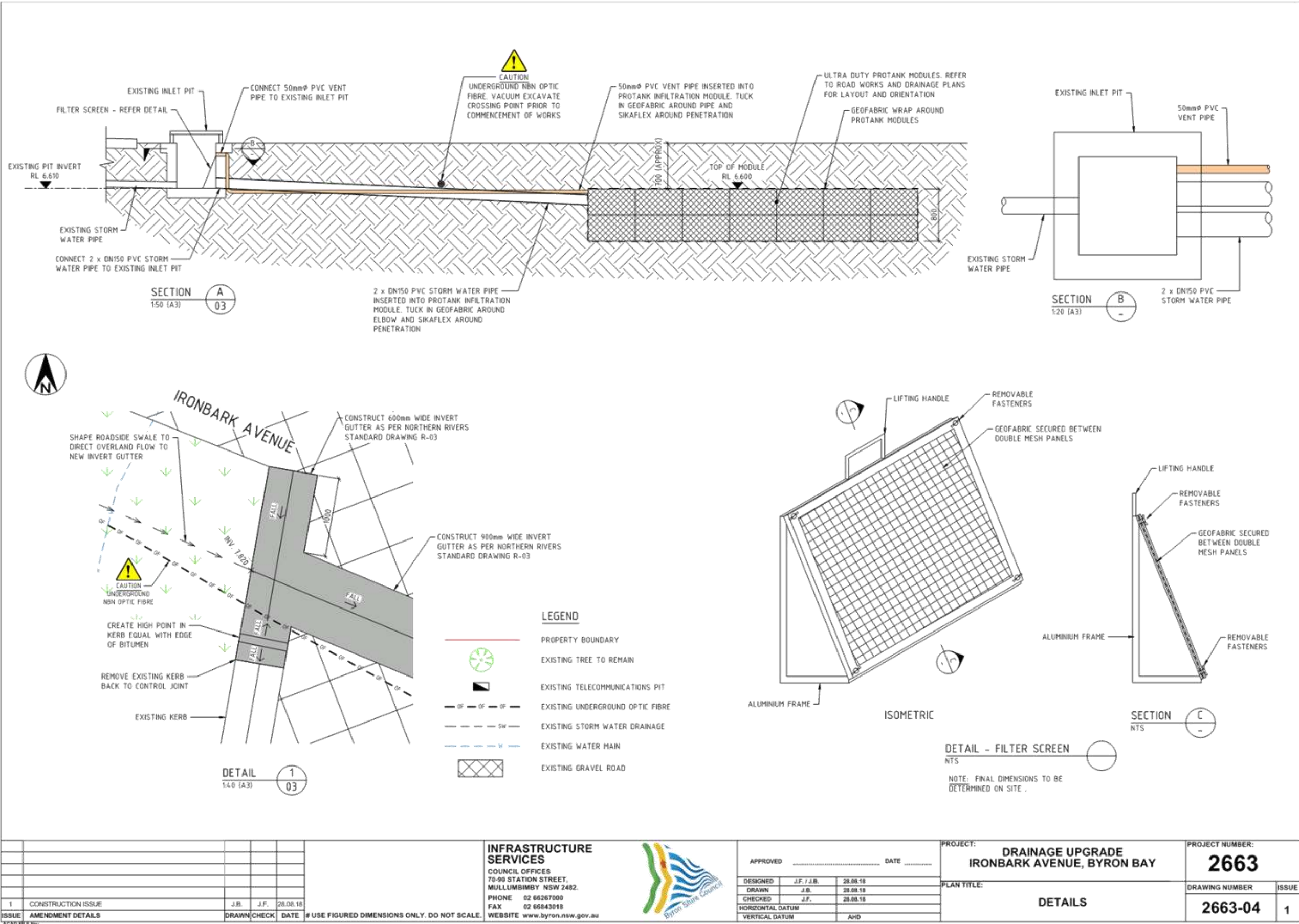
CONCRETE

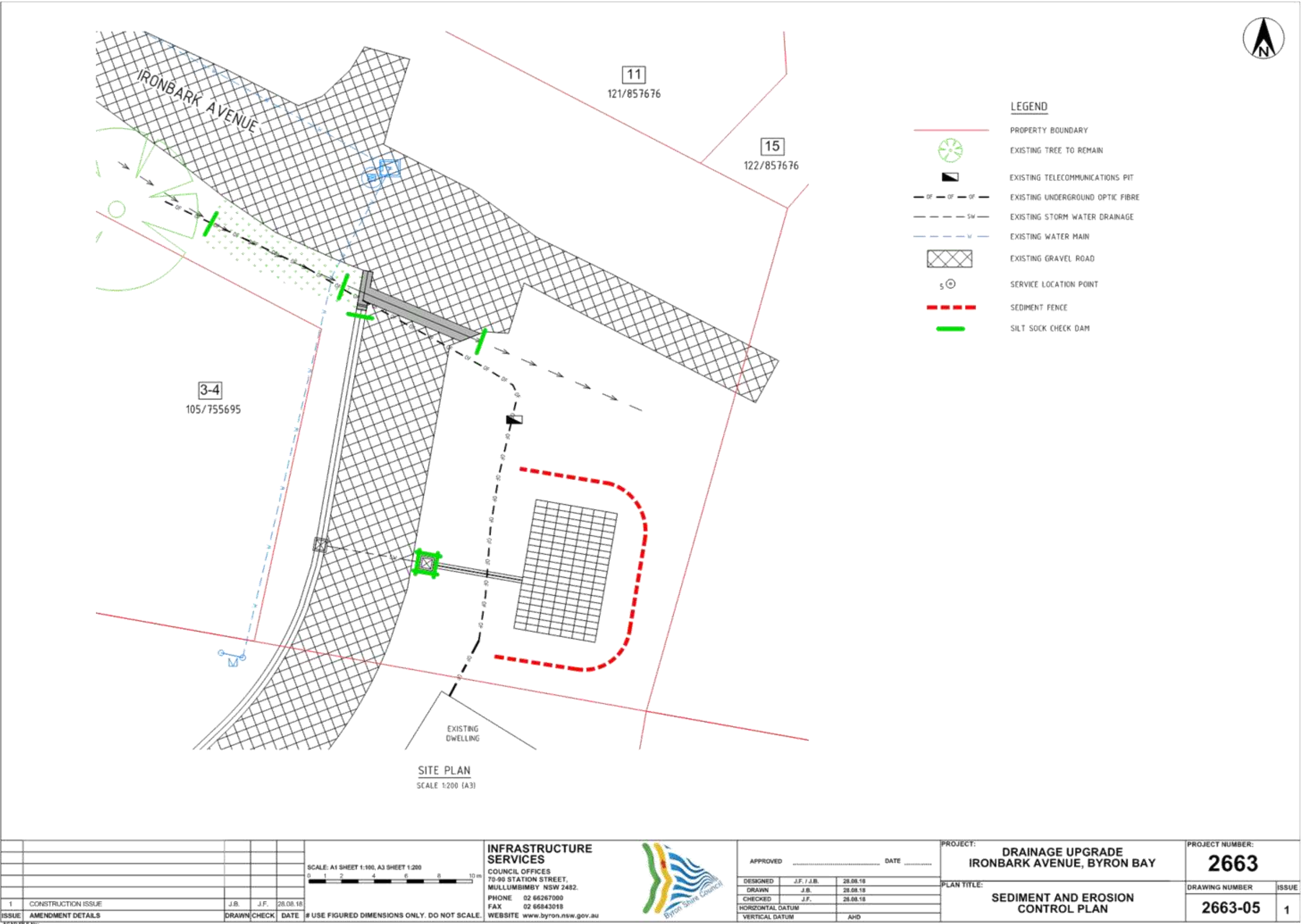
ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH A.S.3600,
CURRENT EDITION WITH AMENDMENTS

1. CONCRETE QUALITY (UNLESS OTHERWISE SHOWN) SHALL BE AS FOLLOWS
 - COURSE AGGREGATE - MAXIMUM SIZE 20mm
 - CEMENT - TYPE "A" PORTLAND CEMENT.
 - CONCRETE SHALL HAVE THE FOLLOWING SLUMP DURING PLACEMENT
 - BEAMS SLABS AND FOOTINGS 80mm
 - COLUMNS AND WALLS 80mm
2. SLAB JOINTS SHALL BE PLACED AS FOLLOWS
 - FOOTPATHS - AS PER NORTHERN RIVERS LOCAL GOVERNMENT STANDARD DRAWING R-07
 - SLABS AND WALLS - REFER TO SLAB JOINTING PLAN WITHIN THIS DRAWING SET
 - SLAB SAWN JOINTS SHALL BE CUT WITHIN 24 HOURS OF SLAB POURING IN A NEAT AND STRAIGHT CUT.
3. ALL SPATTER TO SURROUNDING SURFACES SHALL BE CLEANED UP IMMEDIATELY
4. COVER TO REINFORCEMENT SHALL BE OBTAINED BY THE USE OF PLASTIC BAR CHAIRS WITH MAXIMUM SPACING OF 800mm IN ANY DIRECTION
5. ALL CONCRETE SHALL BE COMPACTED USING HIGH FREQUENCY VIBRATORS.
6. CURING OF CONCRETE SURFACES SHALL COMMENCE IMMEDIATELY AFTER SURFACES ARE FINISHED AND SHALL CONTINUE TO CURE FOR A MINIMUM OF 7 DAYS
7. SLABS WITH SPECIFIC ROUGH FINISHES SHALL BE KEPT FREE OF BLEED WATER AND FLOATED TO PREVENT THE FORMATION OF PLASTIC SHRINKAGE CRACKS.

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