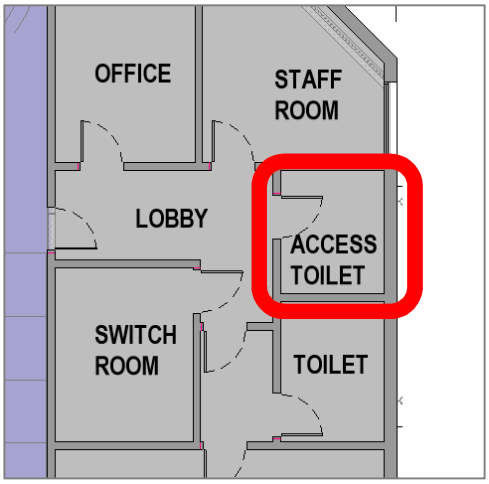
BCA Part E3 – LIFT INSTALLATIONS

Cl. E3.6: Passenger lifts

DtS Provision	Comment(s)/Recommendation(s)	Status
Every passenger lift must – • be one of the types identified in Table E3.6a, subject to the limitations on use specified in the Table; and • have accessible features in accordance with Table E3.6b; and • not rely on a constant pressure device for its operation if the lift car is fully enclosed.	1x Passenger lift is proposed. The proposed passenger lift shall have the following features – • Handrail complying with the mandatory handrail provisions of AS1735.12, • Lift floor dimensions not less than 1,400mm x 1,600mm where the lift vertical travel is greater than 12m – or – 1,100mm x 1,400mm where the vertical travel is less than 12m. • Minimum clear door opening complying with AS1735.12, • Passenger protection system complying with AS1735.12, • Lift landing doors at the upper landing, • Lift car and landing control buttons complying with AS1735.12, • Lighting in accordance with AS1735.12, • Automatic audible/visual information within the lift car and at the landings as prescribed, • Emergency hands-free communication, including a button that alerts a call centre of a problem and a light to signal that the call has been received. A design compliance certificate should be obtained from the lift designer to confirm compliance with the relevant provisions of the BCA and Australian Standards.	CoC

BCA Part F2 – SANITARY AND OTHER FACILITIES

Cl. F2.4: Accessible sanitary facilities

DtS Provision	Comment(s)/Recommendation(s)	Status
In a building required to be accessible: • Accessible unisex sanitary compartments must be provided as in accordance with Table F2.4(a), • Accessible unisex showers must be provided in accordance with Table F2.4(b), • At each bank of toilets where there is one or more toilets in addition to an accessible unisex sanitary compartment at that bank of toilets, a sanitary compartment suitable for a person with an ambulant disability in accordance with AS 1428.1 must be provided for use by males and females. • An accessible unisex sanitary compartment must contain a closet pan, washbasin, shelf or bench top and adequate disposal of sanitary towels. • Circulation spaces, fixtures and fittings of all accessible sanitary facilities must comply with AS1428.1. • An accessible unisex sanitary facility must be located so that it can be entered without crossing an area reserved for one sex only; and • Where two or more of each type of accessible unisex sanitary facility are provided, the number of left and right handed mirror image facilities must be provided as evenly as possible.	**Accessible Sanitary Facilities** Amended plans indicate an accessible unisex sanitary facility.  Compliance is readily achievable with minor design development at detailed design stage. **Ambulant Sanitary Facilities** <u>Design Detail</u> Ensure ambulant sanitary facilities are provided for used by males & females in addition to an accessible unisex sanitary facility. Ambulant facility compliance is readily achievable with minor design development at detailed design stage.	CoC

3.0 ACCESSIBILITY COMPLIANCE STATEMENT

This report has provided a review of the relevant project concept design documentation to determine the compliance status of the proposed development against Part D3, Clause E3.6 and Clause F2.4 'deemed-to-satisfy' (DtS) requirements of the Building Code of Australia 2016 (BCA), The Disability (Access to Premises - Buildings) Standards 2010 and the pertinent Australian Standards.

Following this review and with the adoption of the recommendations/Performance Solutions proposed, ABE Consulting are able to confirm that at the Development Application documentation can readily achieve compliance with the aforementioned BCA provisions.

4.0 REVIEW PROVIDED BY

Prepared by:	**Reviewed by:**
 **Sam Freeman** Assistant Accessibility Consultant	 **Abe Strbik** Director Member - Association of Consultants in Access Australia # 405

deep end services

Proposed ALDI Store, Merimbula Retail Impact Report

ALDI Stores Ltd
21 September 2017

Deep End Services
Deep End Services is an economic research and property consulting firm based in Melbourne. It provides a range of services to local and international retailers, property owners and developers including due diligence and market scoping studies, store benchmarking and network planning, site analysis and sales forecasting, market assessments for a variety of land uses, and highest and best use studies.

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Document Name
ALDI Merimbula Retail Impact Report - 21 Sept 2017
21.09.17

Contents

Tables + Figures

1

Introduction

Deep End Services has been engaged by ALDI Stores to provide an independent retail demand and impact report for a proposed freestanding ALDI store in the Merimbula Town Centre. The site is a former Council library and car park at 103 Main Street. Under the Bega Valley Local Environmental Plan (LEP) 2013, the land is Zone B2 Local Centre where a supermarket is a permitted use, with consent.

The proposed ALDI store is the first and only ALDI store in the Bega Valley Shire – the next nearest stores being at Cooma (130 km inland) and Batemans Bay (180km north). The new store will bring additional choice to the limited range of supermarket brands in Merimbula and Tura Beach and should draw customers from other main settlements in the Shire.

This report is provided to meet a request by Bega Valley Shire Council's Development Assessment Panel for an Economic Impact Assessment to accompany a development application on the site.

In preparing this report, the subject site and nearby areas and centres were inspected. All references to spending and sales or turnover levels are at constant 2016 prices and include GST.

2

Local and regional context

The Bega Valley Shire – also known as the Sapphire Coast - is the southernmost local government area of NSW, extending from Bermagui in the north to Eden and the state border in the south. The coastal and hinterland area of over 6,000 square kilometres has 75% of its area in national parks and state forests.

About 60% of the Shire's population of 33,946 people (2016 Census) live in the six main settlements of Merimbula – Tura Beach, Bega, Eden, Tathra, Pambula and Bermagui. The coastal towns are popular lifestyle areas where retirees and families are drawn to the temperate climate, beaches, State forests, camping grounds and recreation pursuits. Holiday homes are a feature of the coastal area supporting large seasonal populations.

Merimbula and the adjoining settlement at Tura Beach have a combined population of 7,672 people. The towns are generally well-provided with amenities while higher level services are at Bega, 30km north.

Merimbula and its satellite villages of Tura Beach and Pambula have the largest urban population and are the principal tourist areas on the Sapphire Coast. The town lies on the Princes Highway about 7 hours-drive from Melbourne, 6 hours from Sydney and 3 hours Canberra.

Merimbula is one of the few centres on the NSW South Coast with its own regional airport with daily Regional Express (Rex) services to Melbourne and Sydney.

Figure 1—Region context

Source: Deep End Services

2.1 Population growth

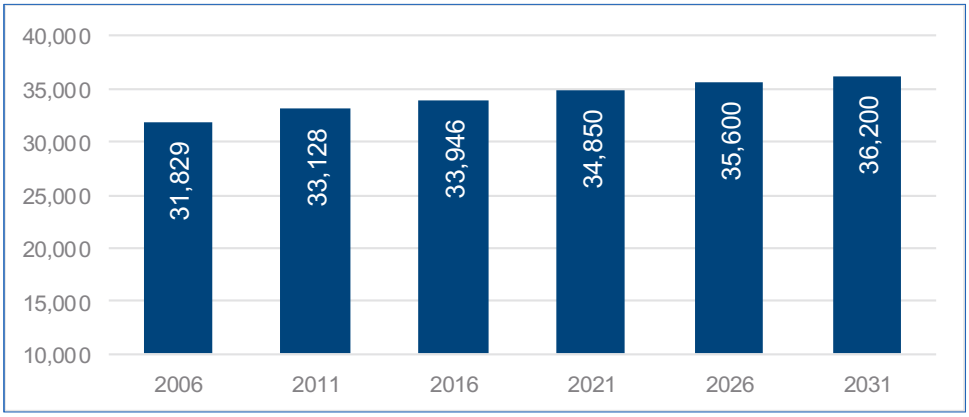
The Bega Valley Shire's 2016 estimated resident population of 33,946 people has grown by 2,117 people in the last ten years (refer Figure 2). The average growth of 0.6% per annum is below the Regional NSW average (0.9% per annum) however development and new residents have been concentrated in the main coastal towns.

The most recent State Government forecasts (Department of Planning & Environment 2016) show that by 2031 the population of Bega Valley is projected to increase to **36,200 people -** an increase of 2,250 people over 15 years. Alternative forecasts by specialist demographers, id. consulting, project a much higher population of **37,421 people** by 2031.

Both forecasts show further ageing of the population base. Id. predict the population aged 60 years and over in the Shire will increase from 34.4% in 2016 to 42.1% in 2031. In Merimbula, the population over 60 years in 2016 is higher than the Shire average at 37.5% (.id). The older population base has less reliance on private vehicles and generally prefer shopping in town centres where there is a concentration of retailers and services to meet most of their needs.

Figure 2—Bega Valley Shire – population forecasts

Source: ABS; NSW Government, Department of Planning & Environment



2.2 Economy and tourism

The main employment sectors in Bega Valley are retail, tourism, agriculture, manufacturing, health and education. Timber production and dairy farming are significant industries with Bega Cheese one of the largest employers in the area. Commercial fishing from Eden and oyster harvesting are also important.

Tourism is vital to the Shire's economy, mainly in the coastal towns with commercial accommodation, game fishing and whale watching.

Sapphire Coast Tourism publishes estimates of tourist visitation to the Shire. The last available data from January 2017 (refer Table 1) indicates 351,000 day trippers and 489,000 other visitors per annum, staying over 2 million visitor nights. The equivalent resident population is 5,620 people (2.052 million / 365 days) or an effective annual increase in Bega Valley Shire's population of +16.6%.

Visitors spend an estimated $350 million per annum in the Shire, much of which flows to retail and other services. Merimbula, a key tourist destination for the Shire, attracts a significant share of this spending which is generally directed to accommodation, cafes and restaurants, takeaway, food and other retail trade.

The tourism industry is estimated to support over 3,500 direct and indirect jobs on the Sapphire Coast.

Table 1—Bega Valley Tourism

Source: Sapphire Coast Tourism update Jan 2017

	Domestic daytrippers	Domestic overnight	International	Total visitors
Visitors	351,000	462,000	27,000	840,000
Visitor nights	n.a.	1,920,000	132,000	2,052,000
Average length of stay (nights)	n.a.	4.2	4.9	2.4

3

ALDI Merimbula

3.1 ALDI site

The L-shaped 4,917 sqm site is situated in the heart of the Merimbula Town Centre at 103 Main Street (refer Figure 3). The land sits at the elevated, northern end of the town centre where several national retailers and clubs have established on larger sites. Regional traffic enters the town at the western end of Main Street from Merimbula Drive (off the Princes Highway) or from Sapphire Coast Drive - the coastal road north to Tura Beach and Tathra. East of the site, the commercial area turns south onto Market Street and transitions to a finer grain of shops, cafes, banks, restaurants and services, extending down to Merimbula Lake.

The site has a former Council building and public car park which will be cleared to make way for the free-standing ALDI store. Former uses on the site include Council administration offices, public library and squash courts.

Adjoining uses and others along Main Street (refer Figure 3) close to the site include:

- A commercial building to the east with an accountant, hairdresser, beautician and pizza tenancies with a right-of-way leading to a rear off-street car park.
- Immediately west of the site, the former car park of the Bowling Club which is being redeveloped for a new Woolworths supermarket.
- West of the Woolworths site is the existing Merimbula – Imlay Bowling Club. As the largest building in Merimbula, it is a major social and recreation facility for the community located at the main western entry to the Town Centre.
- An existing Woolworths store directly opposite the ALDI site. It is assumed Woolworths will exit its existing premises when its new store opens in 2018.
- A twin cinema complex beside Woolworths.
- Two national fashion and homeware tenancies in Best & Less and Target Country.
- The Merimbula RSL club on Main Street, 100 metres east of the ALDI site.

Figure 3—Site location

Source: NSW Planning & Environment; Deep End Services

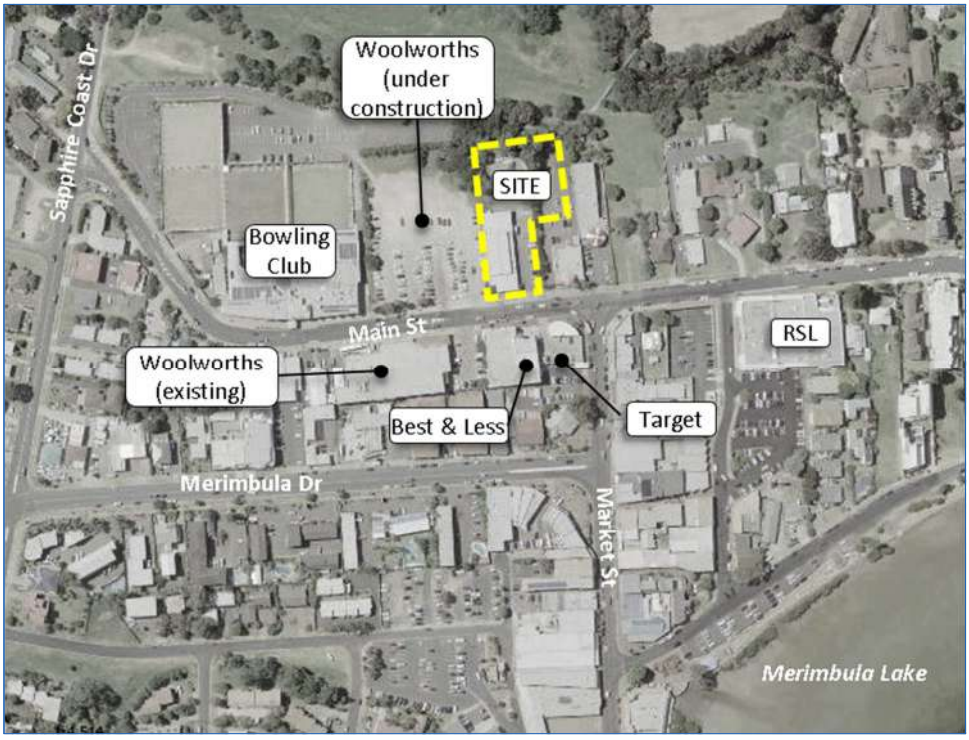


Figure 4—View of site and surrounds from Main Street

The site is zoned B2 Local Centre under the Bega Valley LEP 2013 (refer Figure 5). Amongst the objectives of the B2 zone are:

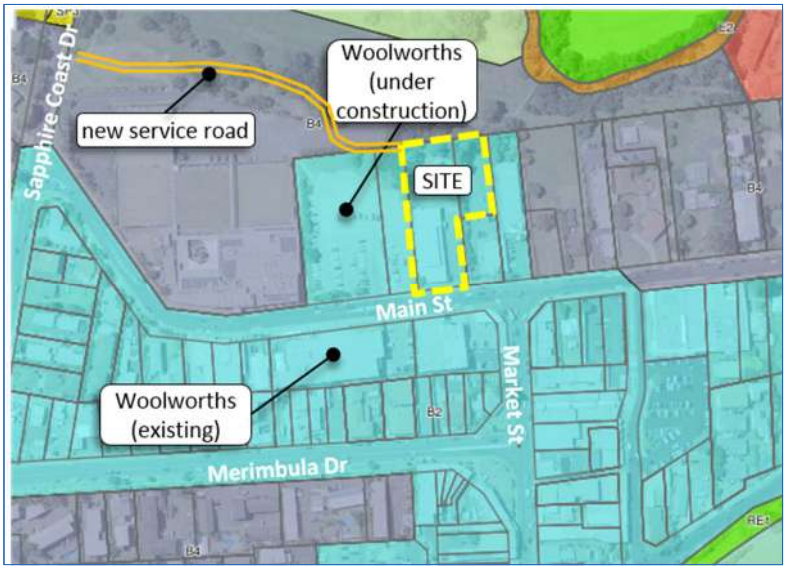
- *To provide a range of retail, business, entertainment and community uses that serve the needs of people who live in, work in and visit the local area.*
- *To encourage employment opportunities in accessible locations.*

- *To enable other land uses that are complementary to, and do not detract from, the viability of commercial uses within the zone.*
- *To strengthen the viability of existing business centres as places for investment, employment and cultural activity.*

Under the B2 zone, "Commercial premises" are permitted with consent.

Figure 5—Bega Valley LEP zones

Source: NSW Planning & Environment; Bega Valley LEP 2013



3.2 Proposed development

The proposed site plan (refer Figure 6) shows a freestanding ALDI store of 1,278 sqm (gross floor area) positioned at the rear of the L-shaped site.

On-site parking is provided for 101 cars – 63 spaces on-grade off Main Street and 38 spaces in a lower under-croft level. The development will have an access lane along its east boundary off Main Street, providing access to the grade car park before ramping down to the lower parking level.

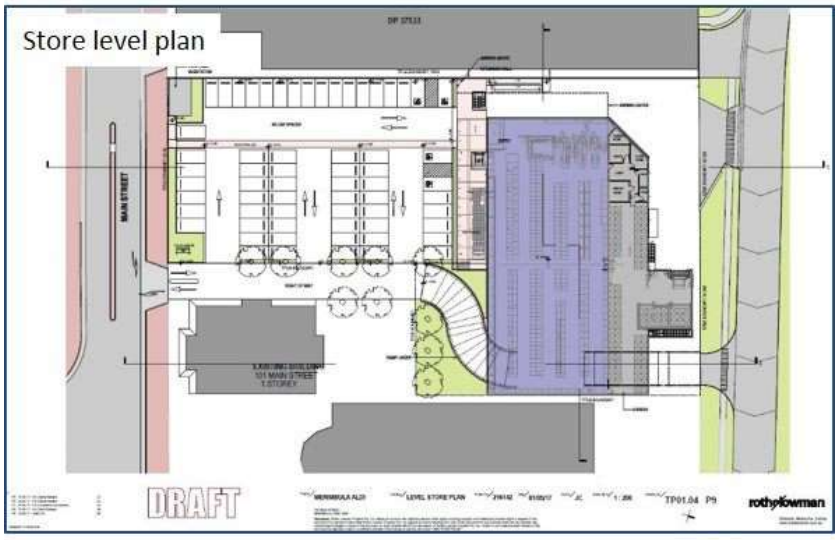
A new rear access road currently under construction from Sapphire Coast Drive along the northern (rear) side of the bowling club and new Woolworths site will be extended to the rear of the ALDI site to facilitate truck access and a secondary customer entry point into the basement carpark.

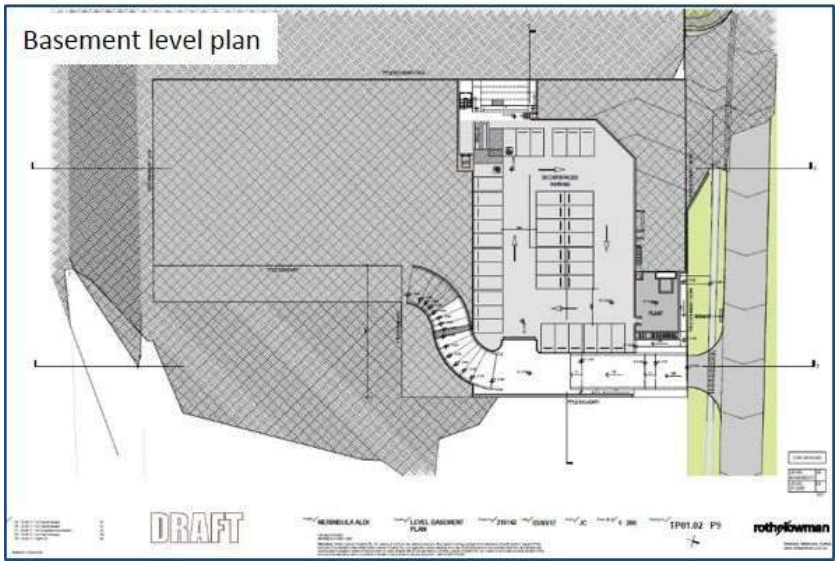
Customers parking in the under-croft level can access the store by ramp or lift.

The ALDI store will provide a convenient supermarket option for residents, visitors and tourists to Merimbula. The location adjacent to Woolworths consolidates the food and grocery options at a central point and enables cross shopping for customers to both stores. ALDI will also provide an important choice and point of difference to Woolworths' who have a dominant position, operating the only supermarkets at Merimbula and Tura Beach.

Figure 6—Site plans

Source: Rothelowman





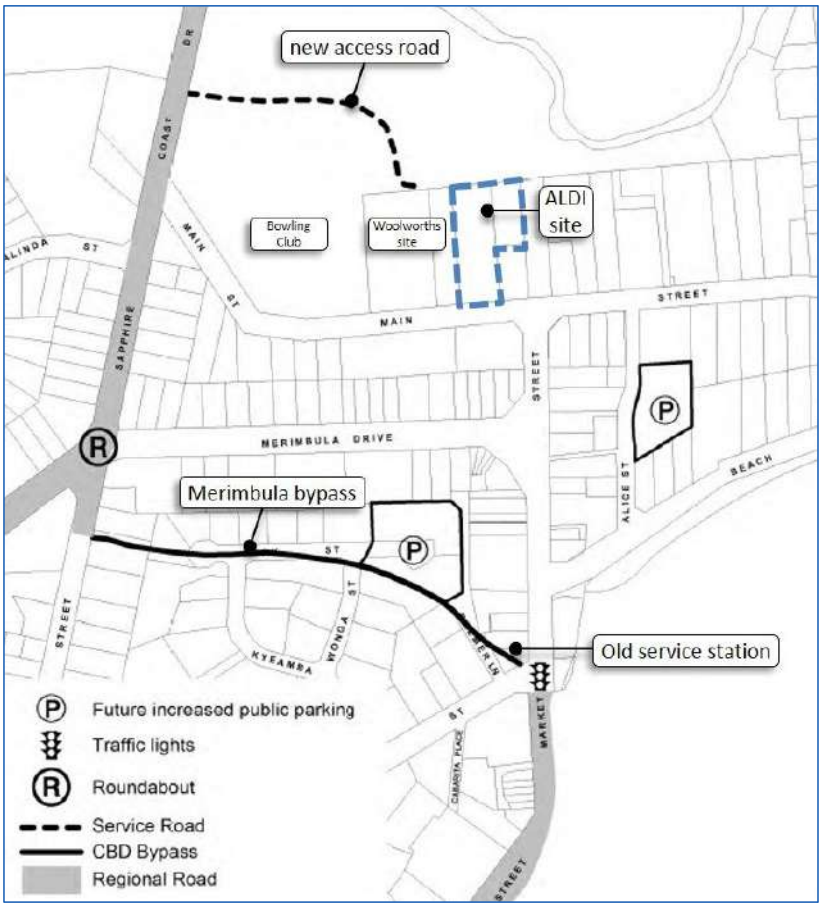
3.3 Town Centre traffic improvements

Two road projects are complete or underway in the Merimbula Town Centre (refer Figure 7):

- The Merimbula bypass now redirects traffic from Sapphire Coast Road south of Merimbula Drive and through to Market Street, easing traffic levels and congestion on Main Street and Market Street.
- A road is being constructed from Sapphire Coast Road, providing a new rear access point to the Bowling Club and new Woolworths site. The ALDI development is reliant on an extension of the new access road to the ALDI site for loading and a second customer entry point.

Figure 7— Merimbula Town Centre – changes in road network

Source: Bega Valley Development Control Plan 2013



4

Bega Valley centres

This section provides an overview of the centres and supermarket competition in Merimbula and nearby towns.

4.1 Centres Structure

The classification and role of centres in Bega Valley is outlined in the *Bega Valley Shire Commercial Strategy (2006)*[1]. It identifies the following:

- Bega as the regional centre providing the higher order commercial, administration and retail functions for the Shire.
- District centres at Merimbula, Pambula, Eden and Tathra servicing the weekly needs of local communities and hinterland areas.
- Neighbourhood Centres (including Tura Beach) providing basic day-to-day needs of residents.

For this report, a retail occupancy survey was undertaken across the southern towns of Bega Valley to establish the existing supply of retail floorspace and the levels of vacant and occupied floorspace. The results are summarised in Table 2 and Figure 9 and the township locations and their supermarkets are in Figure 8.

Table 2—Centres floorspace

Source: Deep End Services June 2017 survey

Commercial area	Smkts	Other food & drink	Non-food & services	Total retail	Non-retail	Vacant	Total floorspace	Vacant % of total	Major food tenants
Merimbula	2,355	3,764	10,521	16,640	4,102	1,935	22,677	8.5%	Woolworths
Tura Beach	3,397	580	1,743	5,720	1,270	440	7,430	5.9%	Woolworths
Pambula	220	1,460	3,610	5,290	2,050	245	7,585	3.2%	Foodworks
Tathra	320	470	490	1,280	80	-	1,360	0.0%	Friendly Grocer
Eden	2,765	1,875	5,164	9,804	2,704	1,396	13,904	10.0%	Coles, IGA
Total	9,057	8,149	21,528	38,734	10,206	4,016	52,956	7.6%	

Non-retail includes medical, offices, entertainment but excludes auto dealerships and hotels.

[1] Centres definitions page 2 and 3

Figure 8—
Townships and
supermarkets

Source: Deep End
Services; MapInfo

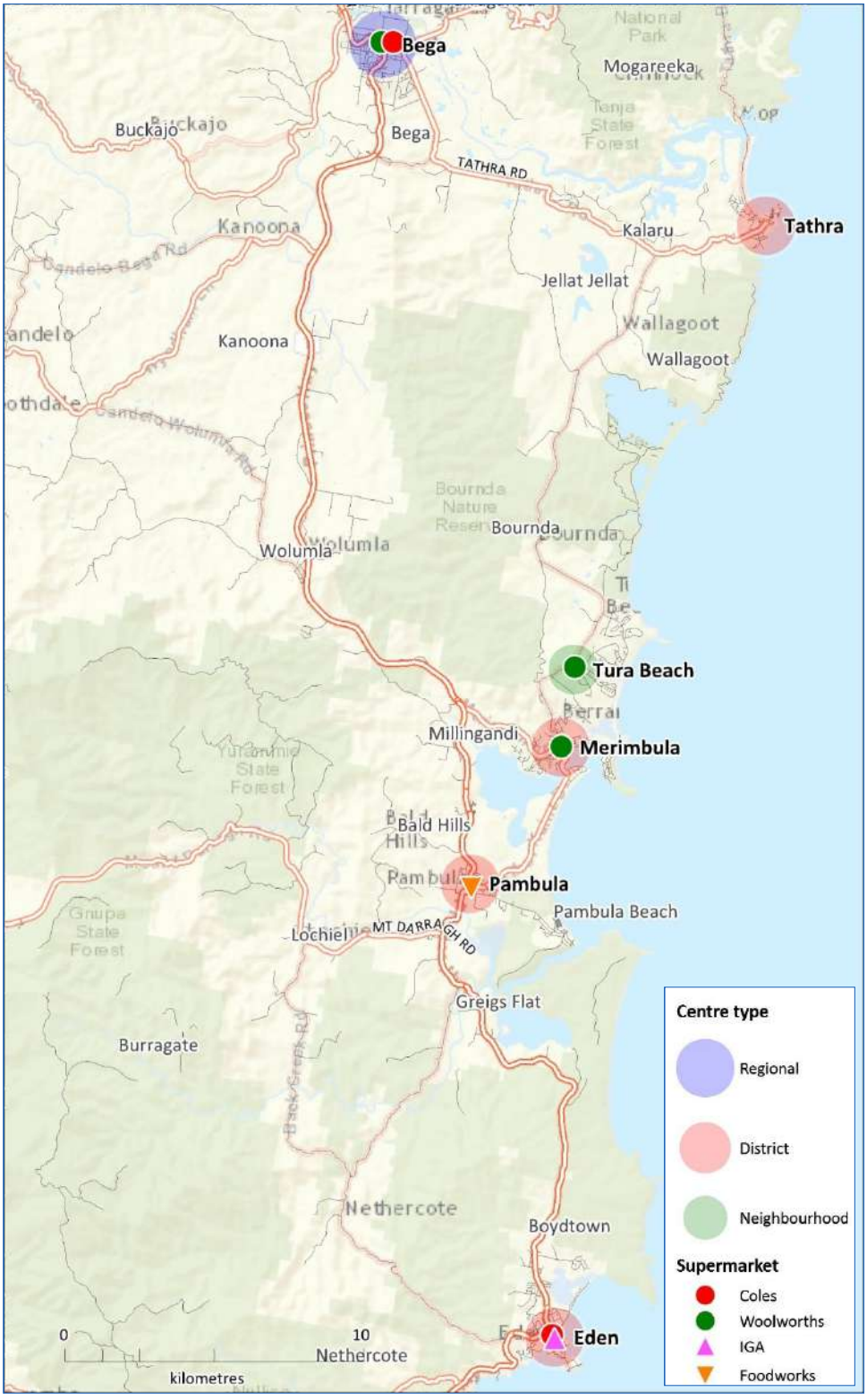
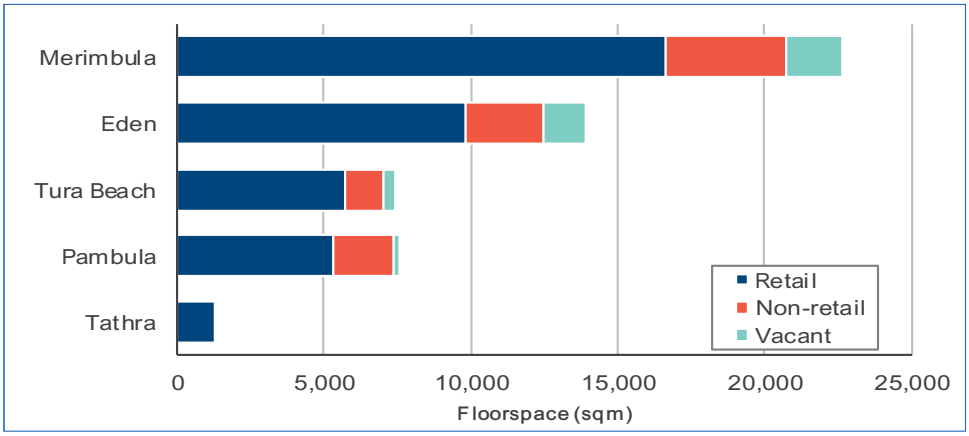


Figure 9—
Floorspace mix

Source: Deep End Services June 2017 survey



4.2 Merimbula

Merimbula is the secondary retail and commercial centre in Bega Valley (below Bega) with 16,640 sqm of retail floorspace.

The town centre has evolved over many years from initially servicing a small, isolated coastal community to a vibrant commercial area with national retailers servicing a large district population and the seasonal influx of visitors which more than double the town's population over summer. The topography of Merimbula has restricted the Town Centre to two street sections rather than a typical grid pattern found in centres such as Bega.

The town broadly caters to the weekly food and services needs of its residents and offers some national retailers in basic clothing and homewares and professional and personal services in various office suites. Leisure, entertainment and club venues are well-positioned in the town centre and are close to accommodation venues.

Woolworths (2,355 sqm) is the only supermarket in Merimbula, a position it has held for about 10 years since the closure of the (former) small BI-LO supermarket at the lower end of Market Street. Woolworths has operated its (now) older style supermarket since 1996 when it acquired an independent supermarket chain operating in Canberra and the south coast, known as Cannons.

The existing Woolworths store has floor area and parking limitations and has proven difficult to expand. Its sales have probably been impacted by the opening of the Tura Beach Woolworths in 2010.

A new 4,020 sqm Woolworths – replacing the existing store - is under construction opposite the existing store and on the western boundary of the ALDI site. The development will have grade parking for 70 cars and a full basement parking level across the site. Each parking level has a separate entry / exit point to Main Street and an entry to the basement level off the new rear access road.

Excavation has commenced on site and the new store is scheduled to open in 2018. The existing Woolworths store is on the market and will likely revert to a non-supermarket use.

At the upper Main Street level, other Town Centre uses include a 2-screen cinema complex and national retailers, Best & Less and Target Country.

Market Street - from Main Street down to Merimbula Lake - has most of the town's specialty shops and services, many catering to the tourist and visitor market. In this section, several arcades extend from Market Street through to the Alice Street and Park Street carparks.

The main findings of the land use and occupancy survey at Merimbula are as follows:

- Merimbula has a small but adequate range of fresh or specialty food retailers including two liquor stores (BWS and Cellarbrations), a butcher, two bakeries, a health food store, fresh seafood and the Merimbula Fresh Food Market.
- There are 30 cafes, restaurants and takeaway food retailers underlining the seasonal influx of visitors and tourists.
- Non-food retailers include Target Country (820 sqm), Harris Scarfe Home and a range of other retailers catering to the local and visitors market, including boutique homewares, giftware and fashion.

- Approximately 26 non-retail tenants (occupying 4,100 sqm) include the cinema centre on Main Street, offices, banks, gym, medical and other services.
- 14 vacant retail / commercial tenancies. These are estimated at about 1,935 sqm or about 8.5% of all retail and commercial floorspace.
- Several large entertainment venues on the edge of the retail area including the Lakeview Hotel at the southern end of Market Street and the Merimbula RSL and Club Sapphire (Bowling Club) at the east and west end of Main Street.

4.3 Tura Beach

The Neighbourhood Centre at Tura Beach is some 3.7 km (or 4-minute drive) north of Merimbula along Sapphire Coast Road. The centre serves the coastal subdivisions of Tura Beach and Mirador which have a permanent population of about 3,900 people (2016 Census).

Tura Beach has about 7,430 sqm of floorspace in two centres comprising:

- The Tura Beach Centre which opened in 2010 and is a modern neighbourhood-style centre with Woolworths (3,397 sqm), a large pharmacy, small Harvey Norman and several shops including BWS, newsagency, café, real estate office and one vacancy.
- An older and smaller local centre of 1,620 sqm to the east which has Beaumont Tiles, bakery, restaurants, op shops, dentist, community uses and a hairdresser. A new library is on the corner of Tura Beach Drive and Golf Circuit. Elsewhere, Tura Beach has a garden centre and two retail units to the rear of the old centre with a hairdresser, pool shop and non-retail tenants.

A Bunnings Warehouse (6,815 sqm) is proposed for the corner of Sapphire Coast Drive and Tura Beach Road directly opposite the shopping centre.

4.4 Pambula

Pambula is one of the older townships in Bega Valley, 7km inland and south-west of Merimbula. Pambula village and its local catchment of Pambula Beach, Pambula South, Bald Hills, Lochiel and Greigs Flat have a population of about 3,060 people. Pambula Beach is a well-known holiday area with holiday homes and camping areas.

The small catchment and holiday population supports a small village centre on the Princes Highway with a range of older shops with traditional awnings and verandahs.

Pambula has some 50 retail and non-retail uses occupying approximately 5,290 sqm. Food retailing includes a small Foodworks (220 sqm), a bakery, delicatessen (including takeaway), butcher, health store, wholefoods and liquor store. A 'fruit

market' sits just west of the village area. Pambula Village has the lowest vacancy rate of the main townships.

A small homemaker centre is on the south side of Bullara Street with carpet, furniture and bedding retailers. A light industrial area on the eastern approach has a bottle shop, hair and beauty and a pet store.

A development application for a supermarket of 920 sqm was approved on the north-east corner of Bullara Street and Merimbola Street in early 2017. This follows other approvals on the site for retail developments which have lapsed. At best, the proposal would be for a small IGA or Foodworks serving the local market.

4.5 Eden

Eden is a small coastal town of 3,100 people, 26 km south of Merimbula. The town has strong maritime influences with its fishing port and other marine and research industries and a small tourist market.

Under Council's Commercial Strategy, Eden is classified as a Local Centre. Surveys suggest about 13,900 sqm of shopfront floorspace along Imlay Street. The main elements are:

- A Coles supermarket of 2,015 sqm.
- An IGA of approximately 750 sqm.
- 42 shops and services, 23 non-retail tenancies and 15 shop vacancies.
- Specialist food shops include a bakery, delicatessen, fish monger and two liquor stores.

The centre caters to daily and weekly shopping needs of the local area which, like Merimbula, also has an older age profile. A basic convenience retail offer is provided as well as some services relevant to the local market including Service NSW, Employment and Forestry office. Higher order shopping and commercial needs are met in Merimbula or further north at Bega.

Approval has been given for a new shopping centre to include a Supa IGA and specialty shops by converting a former hotel on Imlay Street. It is understood Council has purchased the site and is looking to on-sell the property.

4.6 Tathra

Tathra is a coastal village of 1,589 people, 25km north of Merimbula. The Tathra Road connection back to the Princes Highway makes Tathra more closely aligned to Bega than Merimbula's catchment. There are ten retail businesses including a small Friendly Grocer (320 sqm), butcher, newsagent and liquor store.

5

Trade area analysis

This section defines Merimbula's likely trade area and assesses population and spending levels and demographic characteristics.

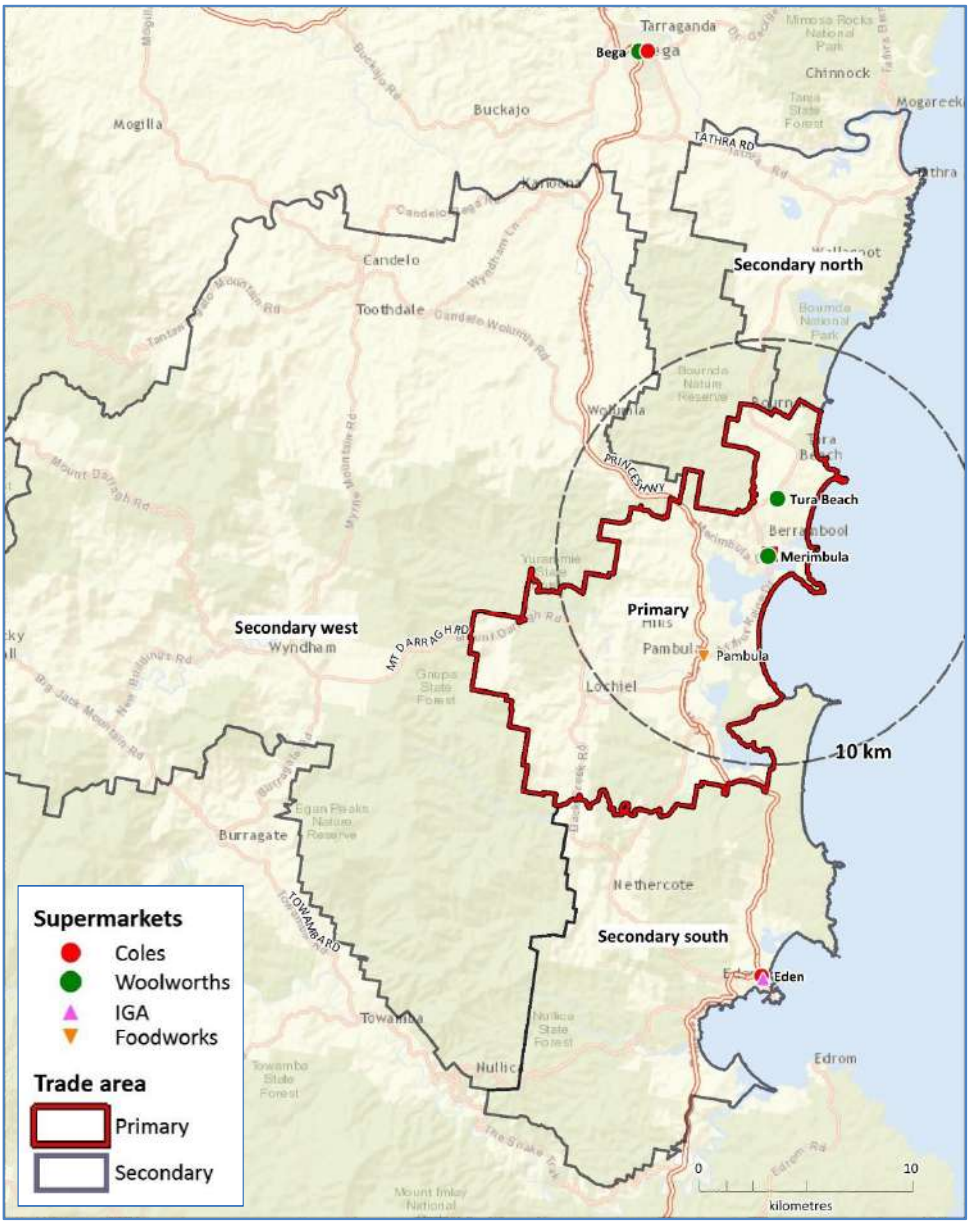
5.1 Trade area definition

The trade area for the proposed ALDI store takes in a broad coastal and inland area of the Bega Valley Shire (refer Figure 10) although the population is concentrated in the lower coastal villages. The trade area includes:

- A **primary trade area** covering Merimbula (2016 Census pop. 4,451), Tura Beach (pop. 3,221) and Pambula (pop. 944) and close rural areas.
- Three **secondary sectors** extending north to Tathra (pop. 1,589), south to Eden (pop. 3,104) and west into the hinterland and scattered rural areas and valleys of the Dividing Range.

Figure 10—
Merimbula trade area

Source: Deep End Services; MapInfo



5.2 Trade area population

The primary trade area had an estimated 11,420 people at December 2016 with 9,373 people in the three secondary sectors (refer Table 3). The total catchment is estimated at **20,793 people**, having increased by 1,807 people since 2006.

Population projections are largely based on the small area forecasts prepared by forecast.id for the Bega Valley Shire (March 2017).

Overall, the trade area is projected to grow from 20,793 people in 2016 to 21,925 people by 2023. An increase of 162 people per annum is consistent with historical growth trends.

The primary trade area has increased by 1,356 people in the last ten years with growth forecast to continue at historic rates. Areas of new housing are available at Mirador, Tura Beach and Pambula. Over 80% of total trade area growth is expected in the primary sector, with limited population growth elsewhere in the catchment.

Table 3—Trade area population

Source: Deep End Services; ABS; Forecast.id

Catchment area sector (December pop)	2006	2011	2016	2019	2021	2023
Population						
Primary	10,064	10,733	11,420	11,840	12,100	12,300
Secondary north	2,912	2,965	3,072	3,117	3,147	3,177
Secondary south	3,556	3,697	3,640	3,645	3,670	3,725
Secondary west	2,455	2,654	2,661	2,661	2,674	2,724
Total secondary	8,922	9,315	9,373	9,423	9,490	9,625
Total	**18,986**	**20,048**	**20,793**	**21,263**	**21,590**	**21,925**
Population growth (No. per annum)						
Primary	-	134	137	140	130	100
Secondary north	-	11	21	15	15	15
Secondary south	-	28	-11	2	13	28
Secondary west	-	40	2	0	6	25
Total secondary	-	79	12	17	34	68
Total	**-**	**213**	**149**	**157**	**164**	**168**
Population growth (% per annum)						
Primary	-	1.3%	1.2%	1.2%	1.1%	0.8%
Secondary north	-	0.4%	0.7%	0.5%	0.5%	0.5%
Secondary south	-	0.8%	-0.3%	0.0%	0.3%	0.7%
Secondary west	-	1.6%	0.1%	0.0%	0.2%	0.9%
Total secondary	-	0.9%	0.1%	0.2%	0.4%	0.7%
Total	**-**	**1.1%**	**0.7%**	**0.7%**	**0.8%**	**0.8%**

5.3 Population characteristics

Demographic data for the catchment area is provided in Table 4, compared to Regional NSW. Data is sourced from the 2016 Census. Where 2016 data is not yet available from the ABS for some variables, 2011 Census estimates are provided and referenced.

The primary catchment is characterised by:

- An older population base with 31% aged 65 years or over, compared to 21% in Regional NSW. The proportion aged 50-64 years is also larger than average.
- The older age structure is reflected in more lone-person households (31%) and couples without children (38%). This results in a low average household size of 2.16 (Regional NSW average of 2.44).
- At the 2011 Census, there was low workforce participation rate (49% vs 56%). 'Retail trade' and 'accommodation and food' were the largest industries by employment making up 31.6% of all jobs (Regional NSW 20%) in 2011. This data reflects Merimbula's service role and the impact of tourism.
- Household income levels are 15% below the Regional NSW average reflecting the older age profile and pension recipients. Common with older areas, home ownership levels are relatively high (49% vs 39%).

- A high proportion of unoccupied dwellings (19%), reflecting the number of coastal holiday homes and apartments.

The secondary north and south sectors have similar population profiles to the primary, with older age structures, low incomes and a high proportion of holiday homes.

The secondary west covers the inland farming areas north-west of Merimbula surrounded by national and state forests. This is a marginally younger area with a higher proportion of families with children.

ALDI generally has a broad appeal across all income levels and household groups. The population profile suggests it will have a particularly strong following with value-driven individuals and families across the trade area who are either older, on fixed pensions or retiree incomes or blue-collar workers and families.

Table 4—Trade area population and household characteristics, 2016

Source: Deep End Services; ABS Census of Population and Housing , 2016

Demographic characteristic (2016 Census)	Primary	Secondary north	Secondary south	Secondary west	Total catchment	Regional NSW
Persons and dwellings						
Usual resident population	11,142	2,992	3,568	2,612	20,314	2,656,237
Total private dwellings	6,102	1,540	1,754	1,168	10,564	1,203,868
- % unoccupied	19%	15%	13%	11%	17%	12%
Average household size [5][7]	2.16	2.23	2.19	2.46	2.21	2.44
At same address (2011 Census): [1]						
- 1 year ago	84%	85%	86%	88%	85%	85%
- 5 years ago	57%	64%	62%	66%	60%	62%
Economic indicators (2011 Census)						
Participation rate [2]	49%	56%	54%	56%	52%	56%
Unemployment rate [2]	5.0%	3.5%	8.6%	6.3%	5.6%	6.1%
White collar workers [2]	43%	48%	34%	44%	42%	45%
Bachelor degree or higher [2][3]	13%	19%	8%	12%	13%	12%
SEIFA	978	1,004	890	953	962	961
Age group						
0-9	9%	11%	10%	11%	10%	12%
10-19	10%	11%	10%	14%	11%	12%
20-34	11%	11%	12%	12%	11%	17%
35-49	15%	18%	16%	16%	16%	18%
50-64	24%	27%	24%	30%	25%	21%
65+	31%	23%	27%	17%	27%	21%
Average age	48.3	45.0	46.0	42.1	46.6	41.5
Annual individual income [2]						
<$15,600	18%	19%	23%	24%	20%	21%
$15,600 - $41,700	49%	41%	49%	44%	47%	42%
$41,700 - $78,200	23%	26%	21%	24%	23%	23%
$78,200 - $104,200	6%	8%	5%	5%	6%	7%
>$104,200	4%	6%	2%	3%	4%	6%
Average individual income	$39,586	$45,046	$33,714	$35,381	$38,926	$42,778
Variation from Regional NSW average	-7%	5%	-21%	-17%	-9%	-
Annual household income [1][3][5]						
<$33,800	27%	24%	33%	26%	28%	25%
$33,800 - $78,200	43%	42%	43%	42%	43%	37%
$78,200 - $130,300	19%	20%	18%	22%	19%	22%
$130,300 - $182,400	7%	8%	6%	8%	7%	9%
>$182,400	4%	6%	0%	3%	3%	7%
Average household income	$67,613	$75,577	$58,362	$69,284	$67,355	$79,157
Variation from Regional NSW average	-15%	-5%	-26%	-12%	-15%	-
Average household loan repayment	$19,841	$18,521	$17,447	$17,292	$18,886	$20,950
% of household income	19%	18%	21%	21%	20%	19%
Average household rent payment	$14,670	$14,056	$12,493	$8,855	$13,640	$14,721
% of household income	27%	25%	32%	25%	28%	23%
Country of birth [1]						
Australia	87%	90%	89%	88%	88%	88%
England	6%	4%	3%	5%	5%	3%
New Zealand	1%	1%	1%	1%	1%	1%
Netherlands	1%	1%	1%	1%	1%	0%
Germany	0%	1%	1%	1%	1%	0%
Scotland	1%	0%	1%	1%	1%	0%
Other	4%	3%	4%	3%	4%	7%
Top 4 regions of ancestry [1][4][8]						
North-West European	85%	91%	79%	83%	85%	77%
Oceanian	45%	44%	50%	50%	46%	48%
Southern and Eastern European	5%	5%	5%	4%	5%	7%
North-East Asian	1%	1%	1%	0%	1%	1%
Occupied private dwelling tenure [1][4][5][6]						
Fully owned	49%	44%	42%	44%	47%	39%
Being purchased	27%	33%	24%	42%	29%	32%
Rented	24%	23%	33%	14%	24%	29%
Dwelling type [1][4][7]						
Separate house	73%	87%	85%	99%	80%	84%
Townhouse/semi-detached	20%	6%	7%	1%	14%	9%
Apartment	7%	8%	8%	0%	6%	7%
Household composition [4][5]						
Couples with children	20%	26%	21%	26%	22%	28%
Couples without children	38%	34%	32%	39%	36%	29%
One parent family	9%	6%	12%	10%	9%	12%
Lone person	31%	32%	33%	22%	30%	28%
Group	2%	1%	3%	2%	2%	3%
Motor vehicle ownership per dwelling [1][5]						
None	5%	2%	7%	1%	4%	6%
One	41%	37%	40%	27%	39%	37%
Two	39%	46%	38%	46%	40%	38%
Three or more	15%	15%	15%	26%	16%	19%

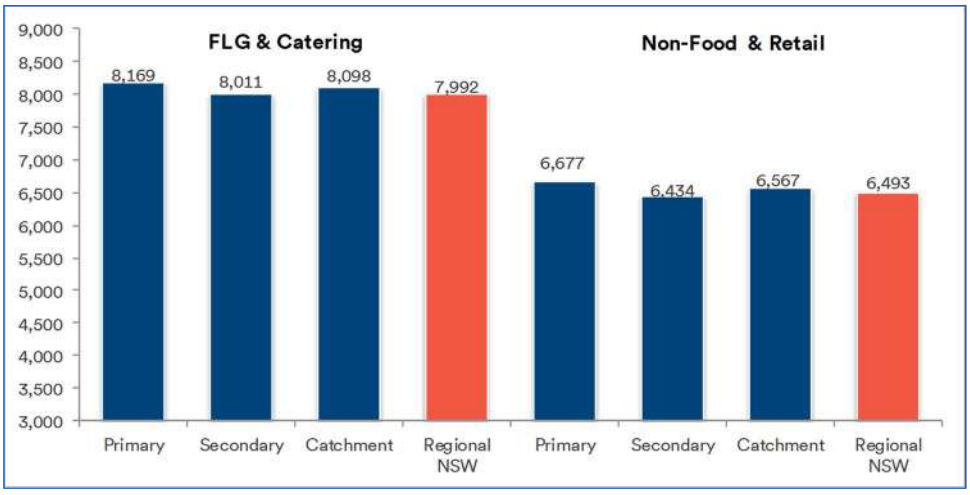
Notes:
[1] Excludes not stated
[2] 15 years and over and excludes not stated
[3] Excludes inadequately described and/or partially stated
[4] Excludes other
[5] Occupied private dwellings
[6] Includes visitor only households
[7] Excludes visitor only households
[8] Multi-response question; total sums to >100%

5.4 Retail spending

Per capita spending levels for the Merimbula trade area against the Regional NSW average are set out in Figure 11. It shows spending on Food, Liquor, Groceries and Catering (FLG&C) in the catchment ($8,098 per capita) is marginally higher (+1.3%) than the Regional NSW average. The per capita spending in the primary is 2.2% above average.

Figure 11—Per capita spending rate comparison, Dec 2016

Source: Deep End Services; MDS (MarketInfo); Deloitte Access Economics



The catchment area currently generates $168.4 million in FLG&C spending and a further $136.6 million in Non-Food and Retail Services spending. The total spending market by permanent residents amounts to $304.9 million.

With population growth across the catchment, the retail spending market is forecast to grow by $41.3 million by 2023 to $346.2 million (in constant 2016 dollars). FLG&C will account for 78% of the growth with a projected increase of $32.3 million, bringing the market to $200.6 million by 2023.

Table 5—Trade area spending estimates

Source: Deep End Services; ABS; MDS; Deloitte Access Economics

	Spending market ($m, Dec)				Average change (%pa)	
Spending category	2016	2019	2021	2023	2019-21	2021-23
FLG & Catering						
Primary	93.3	101.1	107.3	113.7	3.0%	2.9%
Total secondary	75.1	78.9	82.4	87.0	2.2%	2.7%
Total	**168.4**	**180.0**	**189.7**	**200.6**	**2.7%**	**2.8%**
Non-Food & Retail Services						
Primary	76.3	79.0	80.5	82.9	0.9%	1.5%
Total secondary	60.3	60.7	61.0	62.7	0.2%	1.4%
Total	**136.6**	**139.6**	**141.4**	**145.6**	**0.6%**	**1.5%**
Total						
Primary	169.5	180.1	187.7	196.5	2.1%	2.3%
Total secondary	135.4	139.6	143.4	149.7	1.4%	2.2%
Total	**304.9**	**319.6**	**331.1**	**346.2**	**1.8%**	**2.3%**

6

Supermarket supply and demand

6.1 Catchment area vs Regional NSW

The rate of supermarket floorspace provision in an area is calculated by dividing the resident population into the total supply of floorspace (sqm) - expressing this as a rate (sqm) per person. When compared with city, regional or state-wide benchmarks, the current or projected rate is a simple guide as to whether floorspace supply levels are relatively high or low before, or after, the addition of new supermarkets.

In the defined Merimbula catchment area, there is currently 9,057 sqm of supermarket floorspace comprising Woolworths at Merimbula and Tura Beach, Coles and IGA at Eden and small independents at Tathra and Pambula.

In 2016 (December), the permanent population of the catchment area (20,793) is boosted by another 4,779 residents which we estimate is the effective annualised population of tourists and visitors throughput the year. The adjusted population (25,571) divided into the supermarket floorspace yields an average of **0.35 sqm** of supermarket floorspace per capita. This rate is -14% below the Regional NSW average of **0.41 sqm** per capita (refer Table 6).

By 2019, with the net additional floorspace of the new Woolworths at Merimbula (+1,655 sqm) and ALDI (1,278 sqm) the effective rate of provision increases to **0.46** sqm per capita.

The projected 2019 rate of provision is about 11.5% above the Regional NSW average however it should be noted that:

- The Regional NSW average includes the entire balance of the State outside of Sydney, Central Coast, Newcastle and Wollongong which includes remote rural areas with little or no access to bannered supermarkets. This tends to bring the

Regional NSW average down compared to areas within close driving distance to major centres (see second analysis in Section 6.2).

- Secondly, the higher-than-average rate of supermarket floorspace provision in the Merimbula catchment is largely due to Woolworths who, by 2019, would control all the 7,417 sqm of supermarket space in Merimbula – Tura Beach and 69% of all supermarket space from Tathra to Eden. The effect of any apparent oversupply of supermarket floorspace will be felt most heavily by Woolworths who have elected to build two large supermarkets at Merimbula and Tura Beach.

Table 6— Supermarket floorspace provision

	Dec-16	Dec-19
Supermarket floorspace (sqm)		
Existing		
Coles Eden	2,015	2,015
IGA Eden	750	750
Woolworths Merimbula	2,355	-
Woolworths Tura Beach	3,397	3,397
Foodworks Pambula	220	220
Tathra Friendly Grocer	320	320
Proposed		
Woolworths Merimbula (replacement)	-	4,020
ALDI Merimbula	-	1,278
Total supermarket floorspace	9,057	12,000
Merimbula catchment population		
Estimated Resident Pop.	20,793	21,263
Annualised visitor population	4,779	4,923
Total equivalent resident population	25,571	26,186
Supermarket floorspace provision (sqm capita)	**0.35**	**0.46**
Regional NSW Average (sqm capita)	**0.41**	**0.41**

6.2 Comparable towns

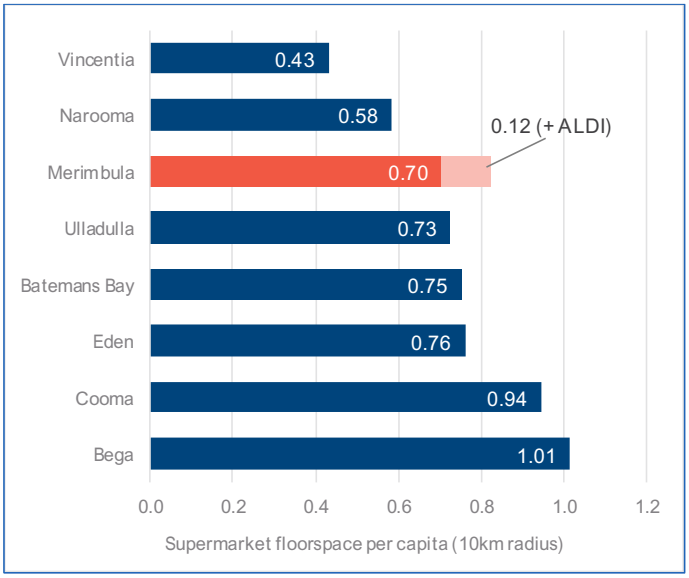
An alternative demand-supply analysis compares the rates of supermarket floorspace provision in Merimbula with other coastal towns south of Sydney. To standardise the geographic areas (or notional catchments) the supermarket provision is calculated for a 10 km radius of each town – that is, the population within 10 km of each town is divided into the supermarket floorspace in the same area.

This method tends to neutralise the shortcomings of the Regional NSW benchmark and compares towns where clusters of supermarkets have grouped because of the perceived value of the market that each town serves. The results are shown in Figure 12. The analysis is based on 2016 Census population levels and only the permanent population since all coastal towns have various benefits from tourists and visitors.

Figure 12— Supermarket floorspace provision – comparable cities*

*Includes replacement Woolworths stores at Merimbula and Narooma

Source: Deep End Services



On this analysis, the average supermarket floorspace provision within 10 km of Merimbula is **0.70 sqm** per capita, factoring in the increased Woolworths presence - but not ALDI. This provision is higher than Vincentia and Narooma but broadly equivalent to Batemans Bay, Eden and Ulladulla. Cooma and Bega have much higher rates of about 0.94 and 1.01 sqm per capita.

Superimposing ALDI's proposed floorspace increases Merimbula's provision to **0.82** sqm per capita (at current population levels). This still sits below both Cooma and Bega.

The conclusions of the analysis are:

- Merimbula will receive a significant increase in supermarket space with the replacement Woolworths and new ALDI within two years.
- This will raise the effective rate of supermarket floorspace to a relatively high level however there are examples on the south coast (and other regional areas) with higher rates than Merimbula.
- The rate of provision is almost entirely due to Woolworths' dominance of the market. Outside of Merimbula, Coles has only a small supermarket at Eden within the catchment area while ALDI has no stores in the Bega Valley Shire.
- The effect of the higher floorspace provision will be most keenly felt by Woolworths who will cannibalise their own sales between Merimbula and Tura Beach – with or without ALDI's presence.
- The proposed ALDI store will represent about 14% of total supermarket floorspace within a 10 km radius of Merimbula (including the relocated Woolworths).

7

ALDI Retail impact assessment

This section assesses the potential trading impacts and benefits of the proposed ALDI store.

The analysis and findings are presented as a series of sequential steps including:

- Projected retail turnover for the 1,278 sqm ALDI store in the assumed first year of operation (2019);
- Projected sales redirected from elsewhere in Merimbula and in competing towns are modelled and expressed in dollar and percentage terms; and
- New employment and other positive benefits from the proposed development.

7.1 Projected sales

Projected sales for the Merimbula ALDI supermarket are assessed at **$12.8 million** in 2019 (constant $2016) or $10,000 per sqm. Approximately 80% of ALDI's sales will be in food and groceries and 20% in general merchandise lines reflecting the weekly special buys.

Table 7 shows the projected sales in the form of market shares of available food and non-food spending by catchment area residents in 2019. The relatively small size of the development in the context of the catchment's total spending capacity is evident where ALDI requires just **3.5%** of total retail spending by catchment area residents.

Table 7—ALDI Merimbula projected sales and market shares, 2019

Source: Deep End Services

Catchment area sector	Spending ($m, Dec 2019)			Market share (%)			Turnover ($m)		
	FLG & C	NF & Serv.	Total Retail	FLG & C	NF & Serv.	Total Retail	FLG & C	NF & Serv.	Total Retail
Primary	101.1	79.0	180.1	7.1%	2.3%	5.0%	7.2	1.8	8.9
Secondary									
Secondary north	27.5	22.4	49.9	2.6%	0.8%	1.8%	0.7	0.2	0.9
Secondary south	29.6	21.1	50.7	2.4%	0.8%	1.8%	0.7	0.2	0.9
Secondary west	21.8	17.2	39.0	1.9%	0.6%	1.3%	0.4	0.1	0.5
Total Secondary	78.9	60.7	139.6	2.3%	0.8%	1.6%	1.8	0.5	2.3
Total catchment area	**180.0**	**139.6**	**319.6**	**5.0%**	**1.6%**	**3.5%**	**9.0**	**2.2**	**11.2**
Beyond trade area (% sales)				12.0%	12.0%	12.0%	1.2	0.3	1.5
Total							10.2	2.6	12.8

By broad product group, ALDI needs to attract **5.0%** of food, liquor, grocery and catering expenditure in the catchment area and **1.6%** of non-food and retail services spending. These are relatively small shares which are proportional to the size of the development.

In addition to spending from permanent trade area residents, ALDI can expect to generate at least 12% of sales from customers originating from outside the trade area - either from other parts of Bega Valley Shire or from visitors / tourists staying in, or passing through, the area. The overnight visitor market effectively increases the permanent population of Sapphire Coast by around 14% over the course of a year.

7.2 Trading impacts

Trading effects are modelled on the overall retail centre and shown in terms of impacts to total sales. It is generally not the role of these reports to determine impacts on individual retailers or businesses as this is not usually a matter that a planning authority or review body would have regard to. The more important consideration is whether the development would result in significant economic impacts to an existing centre that could, for example, cause a significant increase in vacancy rates or economic and retail blight to the extent that the community is not better off – even after the positive effects of the development are considered.

Customers use ALDI in various ways including:

- As their only dedicated supermarket.
- On an occasional or even regular basis but making large purchases. These customers will travel to ALDI from more distant areas which has the effect of expanding ALDI's catchments in many locations. At Merimbula, residents from other towns in the catchment will travel to the store for lower grocery prices and / or the weekly specials but return to their local supermarket for their daily or even weekly needs.
- As a regular 'top up' visit complementing visits to other supermarkets. ALDI stocks approximately 1,500 products compared to over 20,000 in a typical Woolworths supermarket. Many shoppers will continue to use the new Woolworths at Merimbula or Tura Beach where they prefer the choice of a broader range of products and national brands but, for others, the limited

assortment of high quality home brand products offered by ALDI in a simple store layout is a compelling choice and point-of-difference to the larger stores.
- Monitoring weekly pamphlet and on-line catalogues for the weekly specials and regular seasonal promotions.

The estimated trading impacts are presented in Table 8. The main centres where ALDI is likely to draw sales from is the larger supermarkets and, to a lesser extent, small food shops and general variety stores in Merimbula, Eden, Pambula and Tura Beach.

Table 8—ALDI Merimbula trading impacts

Source: Deep End Services

	Retail floorspace (sqm)		Retail sales ($m)			ALDI Merimbula	
Centre	2016	2019	2016	2019 - no ALDI Merimbula	2019 - post ALDI Merimbula	($m)	(%)
ALDI Merimbula	-	1,278	-	-	12.8	n/a	n/a
Impacted centres							
Merimbula	16,640	20,660	120.3	138.8	131.9	-6.9	-5.0%
Tura Beach	5,720	5,720	60.7	55.5	52.9	-2.6	-4.7%
Pambula	5,290	5,290	35.0	35.6	35.3	-0.4	-1.0%
Tathra	1,280	1,280	8.3	8.6	8.6	-0.1	-0.9%
Eden	9,804	9,804	61.0	60.8	59.8	-1.0	-1.7%
Other / beyond TA	-	-	-	-	-	-1.8	-
Total	38,734	42,754	285.1	299.4	288.4	-12.8	

The recent land use and occupancy survey of the catchment found a small number of specialty food shops in each of the towns but only a limited range in Merimbula itself. Therefore, ALDI's trading effects are likely to fall disproportionately on the larger (and closer) supermarkets rather than the independent specialty food stores.

In relation to impacts on individual centres:

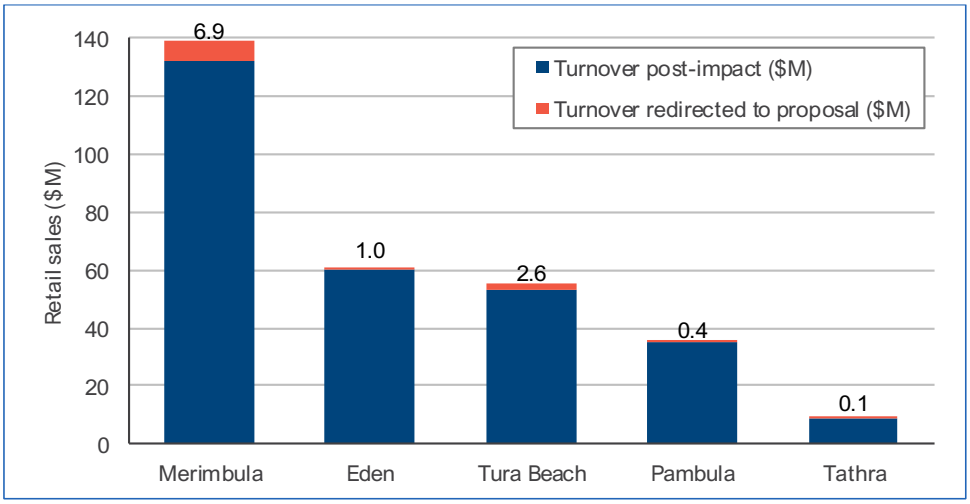
- **Merimbula** town centre will experience some increase in sales from the new Woolworths although some will merely shift back from Tura Beach. Total sales across the Merimbula Town Centre are estimated at $138.8 million in 2019.
- The impact on Merimbula is modelled at **-$6.9m** in sales or -5.0% of the sales that the town would otherwise have generated in 2019. The impact on its sales will be a one-off re-allocation to the ALDI site and sales levels should recover in the following years. Importantly, these redistributed sales are retained in Merimbula rather than lost to other areas.
- The redistributed sales will fall disproportionately on the new and larger Woolworths Merimbula. Woolworths is a well-resourced retailer who can withstand small sales fluctuations from changes to their competitive environment. This is no different to dozens of other regional towns in Australia where ALDI has established in competition to Coles and Woolworths stores since 2001. The balance of the town has only a few competing fresh food shops which appear to be long-established businesses that have, most likely, built a following outside the major supermarket. We would expect these businesses to experience little, if any impact on their sales.

- **Tura Beach** will be impacted by the new Woolworths in Merimbula prior to ALDI opening. The impact from ALDI will be low in comparison, modelled at -4.7%, or -2.6 million. This impact will again mainly fall on the Woolworths store with little impact on the balance of the centre.
- The impact on **Eden** is modelled at -1.0m or -1.7%, with the impact falling on Coles and IGA supermarkets.
- **Pambula** is close to Merimbula and is assumed to have no further supermarket competition by 2019. The impact on Pambula, estimated at -$0.4m and -1.0%, will fall mainly on the small independent with little or no impact on the small range of fresh food retailers.
- Redirected sales from **Tathra** are negligible.
- Around 14% of the projected sales or $1.8 million is unallocated from specific centres and is likely be drawn in small amounts from:
  - Other small villages and retailers in the catchment;
  - Other areas of the Bega Valley beyond the catchment including Bega which has no ALDI store.
  - Other businesses outside the listed town centres including bulky goods and showroom retailers, hardware stores and other formats who sell similar products to ALDI's unique weekly specials range.

A summary of the sales at each town in 2019 with the redistributed sales to ALDI is shown in Figure 13.

Figure 13—ALDI Merimbula source of sales, 2019

Source: Deep End Services



7.3 Impact conclusions

The development or expansion of a centre or entry of a new retailer to a market inevitably results in sales shifting from a range of existing centres and retailers to the new location. Importantly, this comes about from consumers electing to change their normal shopping patterns, permanently or occasionally, for one or more of the following reasons:

- An improvement in the quality, choice and range of shops and services available in the local area including better value and pricing;
- Improved accessibility or reduced travel time; and/or

- Perceptions of improved amenity, convenience, parking, design and layout.

The proposed ALDI store will not result in significant trading impacts or the closure of multiple retailers at Merimbula or other townships for the following reasons:

- A small provision of floorspace. The proposed ALDI supermarket is approximately one-third the size of the proposed Woolworths on the adjacent site. At 1,278 sqm GFA it will be just 6% of the future occupied retail floorspace in Merimbula in 2019. The store is significantly smaller than both Woolworths stores in the area and smaller than Coles at Eden. The projected sales of $12.8 million in 2019 are modest in the context of the combined sales volumes of Woolworths at Merimbula and Tura Beach.
- Supermarket provision. The existing provision of supermarket floorspace per capita in the catchment area is higher than Regional NSW averages but less than other regional city comparisons.
- Impacts on larger supermarkets. ALDI will provide a convenient option and point of difference to existing supermarkets and most of the redirected sales will fall disproportionately on Woolworths which has little or no competition in Merimbula. Woolworths is in no danger of vacating either of its two new stores.
- No specialty shops. There are no specialty shops in the ALDI development so that residents will continue to visit and use small businesses operating from specialty shops. These businesses will be largely unaffected so that shop occupancy levels should be unchanged in the balance of Merimbula and the surrounding townships.
- Redirection of sales within Merimbula. Most of ALDI's sales will be merely redirected from within Merimbula or from Tura Beach. The location on Main Street consolidates the Town Centre as the primary location for competitive supermarkets. The concentration of activity to this area – as opposed to an out-of-centre location – is beneficial to existing businesses.
- Population growth. Retirees and young families will continue to settle on the NSW south coast for its lifestyle attractions. Any small sales impacts from new developments, such as ALDI at Merimbula, should be recovered in the short term through local population and spending growth.

In overall terms, the projected sales and accompanying range of impacts are relatively small and proportional to the role and incremental change in floorspace at Merimbula. The sales re-allocations at all centres are within the tolerance levels of a normal competitive environment where turnover levels naturally fluctuate with changes in economic and market conditions.

8

Benefits & Conclusions

8.1 Benefits

8.1.1 Competition & Choice

The new supermarket will reflect the latest in ALDI's standards and in store concepts and provide a distinct point of difference to Woolworths who dominate the Merimbula – Tura Beach area. There is currently limited choice available for residents and ALDI will improve the quality, choice and convenience of supermarket shopping across the southern part of the Sapphire Coast.

8.1.2 Employment

Direct on-site employment for the management and operation of the store is estimated at 15 full-time equivalent (FTE) positions.

New employment opportunities will benefit the local economy and will be filled by residents.

Unemployed and semi-retired people or those looking to work close to home with part-time hours in conjunction with family care and duties are strong candidates for retail employment opportunities.

The employment positions offered by ALDI are reliable, stable and provided in a safe and professional work place where extensive training is provided and new skills are developed which can lead to further career opportunities in the retail industry.

8.1.3 Salaries paid to the local workforce

The increase in local employment will increase wages and salaries in the area which should be spent in part, with local retailers.

ALDI's payroll is estimated at approximately $65,000 per month or $780,000 per annum paid in salaries and benefits to staff recruited from the local area.

Employment is also created during the construction phase of the development. Based on an estimated construction cost of $4.5 million, the development would generate 21 on-site, full time equivalent (FTE) jobs during the construction period.

There are further indirect employment or multiplier effects from wages and salaries paid to construction workers. An ABS-developed multiplier of 0.876 applied to the total number of directly employed positions indicates around 18 other indirect FTE jobs would be supported during the construction period.

8.1.4 Rate revenue

The proposal will generate important rate revenue for the Shire of Bega Valley.

8.1.5 ALDI initiatives

Environmental, health and corporate responsibility initiatives which differentiate ALDI from the major chains are as follows:

- ALDI does not issue plastic bags at the check-out. Instead, customers are encouraged to bring recyclable bags.
- ALDI is the only supermarket in Australia whose food products are entirely free of artificial colours.
- ALDI was the first supermarket chain to implement on-shelf unit pricing.

8.1.6 Grocery savings

ALDI's overall cheaper price structure will provide significant savings for young families, retirees and pensioners and other price-conscious residents. This is especially relevant in an area where 31% of the population is aged over 65 years.

A recent quarterly survey of shoppers by consumer group Choice found that 71% of Australians were concerned about the price of food and groceries – exceeded only by electricity and healthcare costs. The latest price survey in March 2017 by Choice of 33 packaged grocery and fresh food items across the major supermarket brands in Australia concluded with the following:

"Our basket of leading brand products cost on average $170.54 at Coles and $168.74 at Woolworths (excluding specials), while a comparable basket of Aldi brand products ($102.50, excluding specials) offered savings of about $66-$68 (49-50%), assuming you're prepared to forgo leading brands. And by switching to even more budget options where available, you can save as much as 59% when buying your groceries from Aldi, rather than shopping for leading brands at Coles and Woolworths.

Switching to supermarket brand – private label, in industry-speak – groceries at Coles and Woolworths can offer significant savings. Compared to our leading brand basket, the equivalent Coles or Woolworths brand basket was 40% cheaper.

At $102.50, the Aldi brand basket was still cheapest, however. The basket of supermarket brand groceries cost on average $112.89 at Woolworths and $113.10 at Coles (excluding specials) – both approximately 10% more than at Aldi".

Source: www.choice.com.au (5 June 2017)

For pensioners and others on fixed benefits, these are considerable savings, especially when utility and health care costs are also increasing. There are few other fixed weekly expenses or essential household bills where this level of saving can be made, simply through increased competition.

Regional areas with similar household and age structures to the Sapphire Coast have responded well to the choice and increased competition offered by ALDI. This is attributed to a range of factors including:

- Regional and country populations generally have lower income levels (including older residents on pension or fixed incomes) which generate price-conscious consumers.
- Residents of regional towns have reduced travel time (compared to capital cities) and often less time pressures allowing price comparisons and selective buying between supermarkets.
- The erosion of retirement incomes and asset values during the GFC has created a more value-conscious consumer.
- While many regional towns in Australia have had one or two major supermarket chains for many years, there has been little effective price competition in these captive markets.
- The growing awareness of ALDI's price and value proposition in a simple and convenient retail format.

Merimbula shares many of the characteristics of other regional markets where the diversity, choice and price competitiveness between supermarkets has diminished over the years. ALDI has become an important part of the competitive retail and economic base of these regional cities.

8.1.7 Effective use of a strategic Town Centre site

The development restores an active use to the former Council site which has been underutilised since the relocation of Council's library. A supermarket is a suitable use in the context of other national retailers located along Main Street.

The site is central and accessible for town residents and traffic from the broader catchment. The development utilises existing and new infrastructure including the new roadway to the rear.

With the adjoining Woolworths development, the Merimbula Town Centre will have two new supermarkets within 12 months which will reinforce its role as a key commercial node and District Centre for the Sapphire Coast.

8.2 Conclusions

The ALDI development presents a range of positive benefits to residents of Merimbula and its wider catchment. ALDI will be well-received by the community whose demographic profile is suited to ALDI's small but efficient layout and competitive pricing.

The expected trading impacts will be largely confined to the existing Woolworths stores who dominate the local market with no effective competition.

The site is well located and will reinforce and increase activity levels in the Town Centre to the benefit of existing businesses.

In all respects, the proposal will deliver positive economic outcomes for the residents and business community of Merimbula.

PROPOSED NEW ALDI STORE – 103 MAIN STREET, MERIMBULA NSW 2548

BUILDING CODE OF AUSTRALIA 2016 DESIGN REVIEW AND CAPABILTY STATEMENT

Report prepared for:

ALDI Stores C/- Rothe Lowman
Level 2, 171 William Street
Darlinghurst NSW 2010

Attention: **Jones Matos**

Report prepared by:

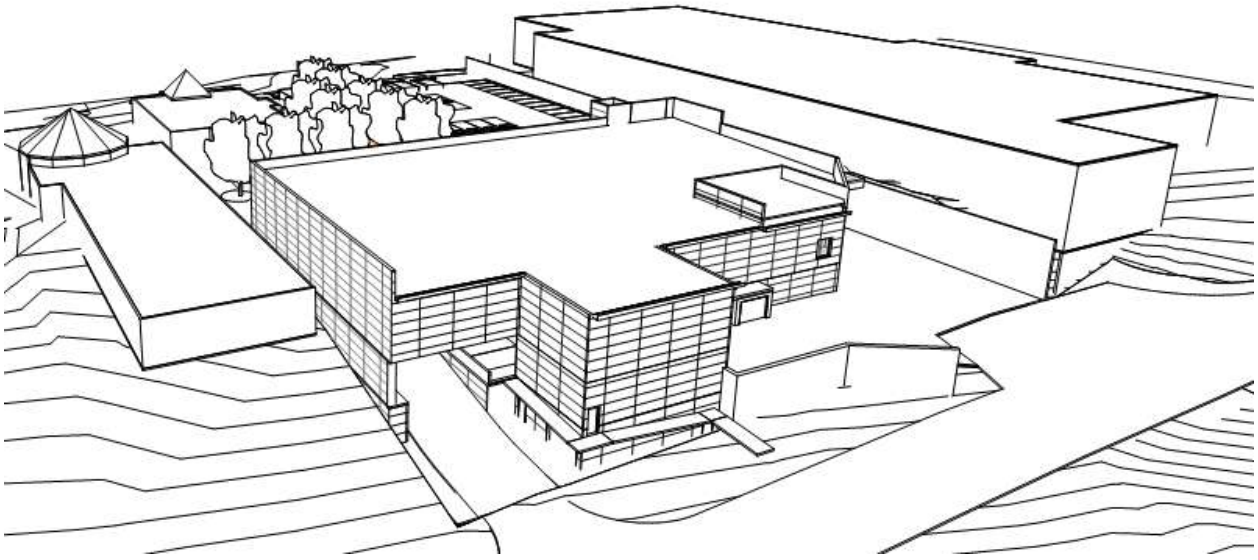
Philip Chun Building Code Consulting
Suite 404
44 Hampden Road
Artarmon NSW 2064

Contact: **Philip Smillie**

Report Ref: 17-209317_ALDI_Store_BCAReportR02_200917

Job Number: 17-209317

Date: 25 September 2017



DOCUMENT ACCEPTANCE

	Name	Signed	Date
Verified by	Philip Smillie	Philip Smillie	25/9/17

CONTENTS

1.0 Introduction and Documentation

The proposal is for a new ALDI Store containing a ground level open carpark and retail store over a lower ground level carpark located at 103 Main Street, Merimbula NSW 2548.

This report contains a design philosophy review concerning the capability of the design to meet Building Code of Australia 2016 (BCA) requirements. This review has found that the fundamental design is capable of meeting the requirements of BCA with the inclusion of fire engineering.

We have reviewed the submitted architectural documentation (provided to date) for compliance with the deemed-to-satisfy provisions of the Building Code of Australia. Where compliance with the deemed to satisfy provisions is not possible a schedule of alternate solutions will be required.

We have made every attempt to cover the main issues under Parts B, C, D, E, F, G, H, I and J of the Building Code of Australia. Areas of the design are still being refined so that resolution will be possible prior to the issue of a Construction Certificate for the works. This report does not assess the impact of the Disability Discrimination Act (DDA) which is outside the scope of the BCA.

This report is for the exclusive use of the client and cannot be used for any other purpose without prior permission from Philip Chun & Associates Pty Ltd. The report is valid only in its entire form. "Philip Chun and Associates accepts no responsibility for any loss suffered as a result of any reliance upon such assessment or report other than as being accurate at the date the property was inspected for the purposes of the assessment or report."

Documentation available and assessed –. Architectural drawings prepared by Rothe Lowman:

Drawings	Drawing No.	Dated
Architectural	TP01.01/P7, TP01.02/P11, TP01.03/P7, TP01.04/P11, TP02.01/P10	Various

Building Assessment

Building Classification(s)	Class 6 (Retail) Class 7a (lower ground and open carpark) Class 8 (Pump room)
Rise in Storeys	3
Type of Construction required	Type B
Effective Height (m)	6.7m (Less than 25m)

2.0 Use and Class of Building

Class and use of the various levels of the building are as follows:

Level	Use	BCA Class	Area	Volume
Lower Ground	Carpark	Class 7a	1,574m^2	5,666m^3
Ground	ALDI Store – Retail	Class 6	1,721m^2	10,756m^3
Plant	Pump Room	Class 8	112m^2	285m^3

The proposed ALDI development proposes 3 storeys with three separate fire compartments as above, all less than 3,500m^2 each. Volumes do not exceed 21,000m^3, hence do not exceed Type B construction limits.

3.0 Construction & Fire Resistance Ratings

Part B - Structure

Structural Provisions
All new works are to comply with BCA 2016 with structural plans and design certification to be provided prior to issue of a Construction Certificate (CC). We believe the building is of Importance Level 2 according to Table B1.2a.

Part C1 - Fire resistance and Stability

All new works to be in accordance with the requirements of Table 4 of Specification C1.1 for Type B Construction. The fundamental concept of fire rating for the building will be as per the following table unless addressed as part of fire engineered solution.

The Eastern retail wall will require an FRL of not less than 180/180/180 where located less than 3m from the Eastern boundary – structural engineer to note and details required prior to the issue of CC.

Table 4 TYPE B CONSTRUCTION: FRL OF BUILDING ELEMENTS

Building element	Class of building—FRL: (in minutes)			
	Structural adequacy/*Integrity*/*Insulation*			
	2, 3 or 4 part	5, 7a or 9	6	7b or 8
EXTERNAL WALL (including any column and other building element incorporated therein) or other external building element, where the distance from any *fire-source feature* to which it is exposed is—				
For *loadbearing* parts—				
less than 1.5 m	90/ 90/ 90	120/120/120	**180/180/180**	240/240/240
1.5 to less than 3 m	90/ 60/ 30	120/ 90/ 60	**180/120/ 90**	240/180/120

3 to less than 9 m	90/ 30/ 30	120/ 30/ 30	**180/ 90/ 60**	240/ 90/ 60
9 to less than 18 m	90/ 30/–	120/ 30/–	**180/ 60/–**	240/ 60/–
18 m or more	–/–/–	–/–/–	**–/–/–**	–/–/–
For non-*loadbearing* parts—				
less than 1.5 m	–/ 90/ 90	–/120/120	**–/180/180**	–/240/240
1.5 to less than 3 m	–/ 60/ 30	–/ 90/ 60	**–/120/ 90**	–/180/120
3 m or more	–/–/–	–/–/–	**–/–/–**	–/–/–
EXTERNAL COLUMN not incorporated in an *external wall*, where the distance from any *fire-source feature* to which it is exposed is—				
For *loadbearing* columns—				
less than 18 m	90/–/–	120/–/–	**180/–/–**	240/–/–
18 m or more	–/–/–	–/–/–	**–/–/–**	–/–/–
For non-*loadbearing* columns—				
	–/–/–	–/–/–	**–/–/–**	–/–/–
COMMON WALLS and FIRE WALLS—	90/ 90 / 90	120/120/120	**180/180/180**	240/240/240
INTERNAL WALLS—				
Fire-resisting lift and stair *shafts*—				
Loadbearing	90/ 90/ 90	120/120/120	**180/120/120**	240/120/120
Fire-resisting stair *shafts*—				
Non-*loadbearing*	–/ 90/ 90	–/120/120	**–/120/120**	–/120/120
Bounding *public corridors*, public lobbies and the like—				
Loadbearing	60/ 60/ 60	120/–/–	**180/–/–**	240/–/–
Non-*loadbearing*	–/ 60/ 60	–/–/–	**–/–/–**	–/–/–
Between or bounding *sole-occupancy units*—				
Loadbearing	60/ 60/ 60	120/–/–	**180/–/–**	240/–/–
Non-*loadbearing*	–/ 60/ 60	–/–/–	**–/–/–**	–/–/–
OTHER LOADBEARING INTERNAL WALLS				
and COLUMNS—	60/–/–	120/–/–	**180/–/–**	240/–/–
ROOFS	–/–/–	–/–/–	**–/–/–**	–/–/–

Lightweight Construction:
Lightweight construction must comply with BCA Specification C1.8 if it is used in a wall system that is required to have an FRL or if lightweight construction is used for the fire-resisting covering of a steel column or the like (C1.8) – *details required prior to issue of CC – none noted.*

Fire Hazard Properties:
Fire hazard properties of all new floor lining & finishes including ceiling lining must comply with Specification C1.10 – *details required prior to issue of CC.*

Performance of External Walls In Fire:
Concrete external walls that could collapse as complete panels (e.g. tilt-up and pre-cast concrete), in a building having a rise in storeys of not more than 2, must comply with Specification C1.11 (C1.11). – *Structural Engineer to incorporate into wall design.*

Part C2 - Compartmentation & Separation

General Floor Area and Volume Limitations:
The building is understood to be designed to have two fire compartments. The building fire compartment does not exceed the limits of Type B construction.

- Ground floor ALDI Store: 1,721m^2
- Lower Ground Carpark: 1,574m^2
- Plant Level: 112m2

Separation of Equipment:
Equipment comprising of lift motors, lift control panels, emergency generators used to sustain emergency equipment operating in the emergency mode, a central smoke control plant, boilers or a battery or batteries installed in the building that have a voltage exceeding 24 volts and a capacity exceeding 10 ampere hours are required to be separated from the remainder of the building with construction complying with Specification C1.1 and be of not less than 120/120/120 (C2.12). *Services engineer to provide further details prior to the issue of a CC - no such equipment likely.*

Electrical Supply System:
An electricity substation located within a building and any main switchboards that sustain emergency equipment operating in emergency mode must be separated from any other part of the building by construction having an FRL of not less than 120/120/120 and have any doorway in that construction protected with a self-closing fire door having an FRL of not less than –/120/30 (C2.13). ***Substation to comply with the requirements of the energy provider and the pump room must comply with the requirements of AS2419.1 – Services engineer to provide details prior to the issue of CC.***

Part C3 – Protection of Openings

Protection of Openings in External Walls:
Openings in an external wall that is required to have an FRL must if the distance between the opening and the fire-source feature to which it is exposed is less than
(i) 3 m from a side or rear boundary of the allotment; or
(ii) 6 m from the far boundary of a road, river, lake or the like adjoining the allotment, if not located in a storey at or near ground level; or
(iii) 6 m from another building on the allotment that is not Class 10,

The South east window located over the drive through breezeway located less than 3m from the eastern boundary will require drencher protection or deletion.

Part D1 – Provision for Escape

Exit travel Distances (Retail area):

- No point on a floor must be more than 20m from an exit, or a point from which travel in different directions to 2 exits is available, in which case the maximum distance to one of those exits must not exceed 40m – *complies.*
- Alternate exits must not be less than 9m apart - *complies.*
- Alternate exits must not be more than 60m apart – *complies.*
- Located so that alternative paths of travel do not converge such that they become less than 6m apart - *complies*.

Exit travel Distances (Carpark):

- No point on a floor must be more than 20m from an exit, or a point from which travel in different directions to 2 exits is available, in which case the maximum distance to one of those exits must not exceed 40m – *complies.*
- Alternate exits must not be less than 9m apart - *complies.*

- Alternate exits must not be more than 60m apart – *complies.*
- Located so that alternative paths of travel do not converge such that they become less than 6m apart - *complies*.

Dimensions of Exits:
Paths of travel are to have a minimum clear width of 1000mm, including throughout the stairways where handrails are installed on both sides (D1.6) See below Number of Persons Accommodated (D1.13):

Level	Area (m^2)	Use	Ratio as Per BCA (D1.13)	Persons
Ground	1,220m^2	Retail	3 Persons Per m^2	407
Ground	501m^2	BOH	30 Persons Per m^2	17
Lower Ground	1,573m2	Carpark	30 Persons Per m^2	53

Total number of persons = 477

A minimum of 4m egress aggregate width is required to Ground level and at least 4m exits are provided – *Satisfactory.*

A minimum of 1m egress aggregate width is required to Lower Ground level and at least 3m exits are provided – *Satisfactory.*

Discharge from Exits:
An exit must not be blocked at the point of discharge and where necessary, suitable barriers must be provided to prevent vehicles from blocking the exit, or access to it (D1.10).

Part D2 - Construction of Exits

Any EDB and communication boards should be enclosed in non-combustible construction and suitable sealed against smoke spreading from the enclosure. *Compliance readily achievable*

Enclosure of space under stairways or ramps:
In accordance with BCA the space below a required non fire-isolated stairway (including an external stairway) or non-fire-isolated ramp must not be enclosed to form a cupboard or other enclosed space unless the enclosing walls and ceilings have an FRL of not less than 60/60/60, and any access doorway to the enclosed space is fitted with a self-closing –/60/30 fire door (D2.8) - *Architect to note - Compliance readily achievable – none noted.*

Goings and risers
The goings and risers dimensions of all new stairs are to comply with the requirements of BCA Clause (D2.13) **-** *details to be provided prior to issue of CC - Compliance readily achievable.*

In a Stairway - landings having a maximum gradient of 1:50 may be used in any building to limit the number of risers in each flight and each landing must be not less than 750 mm long, and where this involves a change in direction, the length is measured 500 mm from the inside edge of the landing - *Architect to note - Compliance readily achievable*

Barriers to Prevent Falls:
A continuous barrier must be provided along the side of stairways or ramps, a floor, corridor, hallway, balcony, deck, veranda, mezzanine, access bridge or the like and any delineated path of access to a building if the trafficable surface is 1 m or more above the surface beneath. A 125 mm sphere must not be able to pass through any opening (D2.16) – *Compliance readily achievable. Detailed drawing required to assess compliance.* ***Balustrade complying with AS2890 will be required to Northern loading dock – see mark-up.***

Swinging Doors:
A swinging door in a required exit or forming part of a required exit must swing in the direction of egress where it serves a building or part with a floor area greater than 200m2 (D2.20) **–** *complies.*

Operation of Latch:
A door in a required exit, forming part of a required exit or in the path of travel to a required exit must be readily openable without a key from the side that faces a person seeking egress, by a single hand downward action on a single device which is located between 900 mm and 1.1 m from the floor (D2.21) **-** *Architect to note - Compliance readily achievable*

Part D3 - Access for people with Disabilities

General Building Access Requirements:
Buildings and parts of buildings must be accessible as required by Table D3.1 BCA. Areas in a Class 6 and Class 7a building that area required to be accessible include all areas to and within that is normally used by the occupants (D3.1). Note.
Does not comply, there is lack of circulation space at doorway to BOH staff room – amendment required to comply with AS1428.1.

Access to Buildings:
In a building required to be accessible, an accessway must be provided through the principal pedestrian entrance, through not less than 50% of all pedestrian entrances including the principal pedestrian entrance and in a building with a total floor area more than 500 m2, a pedestrian entrance which is not accessible must not be located more than 50 m from an accessible pedestrian entrance (D3.2). – *Current plans indicate compliance as a lift is provided to access between levels.*

Parts of the Building to be Accessible:
In a building required to be accessible every ramp and stairway must comply with for a stairway, clause 11 of AS 1428.1 - *Architect to note - Compliance readily achievable*

Accessible Carparking
Accessible car parking must be provided in accordance with Table D3.5 (D3.5) i.e. 1 space for every 50 spaces – there are 101 car spaces hence 3 accessible spaces is required – *Complies: 6 accessible carpark spaces are present.*

Signage
In a building required to be accessible, Braille and tactile signage complying with Specification D3.6 must incorporate the international symbol of access or deafness, as appropriate, in accordance with AS 1428.1 and identify each sanitary facility and each door required by E4.5 to be provided with an exit sign and state " Exit " and " Level " and either the floor level number or a floor level descriptor (D3.6). *Signage schedule to be provided prior to the issue of a Construction Certificate*

Tactile Indicators, nosing strips and handrails:
Tactile indicators, nosing strips and handrails complying with the requirements of AS1428.1 are required to stairs – *Details needed, compliance readily achievable*.

Ramps
The ramp must comply with the requirements specified in AS 1428.1 including a maximum gradient, landings, TGSIs, handrails and kerbing, as appropriate for the type of ramp. – *Details needed, compliance readily achievable.*

Glazing on Accessway
On an accessway, where there is no chair rail, handrail or transom, all frameless or fully glazed doors, sidelights and any glazing capable of being mistaken for a doorway or opening, must be clearly marked in accordance with AS 1428.1. – *Details needed, compliance readily achievable.*

5.0 Section E - Fire Services & Equipment

Part E1 – Fire Fighting Equipment

Fire Hydrants
Fire hydrants are to be provided throughout the building and installed in accordance with AS 2419.1-2005 as the building has a total floor area of greater than 500 m2 (E1.3). – ***show on plans to assess compliance.***

Fire Hose-Reels
Fire hose-reels should be arranged to provide for full coverage to the building in accordance with AS 2444.1-2005. Firehose-reels are to be located within 4 meters of an exit or adjacent fire hydrant (E1.4)**.** ***Show on plans to assess compliance.***

Sprinklers
A Sprinkler system complying with Specification E1.5 must be installed in:

- a Class 6 building with fire compartment floor area of more than 3,500m^2 or a volume of 21,000m^3 , or
- A Class 7a carpark having more than 40 vehicles – only 38 spaces are shown.

Sprinklers are not required in this building.

Extinguishers
Portable fire extinguishers must be provided as listed in Table E1.6 to cover Class AE or E fire risks associated with emergency services switchboards and to cover Class B fire risks in locations where flammable liquids in excess of 50 litres are stored or used. – *Compliance achievable.*

Part E2 – Smoke Hazard Management

An air-handling system which does not form part of a smoke hazard management system in accordance with Table E2.2a or Table E2.2b and which recycles air from one fire compartment to another fire compartment or operates in a manner that may unduly contribute to the spread of smoke from one fire compartment to another fire compartment must— (i) be designed and installed to operate as a smoke control system in accordance with AS/NZS 1668.1; or (A) incorporate smoke dampers where the air-handling ducts penetrate any elements separating the fire compartments served; and (B) be arranged such that the air-handling system is shut down and the smoke dampers are activated to close automatically by smoke detectors complying with clause 4.10 of AS/NZS 1668.1 ***– Mechanical Services consultant to provide details. Compliance readily achievable.***

The top level building will not need a smoke detection system.

In a Class 7a Carpark in a building not more than 25m, including a basement, provided with a mechanical ventilation system in accordance with AS 1668.2 must comply with clause 5.5 of AS/NZS 1668.1 except that fans with metal blades suitable for operation at normal temperature may be used and the electrical power and control cabling need not be fire rated. – ***Mechanical Services consultant to note – show the location of where the on/off/auto carpark exhaust switch will be located. – must be within sight of the main entry.***

Part E3 – Lift Installations

In an accessible building, every passenger lift must be one of the types identified in Table E3.6a BCA and have accessible features in accordance with Table E3.6b BCA I.e. – Handrails complying with AS 1735.12 and for a lift that travels less than 12m, dimensions of not less than 1100mm wide x 1400mm deep and not rely on a constant pressure device for its operation if the lift car is fully enclosed (E3.6). – ***Provide details***

of lift prior to the issue of a Construction Certificate. Must comply with AS1735.12 with accessible features – grabrail, tactile braille buttons and audible level call.

Part E4 – Emergency Lighting, Exit Signs and Warning Systems

Exit and Emergency Lighting

An emergency lighting system must be installed in every storey of a Class 6 or 7 building where the storey has a floor area more than 300 m2— in every passageway, corridor, hallway, or the like, that is part of the path of travel to an exit; and in any room having a floor area more than 100 m^2 that does not open to a corridor or space that has emergency lighting or to a road or open space; and in any room having a floor area more than 300 m^2 (E4.2). *Electrical consultant details needed*

All exit signs must be clearly visible to persons approaching the exit, and must be installed on, above or adjacent to each stairway, passageway or ramp serving as a required exit and door serving as, or forming part of, a required exit in a storey required to be provided with emergency lighting (E4.5) – *Electrical consultant details needed*.

6.0 Health and Amenity Issues

Part F2 – Sanitary & Other facilities

If not more than 10 people are employed in a Class 6 building, a unisex facility may be provided instead of separate facilities for each sex and if the majority of employees are of one sex, not more than 2 employees of the other sex may share toilet facilities if the facilities are separated by means of walls, partitions and doors to afford privacy (F2.3). ***Confirm Number of staff to be employed at one time in ALDI. A sole accessible facility will allow for up to 10 staff.***

Accessible Sanitary Facilities
In a Class 6 building the minimum sanitary facilities required must include

- 1 on every *storey* containing sanitary compartments and
- Where a storey has more than 1 bank of sanitary compartments containing male and female sanitary compartments, at not less than 50% of those banks.

Show on plans and provide detailed elevations and sections of accessible toilets complying with AS 1428.1 – 2009.

Part F4 – Lighting & Ventilation

The artificial lighting system must comply with AS/NZS 1680.0. *Electrical Consultant to provide details.*

A mechanical ventilation or air-conditioning system complying with AS1668.2 and AS/NZS 3666.1 is required to all areas not provided with natural ventilation **-** *Details to be provided prior to issue of CC.*

7.0 Energy Efficiency

The building is to comply with the requirements of Part J of the BCA in terms of Energy Efficiency. The architect and services drawings particularly the electrical, hydraulic and mechanical drawings must include compliance with Parts J1-J8 of BCA. *Details to be provided prior to issue of a Construction Certificate.*

Merimbula is in Climate Zone 6

J1 Building Fabric must achieve a minimum Total R-Value as follows:

Roof or ceiling - R3.2;
External walls - R2.8;
Floors – refer to Table J1.6 of the BCA.

J2 Glazing
Glazing calculations will be needed prior to the issue of a Construction Certificate.

J3 Building Sealing
A seal to restrict air infiltration must be fitted to each edge of a door, openable window or the like. The requirements do not apply to windows complying with AS2047 or fire doors, smoke doors and roller shutters.

A miscellaneous exhaust fan and evaporative cooler must be fitted with a sealing device such as a self-closing damper or the like.

Roofs, ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like must be constructed to minimise air leakage.

J5, J6 and J7 compliance – details to be provided from mechanical and electrical consultants.

J8 Facilities for energy monitoring
A building or sole-occupancy unit with a floor area of more than 500 m2 must have the facility to record the consumption of gas and electricity.

8.0 Conclusion

We have assessed the proposed design to date and we have reviewed the scheme with respect to the Building Code of Australia 2016. The design is at a point where the inherent BCA philosophies have been checked. The finer details with respect to BCA 2016 compliance can be finalised prior to the issue of a Construction Certificate.

Aitken Rowe
GEOTECHNICAL ENGINEERING

Geotechnical Engineering
Environmental Consultancy
Soil Concrete Aggregate Testing
NATA Accredited Laboratories

ABN 53 058 315 138 ACN 058 315 138

29 September 2017 Reg. No.: S17-373

Aldi Stores
C/- Rothelowan
Level 2/171 William Street,
Darlinghurst NSW, 2010

Attention: Mr. Jones Matos – Project Leader

Dear Louise,

GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN – PROPOSED ALDI SUPERMARKET, 103-107 MAIN STREET, MERIMBULA, NSW

Further to your request in response to our quotation, Q17-233 dated 31 July 2017, the geotechnical field investigation was carried out at the location of the proposed development at the above site on 21 to 24 August 2017.

The purpose of the investigation was to determine the nature of the subsurface soil and groundwater conditions by augering, sampling and testing across the proposed site of the development. Based upon the information obtained, comments and recommendations for the proposed development are to be made.

It is noted that the proposed development includes the construction of a proposed Aldi Supermarket building and associated pavement areas including an on-grade 63 space car park, 38 space basement car park/loading deck and a new rear service road as shown in the attached borehole & DCP test location plan.

1.0 Site Description

The site for the proposed development is located across Lot 949 in DP 810986, No. 103 Main Street & Lot 946 in DP 604076, No. 105-107 Main Street, Merimbula, NSW which is located within the central business of Merimbula. The proposed new Aldi Supermarket building and basement car park/loading dock is to be located on the northern boundary of the subject site spanning across lots 949 & 946 (existing childcare building to be demolished) and measures approximately 60m in length (east to west) and 34m in width (north to south). The proposed on-grade car park

area located directly north of Main Street extending north to the proposed supermarket building is located across lot 946 (existing building to be demolished) and will comprise 63 car spaces. The proposed new service road is to be located directly north of the subject site running east to west within crown land.

As noted above an existing large building will be demolished for construction of the on-grade car park and an existing childcare building also demolished within the footprint of the proposed supermarket building. The site is noted as having a downward slope from south-west to north east at approximately 1V (Vertical): 15H (Horizontal) with the slope increasing to approximately 1V:5H towards the northern end of the site and covered with shallow to deep compacted fill across the site at the time of the investigation.

2.0 Site Geology

The 1:250 000 Geological Series Sheet for Bega-Mallacoota (SJ/55-4 and part of SJ/55-8) indicates the area is underlain by late Devonian Palaeozoic aged undifferentiated sandstone and conglomerate as part of the Merimbula Group (DM).

3.0 Investigation Procedure

3.1 Fieldwork

The drilling investigation was carried out on 21 to 24 August 2017 using our truck mounted drill rig. The fieldwork for the investigation consisted of auger drilling of ten (10) boreholes (BH1 to BH10) across the subject site; being two (2) boreholes across the proposed on-grade car park area (BH1 & BH2) to the TC bit auger termination depth of 1.5m (BH1) and refusal depth of 0.5m (BH2), two (2) boreholes along the proposed new rear service road (BH5 & BH6) to the TC bit auger termination depth of 1.5m and six (6) boreholes across the proposed supermarket and basement car park area (BH3, BH4, BH7, BH8, BH9 & BH10) to the TC bit auger refusal depth of 2.4 to 3.5m at the locations shown in the attached plan. Dynamic Cone Penetrometer (DCP) tests were performed at each borehole location to assess the consistency of the subsoil materials above bedrock.

The boreholes were advanced through the soil profile using flight augers to the termination or refusal depths as mentioned above and then continued coring using core barrel with diamond bit in BH3, BH4 & BH10 to 6.0m to 6.2m. It should be noted that BH7, BH8 & BH9 drilled at the location of the proposed supermarket and basement car park were not rock cored and terminated at the TC bit auger refusal depths as mentioned above. It should also be noted that BH2 encountered refusal with TC bit auger at 0.5m however was not continued with coring method. The cores recovered from the boreholes (BH3, BH4 & BH10) were placed into core boxes and logged by our Geotechnical Engineer of Aitken Rowe Testing Laboratories Pty Ltd from Wagga Wagga, NSW.

The fieldwork was supervised on a full-time basis by our Senior Geotechnician of Aitken Rowe Testing Laboratories Pty Ltd, who nominated the sampling and prepared continuous engineering log of the boreholes. Small and bulk samples were recovered at various depths from the boreholes for relevant laboratory testing.

The detailed borehole logs with explanatory note and DCP test reports are herewith attached. The descriptions in the borehole logs are provided in accordance with "AS 1726 - 2017 Geotechnical site investigation".

3.2 Laboratory Testing

To confirm and evaluate the results of the fieldwork, some laboratory tests were carried out on the recovered soil samples from the boreholes. The laboratory tests included particle size distribution test, Atterberg Limit test, linear shrinkage test, field moisture content determination test, Standard Maximum Dry Density test (SMDD) and California Bearing Capacity test (CBR) and they were carried out at our NATA accredited testing laboratory in Wagga Wagga, NSW. The test reports are herewith attached.

The pH, Electrical Conductivity (EC), chloride and sulphate content and resistivity tests were carried out on a recovered sample from the borehole at the NATA accredited Sydney Environmental and Soil Laboratory (SESL) in Sydney, NSW. The test report as received from SESL is also herewith attached.

The Point Load Index Strength Tests were performed on the recovered cored samples at our Wagga Wagga laboratory in order to assess the strength of rock and the test report is herewith attached.

Contamination analysis was also carried out on recovered samples at the site. The samples were analysed for the following by EnviroLab Services, a NATA accredited laboratory in Sydney, NSW;

- Metals – Mercury, Cadmium, Lead, Arsenic, Chromium (total), Copper Nickel and Zinc
- Electrical Conductivity (EC)
- pH
- Total Polycyclic Aromatic Hydrocarbons (PAH)
- Benzo(a)pyrene
- Benzene
- Toluene
- Ethyl-benzene
- Xylene
- Total Recoverable Hydrocarbons C_{10}-C_{36} (TRH)

The test report as received from EnviroLab is herewith attached.

4.0 Subsurface Condition

4.1 Proposed On-Grade Car Park

BH1 & BH2 cover the proposed on-grade car park at the front of the subject site. The boreholes drilled revealed that the site is underlain by fill material comprising fine to coarse grained silty gravelly sand to 0.3m in BH1 & BH2 overlying natural extremely weathered, extremely low strength, sandstone bedrock, extending to the borehole termination depth at 1.5m in BH1 and borehole refusal depth at 0.5m in BH2. The augered borehole refusal encountered in BH2 appeared to have been encountered on underlying highly weathered, medium strength sandstone bedrock. The fill material encountered across the site appeared to have been placed "uncontrolled" and assessed to be "moderately to well compacted".

The moisture condition of the underlying natural sandstone bedrock material was generally dry throughout the profile at the time of the investigation. No groundwater or seepage was encountered during the drilling in the boreholes drilled and the boreholes were found dry on completion of the drilling. It should however be noted that variations to the moisture condition and water table level could fluctuate with changes to the season, temperature and rainfall.

As per the DCP test result and visual observation of the resistance by auger TC bit, the underlying fill material is assessed to be generally medium dense to dense throughout the tested fill profile at the time of the investigation.

Based on the visual inspection of the rock cuttings from the augers and observation of the drilling resistance, the underlying sandstone bedrock across the site is generally assessed to be extremely weathered, extremely low strength. However it should be noted the augered borehole refusal encountered in BH2 appeared to have been encountered on underlying highly weathered, medium strength sandstone bedrock or better.

The Materials Schedule & Log with explanatory note and DCP test reports are herewith attached.

4.2 Proposed Rear Service Road

BH5 & BH6 cover the proposed service road at the rear of the subject site. The boreholes drilled revealed that the site is underlain by fill material comprising low plasticity gravelly sandy clay, sandy silt and sandy clay (in BH5 only) to 0.7m in BH5 and fine to coarse grained silty sand (in BH6 only) to 1.5m in BH6 (borehole termination depth) overlying natural low plasticity sandy clay to 1.1m which is then underlain by extremely weathered, extremely low strength, sandstone bedrock, extending to the borehole termination depth at 1.5m in BH5. The fill material encountered across the site appeared to have been placed "uncontrolled" and assessed to be "moderately to well compacted".

The moisture condition of the underlying natural clay and sandstone bedrock material was generally greater than plastic limit and dry to moist throughout the profile respectively at the time of the investigation. No groundwater or seepage was encountered during the drilling in the

boreholes drilled and the boreholes were found dry on completion of the drilling. It should however be noted that variations to the moisture condition and water table level could fluctuate with changes to the season, temperature and rainfall.

As per the DCP test result and visual observation of the resistance by auger TC bit, the underlying clay and sand fill material is assessed to be generally firm to stiff consistency and medium dense to dense throughout the tested fill profile respectively at the time of the investigation. The underlying natural clay material is assessed to be generally very stiff consistency throughout the tested profile at the time of the investigation.

Based on the visual inspection of the rock cuttings from the augers and observation of the drilling resistance, the underlying sandstone bedrock across the site is generally assessed to be extremely weathered, extremely low strength.

The Materials Schedule & Log with explanatory note and DCP test reports are herewith attached.

4.3 Proposed Supermarket & Basement Car Park

BH3, BH4, BH7, BH8, BH9 & BH10 covers the supermarket and basement car park subject site. The boreholes drilled revealed that the site is underlain fill material comprising fine to coarse grained silty gravelly sand, silty sand, silty sandy gravel, sandy gravel, clayey sand and low plasticity sandy clay & sandy silt to 0.3m in BH3, 0.1m in BH4, 0.3m in BH7, 1.0m in BH8, 0.5m in BH9 and 2.0m in BH10 overlying natural alluvial and residual material comprising fine to coarse grained silty sand, low plasticity sandy clay to 1.5m in BH3, 0.7m in BH4, 0.5m in BH7, 1.3m in BH8 and 2.4m in BH10 which in turn is underlain by extremely to highly weathered, extremely low to very low strength, sandstone bedrock, extending to the augured borehole refusal depth at 2.7m in BH3, 3.0m in BH4 & BH7, 3.5m in BH8, 2.4m in BH9 and then highly to moderately weathered, very low to low strength, sandstone bedrock, extending to the cored borehole termination depth at 6.2m in BH3 & BH4 and 6.0m in BH10. The augered borehole refusal encountered in BH3, BH4, BH7, BH8, BH9 & BH10 appeared to have been encountered on underlying weathered sandstone bedrock.

The moisture condition of the underlying natural alluvial, residual material & sandstone bedrock was noted to be generally greater than plastic limit and dry to moist throughout the tested profile respectively at the time of the investigation. Groundwater or seepage was not encountered in the boreholes drilled and the boreholes were found dry on completion during the course of the drilling. However, it should be noted that water was used in coring through the rock and therefore it could not be established the occurrence of groundwater within the coring depth where coring was undertaken. It should also be noted that he variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

As per the DCP test result and visual observation of the resistance by auger TC bit, the underlying silt and sand/gravel fill material is assessed to be generally stiff to very stiff consistency and medium dense to dense throughout the tested fill profile respectively at the time of the

investigation. The underlying natural clay and sand material is assessed to be generally stiff to very stiff consistency and loose to medium dense increasing to medium dense with depth throughout the tested profile at the time of the investigation.

Based on the visual inspection of the rock cuttings from the TC bit augered boreholes and observation of the drilling resistance, the underlying sandstone bedrock across the site is generally assessed to be extremely to highly weathered, extremely low to very low strength to the augered borehole refusal depth of 2.7m in BH3, 3.0m in BH4 & BH7, 3.5m in BH8, 2.4m in BH9. The inspection of the recovered rock cores and Point Load Index test results indicate the cored sandstone to be highly to moderately weathered, very low to low strength with bands of medium strength extending to the cored borehole termination depth of 6.2m in BH3 & BH4 and 6.0m in BH10.

Details of the subsurface profile should be referred to the borehole logs. The borehole logs (auger & cored) with explanatory notes and DCP test reports are herewith attached.

5.0 Site Preparation and Earthworks

The fill material encountered across the site appeared to have been placed "uncontrolled" and therefore considered "not suitable" to use as subgrade or foundation of any structure in its current state. We therefore recommend removal of this material in the areas of the proposed building and car park areas and replace and re-compact with approved fill material in such a way that it achieves a minimum of 100% of Standard Maximum Dry Density (SMDD) if to be used as subgrade or foundation for the proposed development. **It should be noted that if a deep footing system, such as deep pad footing, pier or pile footing system is to be adopted and the slab is to be suspended on the footing system, then the removal of the existing fill material may not be required. It is also noted that the removal of existing buildings and cuts will be undertaken for the new development.**

In general, **if the slab is not to be fully suspended**, the following site preparation is recommended once cuts and removal of the buildings as required are undertaken for the proposed building, car park areas and service road.

- Remove topsoil, bitumen seal and fill material and stockpile for later use for landscaping and backfilling as appropriate. The removal of fill material may be undertaken as such that it remains about 250mm and then scarify to a depth of 250mm into fill, natural soil or rock and re-compact as specified. It should be noted that the fill material extends to 0.1 to 2.0m in the proposed building area, 0.3m in the proposed on-grade car park area and 0.7 to 1.5m (borehole termination depth) in the proposed service road area. It should be noted that the fill material may extend deeper than 1.5m in places across the site particularly under existing buildings which are to be removed from across the site.
- Remove any unsuitable material encountered at the time of the construction as required. It should be noted that the materials in these borehole locations & other areas

may become unsuitable with moisture ingress depending on the climatic condition at the time of the construction.

- Proof roll the exposed subgrade using a minimum of 10 passes of 12 tonne dead weight roller to detect any soft, loose or heaving areas.
- Any soft, loose or heave areas, if detected, should be excavated down and backfilled with appropriate approved materials, compacted in 150mm thick layers to the equivalent density of minimum 100% of SMDD.
- Any area of exposed subgrade, which exhibits shrinkage cracking and does not require re-compaction, should be watered and rolled until the shrinkage cracks do not reappear. During this undertaking, care should be exercised to ensure the surface does not become soft.

Subsequent to the above subgrade preparation, clean approved fill preferably granular materials can be placed as required and compacted to the compaction requirements as given above. The degree of compaction of any fill placement should be verified by a NATA accredited testing authority to ensure that it achieves the specified density. As the fill is likely to be laid on the clay formation, the compaction shall be carried out with minimum amount of water required to achieve the required density. The boundaries of the fill areas should be sloped to a maximum batter of 1.0 Vertical to 2.0 Horizontal as required or retained with a properly designed retaining wall.

The structural fill supporting any structural element of the structures shall be prepared in such a way that it achieves a minimum of 98% of Standard Maximum Dry Density in every 150mm thick compacted layers and certified by a relevant NATA accredited testing laboratory for which a safe allowable bearing pressure of 100kPa may be adopted, provided proper drainage measures are incorporated in the design, during and after the construction.

It is highly recommended to undertake construction of fill pads under Level 1 supervision in accordance with “AS3798 – 2007 – Guidelines on earthworks for commercial and residential developments” if fill pads are to be used for the foundation of any structure.

If the subgrade is to be stabilised, then the exposed silty sand and clayey sand should be stabilised with cement based additive & sandy clay subgrade should be stabilised with lime based additive as appropriate. It is anticipated that mixing 3% of appropriate additive to the soil material should provide required strength for the subgrade. We however strongly recommend laboratory trial test to ensure specified strength is achieved through stabilization.

It would be essential to maintain drainage of the site area during any earthworks to prevent rainfall from adversely affecting the materials such that they become unsuitable for direct re-us.

6.0 Excavation & Support and Retaining Wall

It is noted that some excavations and cuts may be involved for the construction of the basement and the car park in the new development, which may extend to 6.0m or greater. Based upon the subsurface conditions encountered in the boreholes, it is expected that the materials to be excavated will comprise layers of fill and natural silty sand, sandy clay and extremely to highly weathered sandstone bedrock depending on the extent of the proposed cut. It is therefore anticipated that all the required earthworks within soil material should be capable of being performed by conventional earthmoving plant such as scrapers, dozers, rollers and backhoes or excavator.

For the deep cuts greater than 3.0m, it is likely to excavate through the underlying extremely to highly weathered sandstone bedrock with medium strength rock bands. It is anticipated that all the required earthworks within extremely low to very low strength, sandstone bedrock should be capable of being performed by conventional earthmoving plant such as scrapers, dozers, rollers and backhoes or excavator. However, the excavation within medium strength bedrock within the investigated depth where encountered, is likely to be undertaken by a large tracked hydraulic excavator or medium weight tracked dozer both fitted with a ripping tyne/jackhammer or high powered machinery. It is therefore highly recommended to provide the borehole logs to the excavation contractor so that the contractor can choose the right equipment for the proposed excavation. It is recommended to drill couple of cored boreholes in order to assess its strength and defect properties if the excavation greater than 6.0m is required.

It would be essential to maintain drainage of the site area during any earthworks to prevent rainfall from adversely affecting the material such that they become unsuitable for direct re-use. It should be noted that trafficability in the sandy clay material for wheeled vehicles can be expected to be slightly difficult during and following rainfall when it is exposed.

The temporary batter slopes of 1(V): 1(H) is recommended for unsupported cuts of up to 3.0m depth within natural clay material.

The followings are recommended for permanent batter slopes for unsupported cuts of up to 3.0m in depth in the following material:

- Alluvium/Residual soils 1(V): 2(H)
- Extremely to highly weathered Rock 1(V): 1(H)
- Highly to Moderately weathered Rock 1(V): 0.5(H)

The permanent batter slope of the unsupported structural fill of up to 3.0m height should not exceed 1(V): 2(H).

If vertical cut with equivalent retaining wall design option is to be adopted, the following characteristic earth pressure coefficients and subsoil parameters given in Table 1 may be adopted for the design of the wall.

Table 1 Design Parameters – Retaining Wall

Design Parameters	**Controlled Fill and Natural Soil & Extremely Weathered Rock**
Bulk Unit Weight	18 kN/m^3
Active Earth Pressure Coefficient, K_a	0.4
At rest Earth Pressure Coefficient, K_o	0.5
Passive Earth Pressure Coefficient, K_p	3.0
Effective cohesion, c'	0.0
Effective Friction Angle, ϕ'	28•
Average Undrained Shear Strength	60

Appropriate factor of safety should be applied in the design of the walls. The walls should be designed to withstand full hydrostatic pressure unless special measures are taken to introduce complete and permanent drainage of the ground behind the wall. It should be noted that similar design parameters may be used for the fill embankment provided similar quality material is used for the fill and the fill placement is placed under Level 1 supervision in accordance with "AS3798-2007 Guidelines on earthworks for commercial and residential developments" as specified above.

It should be noted that surcharge loadings should not be placed within a distance equivalent to the excavation depth form the crest of a batter cut or fill.

Care would be required to ensure excavation bases are cleaned of loosened and remoulded debris. The exposed subgrade base should be proof rolled to detect any soft or heaving areas. Any soft or heave areas should be removed. The excavation base should not be left exposed for prolonged periods as deterioration of bases may occur when subjected to wetting and drying processes. Care should be exercised during construction to ensure water ponding does not occur in the excavations since this may lead to subsequent softening of the founding materials.

Although no groundwater seepage was observed within the investigated depth in the boreholes during the site investigation, it would be prudent to expect some seepage, even at shallower depth, particularly if excavation is carried out after periods of extreme rainfall. Any such seepage should be readily controllable by conventional sump and pump dewatering systems installed at the base of the excavation.

The excavated natural sand & weathered rock material can be used as structural fill provided the moisture is conditioned accordingly.

It should be noted that, no matter what method of excavation support is used, some ground displacement will occur within and immediately surrounding the excavation. We recommend that the risk of structural damage to nearby infrastructures, buildings and buried services as a result of such excavation-induced movements, be carefully evaluated. We believe it is unlikely that excavation induced movements will significantly affect structures situated back from the excavation perimeter a distance greater than the excavation depth.

7.0 Proposed Supermarket Building & Basement Car Park

It is noted that the fill material encountered at the site is considered "uncontrolled" and "not suitable" for any structural element of the footing system in its current state. Therefore based on the results obtained, the site shall be classified as **"P-Problem site"** in accordance with the Australian Standard AS 2870 "AS 2870-2011 – Residential slabs and footings". However, if the fill and any "unsuitable material and topsoil, if any, are removed and replaced with approved material (existing fill may be used provided vegetable matter is removed within the fill) and re-compacted and certified as "structural fill" as specified above or all the footings (i.e. edge beams internal beams and load support thickenings) are founded on the natural ground through filling, then **"Class 'S' – Slightly reactive"** classification may be adopted.

If the proposed cut and excavation exposes the sandstone bedrock across the proposed building site, then **the site may be classified as "A – Rock Site"** in accordance with AS 2870**.** If fill placement is required as part of the proposed development, the site for the proposed building shall then be classified as **"S – Slightly reactive"** in accordance with AS 2870 provided granular type of fill material used, provided the subgrade is prepared as specified in Section 5.0.

It should be noted an existing childcare building is to be demolished prior to the new construction. It is therefore highly recommended to completely remove the entire footing system of the previous building, allow the ground to achieve equilibrium moisture condition throughout the soil profile after the removal and then backfill in a controlled manner that it can be used as "structural fill" as required. It should also be noted the proposed cut across the site is likely to be up to 4m at this location.

If fill placement is required across the site, it is highly recommended to place granular fill comprising mainly sand and well graded gravel, but caution shall be exercised not to select a 'raw' or non-plastic material that may induce erosion. It should be noted that the clay soils are subject to saturation and shrink/swell problems. The fill shall be placed in accordance with clause 6.4.1 & 6.4.2 of AS2870, or otherwise the site classification shall be reviewed.

The shallow footing system can be designed for a subgrade reaction modulus (k) of 30kPa/mm and a maximum allowable bearing pressure of 100kPa founded on the controlled fill, prepared as specified in Section 5.0.

Alternatively, the bored and cast-in-place pile footing system, if adopted, should be taken into the natural stiff to very stiff sandy clay or sandstone bedrock material and the design parameters given in Table 2 below may be adopted for the design of the footing system. It should be noted that the geotechnical design parameters given in Table 2 were estimated from the DCP & point load test results and visual observation of the soil & rock cuttings from the boreholes.

Table 2 Geotechnical Design Parameters

Location	Depth (m)	Material Description	ABP (kPa)	ASA (C) (kPa)	AOF (°)	USS (kPa)	Density (kN/m^3)	Modulus of subgrade reaction (kN/m^3)
BH3	0.9-1.5	Silty Sand	200*	20*	30	-	17.5	16,000.00
	1.5-5.4	Sandstone	500	50	35	-	20.0	40,000.00
	5.4-6.2#	Sandstone	750	75	40	-	21.0	60,000.00
BH4	0.1-0.7	Sandy Clay	150*	15*	-	40	16.5	12,000.00
	0.7-6.0	Sandstone	500*	50*	35	-	20.0	40,000.00
	6.0-6.2#	Sandstone	750	75	40	-	21.0	60,000.00
BH7	0.3-0.5	Sandy Clay	150*	15*	-	40	16.5	12,000.00
	0.5-3.0+	Sandstone	500*	50*	35	-	20.0	40,000.00
BH8	1.0-1.3	Sandy Clay	150	15	-	40	16.5	12,000.00
	1.3-3.5+	Sandstone	500	50	35	-	20.0	40,000.00
BH9	0.5-2.4+	Sandstone	500*	50*	35	-	20.0	40,000.00
BH10	2.0-2.4	Sandy Clay	150	15	-	40	16.5	12,000.00
	2.4-2.7	Sandstone	500	50	35	-	20.0	40,000.00
	2.7-6.0#	Sandstone	750	75	40	-	21.0	60,000.00

Note:

ABP - Allowable (End) Bearing Pressure
ASA(C) - Allowable Side Adhesion (Compression)
AOF - Angle of Friction
USS - Undrained Shear Strength
Density - Density (at in-situ moisture)

The borehole termination depth.
+ The borehole refusal depth
* The side adhesion within the top 1.0m depth of natural soil shall be ignored.

If uplift forces are to be assessed, the allowable side resistance on the footing system may be taken as equivalent to 50% of the allowable side adhesion values given above. It should be noted that a factor of safety (FOS) 2.0 was adopted for the bearing pressure and skin friction values given in Table 2 for the all above material.

The footing excavations in the clay material should not be left exposed for prolonged period as deterioration of footing bases may occur when subjected to wetting and drying processes. Care

should be exercised during construction to ensure water ponding does not occur since this may lead to subsequent softening of the founding materials. Groundwater seepage may be encountered during the footing excavation if the footing excavation is undertaken after prolonged period of extreme rainfall and any such seepage should be readily controllable by conventional sump and pump dewatering systems installed at the base of the excavation. In a situation of groundwater inflows during the foundation construction, correct underwater concrete placement technique should be adopted to ensure achievement of the specified concrete quality.

The footing excavations shall be cleared off the debris and ponding water prior to the placement of the concrete in order to adopt the recommended design parameters. The bases of the pile shafts and footings must be clean and free of soft and loose material and the sides of bored pile holes where side adhesion is adopted must be free of smear prior to concreting. To achieve this, bases of bored pile holes should be cleaned using a cleaning bucket and the sides of the pile holes should be roughed to remove the smear zone associated with drilling, or the side adhesion values given above Table 2 should be reduced by 50%.

If water ponds in the base of footings or the base founding materials are affected by moisture ingress, then this material should be excavated to expose the subgrade, which has not been exposed to moisture, and pour the concrete immediately. If a delay in pouring concrete is anticipated, then a blinding layer should be placed over the base of the footing to prevent softening of the footing base, particularly for clay based foundation.

It is highly recommended the inspection of the footing construction by an experienced geotechnical engineer to ensure that the specified allowable bearing capacity is achieved for the footing system.

8.0 Settlement

We envisage that the total settlements should be minimal provided the design is made within the allowable design parameters recommended and, the maintenance of the structure and proper drainage measures are adopted around the structures.

Shallow footings proportioned in accordance with design parameters recommended above are estimated to have load induced settlements of no greater than 0.75% of the width of the footing.

Pile foundation designed in accordance with design parameters recommended above are estimated to have load induced settlements of no greater than 0.75% of the diameter of the piles. It is anticipated that differential settlement is likely to be less than 50% of the total settlement provided the footings are designed in accordance with the design parameters given above.

It should be noted that although the design parameters given above are in terms of allowable limit, their use should be checked against settlement, using deformation characteristics values of the underlying clay material given in Table 3. It should be noted that differential settlement should not exceed 50% of the total settlement.

Table 3 Deformation Characteristics Values[1]

Parameters	Stiff Clay	Very Stiff Clay
Bulk Density (kN/m^3)	17.0	18.0
Elastic Modulus (Undrained) (MPa) -E_u	7.5	12.0
Coefficient of Volume Compressibility - (m^2/MN) - m_v	0.07	0.07

Note: 1 - These values are estimated from the field DCP test results.

9.0 Site Sub-Soil Class – Earthquake Design

The site sub-soil class in accordance with Section 4.2 of AS1170.4-2007 "Part 4: Earthquake actions in Australia", is assessed to be "Class B_e- Rock site".

10.0 Soil Aggression

The pH tests indicated pH values of 6.2 & 6.5 on silty sand material recovered from BH3 & BH10 and therefore the underlying soil is considered "slight & very slight acidity" respectively. EC values of 0.33 & 0.04mS/cm were recorded on the same samples tested, which are assessed to be "moderate & very low salinity" respectively. The pH values on the silty sand materials are considered "mildly aggressive" towards concrete and "non-corrosive" towards steel due to its permeable nature.

The sulphate contents of 210 & 20mg/kg were recorded on the same samples tested and are considered generally "low" and chloride contents of 50 & 100mg/kg recorded on the same samples tested and are considered generally "low". The "low" sulphate levels in the permeable silty sand material are considered "mildly aggressive" towards concrete and the "low" chloride levels in the permeable silty sand material are considered "non-corrosive" towards steel.

The resistivity values of 11.1 & 59.19Ω.m were recorded on the same samples tested which are assessed to be "mild & high resistivity" respectively. The "mild & high resistivity" in the permeable silty sand material is considered to provide a "moderate & non-aggressive" environment towards unprotected steel respectively.

The designer is therefore referred to the Cement and Concrete Association of Australia Technical Note 57 for any special precautionary measures required for buried concrete and steel elements into these material.

11.0 Proposed Car Parks & Service Road

11.1 Subgrade

The site is underlain by fill material overlying natural alluvium & residual material comprising fine to coarse grained silty sand and low plasticity sandy clay overlying sandstone bedrock. It should be noted that the site for the proposed front on-grade car park area is covered by BH1 & BH2, basement car park covered by BH3, BH4, BH7, BH8, BH9 & BH10 and rear service road covered by BH5 & BH6 (refer to borehole location plan). It should also be noted the front on-grade car park will have shallow cut across the site, the basement car park deep cut across the site and the rear service road deep fill across the site.

The laboratory 4 day soaked CBR tests indicated a CBR values of 25% of fine to coarse grained silty gravelly sand fill material, 7% on low plasticity sandy clay fill material and 11% on fine to coarse grained silty sand fill materials, which were compacted at 98% of SMDD and at nearest 100% SOMC.

It is noted that the Merimbula area has an annual average rainfall of <1000mm and the moisture content of the subgrade materials would be generally less than Optimum Moisture Content with provision of drainage measures across the site and the subgrade would be prepared as specified in Section 5.0.

Based on these evaluations, the design subgrade CBR value of 12% for the proposed car park area (front on-grade & basement car park areas) where bedrock subgrade material is exposed and 7% along the proposed rear service road area where fill material is proposed to raise the existing level (refer to borehole location plan), provided the subgrade is prepared as specified in Section 5.0 and fill material with a minimum CBR value of 7% compacted at 98% of SMDD and at nearest 100% SOMC is placed.

11.2 Design Traffic

The following design traffic data are adopted as advised by Mr Thomas Rozehnal of Henry & Hymas Pty Ltd for the proposed car parks, truck traffic areas and service road.

Pavement Area	Design ESA Value for 40 year Design Life
Proposed Car Parks	$1.0x10^4$ ESA
Truck Traffic Areas	$1.0x10^6$ ESA
Service Road	$1.0x10^6$ ESA

11.3 Pavement Design – Proposed Car Parks

In adopting the design subgrade CBR of 12.0% and the design traffic of $1.0x10^4$ ESA as discussed above, we recommend the following pavement design options for proposed car park.

Design Option 1 – Pavement with Asphalt Concrete & Granular Material (DGS20)

40mm Asphalt (AC10) – 1100Mpa
100mm RMS DGS20 (Ev=250Mpa) or equivalent
Subgrade CBR 12.0%

The above pavement will give a design life of 40 years, according to Circly 5.0u, using the given design parameters, provided proper drainage measures are incorporated at the site. It should be noted that this does not allow any tolerance on pavement layers.

Design Option 2 – Granular Pavement with Bituminous Seal (DGB20)

7mm Primerseal followed by 14mm Seal
150mm RMS DGB 20 or equivalent (Ev=350Mpa)
Subgrade CBR 12.0%

The above pavement will give a design life of 40 years, according to Circly 5.0u, using the given parameters, provided proper drainage measures are incorporated at the site. It should be noted that no tolerance is allowed on pavement layers.

Design Option 3 – Concrete Pavement

140mm Plain Concrete (Jointed/Unreinforced)*
150mm Crushed Rock or Gravel
Subgrade CBR 12.0%

Note: * - The concrete specified in the above design should achieve the flexural strength of 3.5Mpa for 32Mpa compressive strength.

The above design should give a design life of 40 years. The exposed sandstone rock may be used as sub-base layer as per above design provided the exposed rock is scarified and re-compacted to a minimum of 100% SMDD as required. Appropriate jointing layout may be prepared in accordance with the requirements of "Industrial Floors and Pavements – Guidelines for design, construction and specification" by Cement and Concrete Association of Australia (May 1999).

11.4 Pavement Design – Trucking Area & Service Road

In adopting the design subgrade CBR of 7.0% and the design traffic of $1.0x10^6$ ESA as discussed above, we recommend the following pavement design options for proposed trucking area and service road.

Design Option 4 – Pavement with Asphalt Concrete & Granular Material (DGB20 & Select Fill)

40mm Asphalt (AC10) – 1100Mpa
160mm RMS DGB20 (Ev=350Mpa) or equivalent
120mm Select Fill material* (Ev=150Mpa)
Subgrade CBR 7.0%

Note*: (i) Select fill material should have a CBR>20% and plasticity index (PI) <12%.
(ii) Select fill material should be modified with 2% hydrated lime if CBR <20% and/or PI>12%.

The above pavement will give a design life of 40 years, according to Circly 5.0u, using the given design parameters, provided proper drainage measures are incorporated at the site. It should be noted that this does not allow any tolerance on pavement layers.

Design Option 5 – Granular Pavement with Bituminous Seal (DGB20 & Select Fill)

7mm Primerseal followed by 14mm Seal

200mm RMS DGB 20 or equivalent (Ev=350Mpa)
130mm Select Fill material* (Ev=150Mpa)
Subgrade CBR 7.0%

Note*: (i) Select fill material should have a CBR>20% and plasticity index (PI) <12%.
(ii) Select fill material should be modified with 2% hydrated lime if CBR <20% and/or PI>12%.

The above pavement will give a design life of 40 years, according to Circly 5.0u, using the given parameters, provided proper drainage measures are incorporated at the site. It should be noted that no tolerance is allowed on pavement layers.

Design Option 6 – Concrete Pavement

170mm Plain Concrete (Jointed/Unreinforced)*
150mm Crushed Rock or Gravel
Subgrade CBR 7.0%

Note: * - The concrete specified in the above design should achieve the flexural strength of 3.5Mpa for 32Mpa compressive strength.

The above design should give a design life of 40 years. The provision of sub-base layer is to assist in controlling volume changes in moderately to highly expansive clay subgrade and to provide uniform support to the base concrete layer. The crushed rock or gravel material before addition of any additive should achieve a CBR of >25% and a PI (Plasticity Index) of <12%. If the sandstone bedrock is exposed at the subgrade level, then sandstone rock may be used as sub-base layer as per above design provided the exposed rock is scarified and re-compacted to a minimum of 100% SMDD as required. Appropriate jointing layout may be prepared in accordance with the requirements of "Industrial Floors and Pavements – Guidelines for design, construction and specification" by Cement and Concrete Association of Australia (May 1999).

12.0 Material Classification

Eight discrete samples were taken for analysis as part of the geotechnical investigation to initially classify the material to provide disposal options and to allow an informed decision. The material classification has been completed as per the following;

Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014; *The excavated natural material order 2014.*
Each sample was analysed for the following:

- Metals – Mercury, Cadmium, Lead, Arsenic, Chromium (total), Copper Nickel and Zinc;
- Electrical Conductivity (EC)
- pH
- Total Polycyclic Aromatic Hydrocarbons (PAH)
- Benzo(a)pyrene
- Benzene
- Toluene
- Ethyl-benzene
- Xylene
- Total Recoverable Hydrocarbons C_{10}-C_{36} (TRH)

Note – Foreign Material was excluded from the analysis suite. On site observations were used to determine if Foreign Material analysis was required.

The samples were sent to EnviroLab Services, a NATA accredited laboratory in Sydney for analysis. No evidence of rubber, plastic, bitumen, paper, cloth, paint and wood was noted within the samples. The results are summarised in Table 4 below which shows that all samples comply with The Excavated Natural Material Order (2014) for the contaminants analysed and can be exported from the site as Excavated Natural Material (ENM).

Table 4. Analytical results summary for Material Classification

No. of Samples	Analyte	Absolute Maximum Concentration (mg/kg) *ENM Order 2014*	Min. Result (mg/kg)	Max. Result (mg/kg)	Comply Y/N
8	Mercury	1	<0.1	<0.1	**Y**
	Cadmium	1	<0.4	<0.4	**Y**
	Lead	100	4	16	**Y**
	Arsenic	40	<4	7	**Y**
	Chromium (total)	150	6	23	**Y**
	Copper	200	<1	9	**Y**
	Nickel	60	<1	32	**Y**
	Zinc	300	3	53	**Y**
	EC (dS/m)	3	0.027	0.25	**Y**
	pH (pH units)	4.5-10	7.3	8.9	**Y**
	Total PAH	40	<0.05	<0.05	**Y**
	Benzo(a)pyrene	1	<0.05	<0.05	**Y**
	Benzene	0.5	<0.2	<0.2	**Y**
	Toluene	65	<0.5	<0.5	**Y**
	Ethyl-benzene	25	<1	<1	**Y**
	Xylene	15	<1	<1	**Y**
	TRH (C_{10}-C_{36})	500	<50	240	**Y**

13.0 General Comment

- Occasionally, the subsurface soil conditions in the completed boreholes may be found different (or may be interpreted to be different) from those expected. This can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact us.
- The material specified as base and sub-base material as per above designs may be used provided the material meets all criteria as shown in Table 242.3 and 242.4 of AusSpec for NGS20/NGS40 or RMS DGB20/DGS20 specification. It is therefore highly recommended to use those similar quality materials and to undertake on-going quality control test to ensure that the material quality is maintained throughout the construction.
- The pavement materials shall be compacted to a minimum of 102% SMDD for base and 100% SMDD for sub-base and select fill or as per Council Specification.
- It is highly recommended that an adequate drainage system should be formed to maintain constant moisture conditions in the pavement and subgrade below the pavement. It is also highly recommended to place interface trench drain at the joints between existing and new pavement if the existing materials are found different from new materials, particularly if the existing or new pavement has a heavily bound layer. The trench drain of 300x300mm shall be placed below heavily bound layer and be extended to about 300mm.
- It should be noted that site preparation may expose wet subgrade material if excavation is carried out after prolonged period of rainfall. Trafficability in the silty clay/silt materials for wheeled vehicles can be expected to be slightly difficult during and following rainfall, if it is exposed. Caution shall therefore be exercised during the construction.

- Determining whether concrete or asphalt is better is a matter of looking at the advantages of both ground covers and how they will be used. Both are permanent solutions that clear the way for a path, road or street. Concrete is a water-based quarried rock material, while asphalt is a petroleum refining residue that retains some of its oil-based properties.

  - The appearance of concrete is light-colored, while asphalt is specifically a charcoal black. Concrete's advantages include its ability to be stained numerous solid or multicolored tints to mimic natural stone and to blend in with, complement or contrast the structural and aesthetic appearance of the property. Texture and pattern can be imprinted into the concrete, giving it a faux stone or paver appearance. Both asphalt and concrete can be molded to the form of the planned path, lending flexibility in design and the ability of a path or road to meander with an organic form around trees and structures.
  - Concrete and asphalt are both suitable for cool climates, but in the heat, concrete outperforms asphalt in temperature management, color and integrity. Asphalt absorbs the heat and its oil-based components make the surface extremely hot in comparison to concrete. Asphalt also softens in the heat, especially newly laid asphalt. While this flexibility prevents asphalt from easily cracking like concrete in sudden impact or from expansion and contraction from heat and cold, this softness lends to dips in the road caused by the weight of the vehicles and also where the ground is soft beneath the asphalt. Concrete keeps the ground cool in sun exposure, while asphalt heats it up.
  - Weather-beating takes its toll on the surface of asphalt, while the face of concrete is more durable throughout the seasons, over many years before visible weather damage is noticed. Asphalt changes tones from a dark charcoal to a light gray in as little as three years, depending on the amount of direct sun exposure and wet weather. It develops cracks and ridges that often cause potholes. Topcoats are applied to asphalt once every five years to preserve the integrity of the asphalt and to improve its faded appearance. With concrete, it maintains its color with minimal fading and while it can develop cracks, this does not happen nearly as often as with asphalt.
  - Concrete is gentler on the environment than asphalt. The rock-based material of the concrete can seamlessly be recycled into the environment, and its installation simply requires water to activate its bonding materials to yield a solid concrete surface once it dries. Asphalt requires added oil to spread it over the ground, and it releases its petroleum fumes into the air.
  - By far, concrete is more expensive to install initially with its costs being more noticeably expensive for larger applications than for residential properties. After the initial expense, concrete doesn't require further applications for many years, but asphalt regularly requires repairs and topcoat applications to maintain its smooth, dark-tone appearance. Concrete pavement lasts much longer than asphalt pavement

Should you have any queries, please do contact us.

Yours truly,

Tin Maung
Senior Geotechnical Engineer
Attachments:

- Addendum
- Plan showing borehole & DCP test locations
- Borehole logs with explanatory note
- Material schedule & log with explanatory note
- Dynamic Cone Penetrometer test report
- Laboratory test reports by Aitken Rowe Testing Laboratories Pty Ltd
- Laboratory test report by Sydney Environmental & Soil Laboratory
- Laboratory test report by EnviroLab Services Pty Ltd
- Circly Design Print-outs
- Core Box Photos

ADDENDUM

LIMITS OF INVESTIGATION

The recommendations made in this report are based on the assumption that the test results are representative of the overall subsurface conditions. However, it should be noted that even under optimum circumstances, actual conditions in some parts of the building site may differ from those said to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal all that is hidden by earth, rock and time.

The client should also be aware that our recommendations refer only to our test site locations and the ground level at the time of testing.

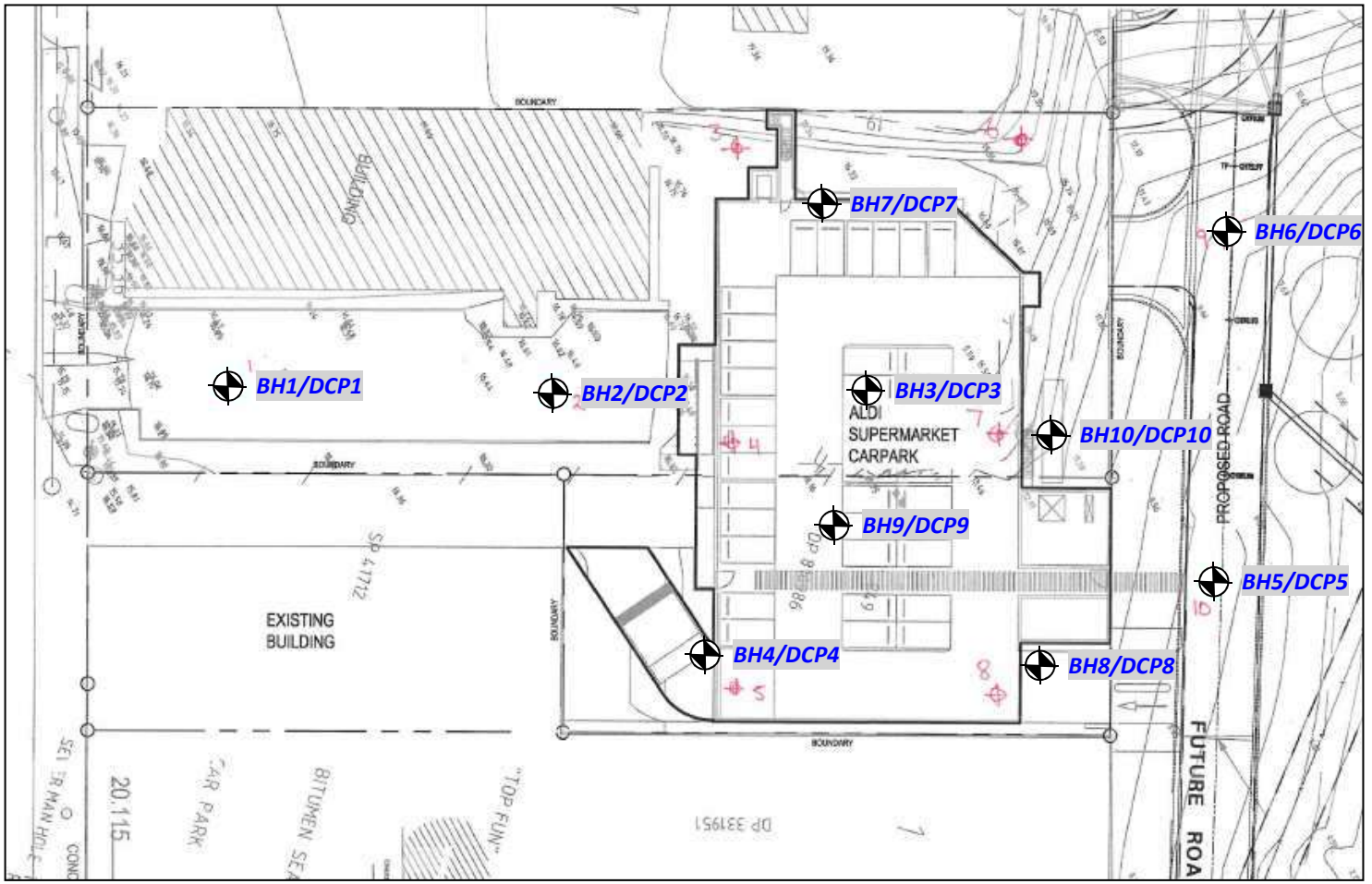
The recommendations in this report are based on the following: -

a) The information gained from our investigation.
b) The present "state of the art" in testing and design.
c) The building type and site treatment conveyed to us by the client.
d) Historical Information

Should the client or their agent have omitted to supply us with the correct relevant information, or make significant changes to the building type and/or building envelope, our report may not take responsibility for any consequences and we reserve the right to make an additional charge if more testing is necessary.

Not withstanding the recommendations made in this report, we also recommend that whenever footings are close to any excavations or easements, that consideration should be given to deepening the footings.

Unless otherwise stated in our commission, any dimensions or slope direction and magnitude should not be used for any building costing calculations and/or positioning. Any sketch supplied should be considered as only an approximate pictorial evidence of our work.



AITKEN ROWE TESTING LABORATORIES PTY LTD

Registration Number: S17-373

Client: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW

Project: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
PROPOSED ALDI SUPERMARKET
MAIN STREET, MERIMBULA, NSW
BOREHOLE & DCP TEST LOCATION PLAN

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **3**

Sheet No.: 1 of 2

Ground Level: Existing
Method: Auger drilling with TC Bit

Date: 22/08/2017
GPS N: 5913823
E: 0759330

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S %	Remarks & Field Records
SM	FILL: Silty Gravelly SAND; fine to coarse grained, fine to medium gravel, fines of low plasticity, brown		D	MD-D				Bitumen Seal top 20mm
					D	3A		FILL: Appears moderately to well compacted
SM	FILL: Silty SAND; fine to coarse grained, with fine to medium gravel, grey brown				D	3B		'Uncontrolled'
SM	Silty SAND; fine to coarse grained, with fines of low plasticity, brown	**0.5**	M	L				NATURAL
					D	3C	3.0	FMC = 10.3%
SM	Silty SAND; fine to coarse grained, with fines of low plasticity, brown	**1.0**		MD				
					D	3D	4.5	FMC = 9.0%
		1.5						
	SANDSTONE; extremely weathered, extremely low strength, with clay bands, grey brown				D	3E		
	SANDSTONE; extremely weathered, extremely low strength, with clay bands, grey pink		D-M					
		2.0			D	3F		
		2.5						
	End of augering of Borehole (BH3) @ 2.7m							Refusal on Sandstone Bedrock
	Continued Coring - Refer Cored Borehole Log - Page 2 o	**3.0**						
		3.5						
		4.0						

Registration No.: S17-373
Project/Location: Geotechnical Investigation and Pavement Design
Proposed Aldi Supermarket, Main Street, Merimbula, NSW
Client: Aldi Stores C/- Rothelowman - Darlinghurst, NSW

Logged By: D.R.R
Scale: As shown
Dry on Completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

CORED BOREHOLE LOG

Client: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW
Project: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN - PROPOSED ALDI SUPERMARKET
Location: MAIN STREET, MERIMBULA, NSW

Borehole No.: 3
Page 2 of 2

Job No.: S17-373 | Core Size: N.M.L.C | R.L.Surface: N/K
Date Drilled: 22/08/2017 | Inclination: 90° | Datum: N/K
Drill Type: TRUCK MOUNTED DIAMOND DRILL | Bearing: N/A

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type,grain characteristics, colour,structure,minor components	Weathering	Strength	POINT LOAD INDEX STRENGTH $I_S(50)$ (EL, VL, L, M, H, VH, EH)	DEFECT DETAILS: DEFECT SPACING (mm) (500, 300, 100, 50, 30, 10)	DEFECT DETAILS: DESCRIPTION (Type,inclination,thickness,planarity,roughness,coating)
				Start Coring @ 2.7m					
				SANDSTONE; brown	HW	VL			
		3.0		Core Loss 0.65m (2.76-3.41m)					
		3.5		SANDSTONE; grey	HW	VL			-JT, 75°, CU, R
	3.8								-DB
		4.0		SANDSTONE; mottled grey red	EW	EL			-JT, 45°, PR, R
									-JT, 65°, CU, R
		4.5							-JT, 60°, CU, R
									- Crumble
	4.9								-DB
		5.0							
		5.5		SANDSTONE; mottled grey red, with Quartzite	EW-HW	EL-M			-JT, 45°, PR, R
		6.0							- Crumble

End of Core Log (BH3) @ 6.2m

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **4**

Sheet No.: 1 of 2

Ground Level: Existing
Method: Auger drilling with TC Bit

Date: 22/08/2017
GPS N: 759372
E: 05913791

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S %	Remarks & Field Records
GM	FILL: Silty Sandy GRAVEL: fine to coarse grained, fine to coarse sand, fines of low plasticity, brown		D	MD-D	D	4A		Bitumen Seal top 20mm FILL: Appears moderately to well compacted 'Uncontrolled'
CL	Sandy CLAY; low plasticity, fine to coarse sand, yellow brown	0.5	MC>PL	St.-VSt.	D	4B		NATURAL
	SANDSTONE; extremely weathered, extremely low strength, grey orange	1.0	D-M		D	4C		
	SANDSTONE; extremely weathered, extremely low strength, grey	1.5			D	4D		
		2.0						
	SANDSTONE; extremely weathered, extremely low strength, grey orange brown	2.5			D	4E		
		3.0						
	End of augering of Borehole (BH4) @ 3.0m Continued Coring - Refer Cored Borehole Log - Page 2 o	3.5						Refusal on Sandstone Bedrock
		4.0						

Registration No.: S17-373
Project/Location: Geotechnical Investigation and Pavement Design
Proposed Aldi Supermarket, Main Street, Merimbula, NSW
Client: Aldi Stores C/- Rothelowman - Darlinghurst, NSW

Logged By: D.R.R
Scale: As shown
Dry on Completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

CORED BOREHOLE LOG

Client: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW
Project: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN - PROPOSED ALDI SUPERMARKET
Location: MAIN STREET, MERIMBULA, NSW

Borehole No.: 4
Page 2 of 2

Job No.: S17-373 | Core Size: N.M.L.C | R.L.Surface: N/K
Date Drilled: 22/08/2017 | Inclination: 90° | Datum: N/K
Drill Type: TRUCK MOUNTED DIAMOND DRILL | Bearing: N/A

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type,grain characteristics, colour,structure,minor components	Weathering	Strength	POINT LOAD INDEX STRENGTH $I_S(50)$ (EL VL L M H VH EH)	DEFECT DETAILS: DEFECT SPACING (mm) (500 300 100 50 30 10)	DEFECT DETAILS: DESCRIPTION (Type,inclination,thickness,planarity,roughness,coating)
				Start Coring @ 3.0m					
				SANDSTONE; mottled red grey yellow, with Quartz	EW-HW	EL-VL			-JT, 45°, CU, R
		3.5							-JT, 50°, CU, R -JT, 50°, CU, R -JT, 60°, CU, R -JT, 50°, CU, R
		4.0		Core loss 2.08m (3.92m - 6.0m)					
	4.3								
		4.5							
		5.0							
		5.5							
	5.8								
		6.0							
6.2	0.4			SANDSTONE; mottled red grey yellow, with Quartz	HW	VL			-JT, 45°, CU, R
				End of Core Log (BH4) @ 6.2m					

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **7**

Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger drilling with TC Bit

Date: 23/08/2017
GPS N: 5913799
E: 0759318

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S %	Remarks & Field Records
SM	FILL: Silty SAND; fine to coarse grained, with fine to medium gravel, fines of low plasticity, yellow brown		D	M-D	D	7A		Bitumen Seal top 20mm FILL: Appears moderately to well compacte
GM	FILL: Silty Sandy GRAVEL; fine to coarse grained, fine to coarse sand, fines of low plasticity, brown				D	7B		'Uncontrolled'
CL	Sandy CLAY; low plasticity, fine to coarse sand, yellow brown	**0.5**	MC<PL	VSt.	D	7C	6.5	NATURAL
	SANDSTONE; extremely weathered, extremely low strength, yellow brown		D		D	7D		
	SANDSTONE; extremely weathered, extremely low strength, orange brown	**1.0**			D	7E		
	SANDSTONE; extremely weathered, extremely low strength, mottled orange grey red yellow, with clay bands	**1.5**			D	7F		
	SANDSTONE; extremely weathered, extremely low strength, mottled orange grey red	**2.0**						
		2.5			D	7G		
		3.0						
	End of Borehole (BH7) @ 3.0m	**3.5**						Refusal on Sandstone Bedrock
		4.0						

Registration No.: S17-373
Project/Location: Geotechnical Investigation and Pavement Design
Proposed Aldi Supermarket, Main Street, Merimbula, NSW
Client: Aldi Stores C/- Rothelowman - Darlinghurst, NSW

Logged By: D.R.R
Scale: As shown
Dry on Completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **8**

Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger drilling with TC Bit

Date: 23/08/2017
GPS N: 5913840
E: 0759363

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S %	Remarks & Field Records
GM	FILL: Silty Sandy GRAVEL; fine to coarse grained, fine to coarse sand, fines of low plasticity, grey orange brown		D	MD	D	8A		Bitumen Seal top 30mm FILL: Appears moderately to well compacte 'Uncontrolled'
CL	FILL: Sandy CLAY; low plasticity, fine to coarse sand, with fine to medium gravel, brown	0.5	MC>PL	F-St.	D	8B	4.5	
		1.0						
CL-CI	Sandy CLAY; low to medium plasticity, fine to coarse sand, trace gravel, orange brown			St.-VSt.	D	8C	8.0	NATURAL FMC = 17.8%
	SANDSTONE; extremely weathered, extremely low strength, with clay bands, orange yellow grey	1.5	M					
		2.0			D	8D		
		2.5						
	SANDSTONE; extremely weathered, extremely low strength, orange grey brown							
		3.0			D	8E		
		3.5						
	End of Borehole (BH8) @ 3.5m	4.0						Refusal on Sandstone Bedrock

Registration No.: S17-373
Project/Location: Geotechnical Investigation and Pavement Design
Proposed Aldi Supermarket, Main Street, Merimbula, NSW
Client: Aldi Stores C/- Rothelowman - Darlinghurst, NSW

Logged By: D.R.R
Scale: As shown
Dry on Completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **9**

Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger drilling with TC Bit

Date: 24/08/2017
GPS N: 5913802
E: 0759353

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S %	Remarks & Field Records
GP	FILL: Sandy GRAVEL; fine to coarse grained, fine to coarse sand, with silt fines of low plasticity, pale brown		M	MD-D	D	9A		Bitumen Seal top 20mm FILL: Appears moderately to well compacte 'Uncontrolled'
SC	FILL: Clayey SAND; fine to coarse grained, fines of low plasticity, mottled orange grey yellow brown	0.5			D	9B		
	SANDSTONE; extremely weathered, extremely low strength, red brown		D		D	9C		NATURAL
	SANDSTONE; extremely weathered, extremely low strength, orange yellow brown	1.0			D	9D		
	SANDSTONE; extremely weathered, extremely low strength, mottled, orange yellow brown	1.5			D	9E		
	SANDSTONE; extremely weathered, extremely low strength, mottled white grey brown	2.0	M		D	9F		
	End of Borehole (BH9) @ 2.4m	2.5 3.0 3.5 4.0						Refusal on Sandstone Bedrock

Registration No.: S17-373
Project/Location: Geotechnical Investigation and Pavement Design
Proposed Aldi Supermarket, Main Street, Merimbula, NSW
Client: Aldi Stores C/- Rothelowman - Darlinghurst, NSW

Logged By: D.R.R
Scale: As shown
Dry on Completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **10**

Sheet No.: 1 of 3

Ground Level: Existing
Method: Auger drilling with TC Bit

Date: 24/08/2017
GPS N: 5913825
E: 0759337

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S %	Remarks & Field Records
ML	FILL: Sandy SILT; low plasticity, fine to coarse sand, brown		MC<PL	F				FILL: Appears moderately compacted 'Uncontrolled
				St.-VSt.	D	10A	2.0	
SM	FILL: Silty SAND; fine to coarse grained, with fine to coarse gravel, with fines of low plasticity, red brown	0.5	D	L-MD	D	10B	4.5	
		1.0		MD				
		1.5			D	10C	3.0	
		2.0						
CL	Sandy CLAY; low plasticity, fine to coarse sand, yellow brown		MC>PL	St.-VSt.				NATURAL
	End of augering of Borehole (BH10) @ 2.4m	2.5						Refusal on Sandstone Bedrock
	Continued Coring - Refer Cored Borehole Log - Page 2 o	3.0						
		3.5						
		4.0						

Registration No.: S17-373
Project/Location: Geotechnical Investigation and Pavement Design
Proposed Aldi Supermarket, Main Street, Merimbula, NSW
Client: Aldi Stores C/- Rothelowman - Darlinghurst, NSW

Logged By: D.R.R
Scale: As shown
Dry on Completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

CORED BOREHOLE LOG

Client: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW
Project: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN - PROPOSED ALDI SUPERMARKET
Location: MAIN STREET, MERIMBULA, NSW

Borehole No.: 10
Page 2 of 3

Job No.: S17-373
Date Drilled: 24/08/2017
Drill Type: TRUCK MOUNTED DIAMOND DRILL

Core Size: N.M.L.C
Inclination: 90°
Bearing: N/A

R.L.Surface: N/K
Datum: N/K

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type,grain characteristics, colour,structure,minor components	Weathering	Strength	POINT LOAD INDEX STRENGTH $I_S(50)$ EL VL L M H VH EH	DEFECT DETAILS: DEFECT SPACING (mm) 500 300 100 50 30 10	DEFECT DETAILS: DESCRIPTION Type,inclination,thickness,planarity,roughness,coating
				Start coring @ 2.4m					
		2.5		SANDSTONE; brown	EW	EL			
				Core loss 0.18m (2.54m - 2.72m)					
				SANDSTONE; light brown	HW	VL			-JT, 45°, CU, R
		3.0		SANDSTONE; light brown yellow					-JT, 45°, CU, R
		3.5							-JT, 50°, CU, R
	3.66								-DB
				Core loss 0.6m (3.66m - 4.26m)					
		4.0							
				SANDSTONE; grey yellow, with Quartz	HW	VL			
		4.5							-JT, 45°, PR, R
									-JT, 45°, PR, R
		5.0							
	5.1								-DB
		5.5							
				Core loss 0.35m (5.55m - 5.9m)					

AITKEN ROWE TESTING LABORATORIES PTY LTD

CORED BOREHOLE LOG

Client: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW
Project: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN - PROPOSED ALDI SUPERMARKET
Location: MAIN STREET, MERIMBULA, NSW

Borehole No.: 10
Page 3 of 3

Job No.: S17-373
Date Drilled: 24/08/2017
Drill Type: TRUCK MOUNTED DIAMOND DRILL

Core Size: N.M.L.C
Inclination: 90°
Bearing: N/A

R.L.Surface: N/K
Datum: N/K

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type,grain characteristics, colour,structure,minor components	Weathering	Strength	POINT LOAD INDEX STRENGTH $I_S(50)$ EL VL L M H VH EH	DEFECT DETAILS: DEFECT SPACING (mm) 500 300 100 50 30 10	DEFECT DETAILS: DESCRIPTION Type,inclination,thickness,planarity,roughness,coating
				Core loss 0.35m (5.55m - 5.9m)					
		6.0		SANDSTONE; grey	HW	VL			
				End of Core Log (BH10) @ 6.0m					
		6.5							
		7.0							
		7.5							
		8.0							
		8.5							
		9.0							

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4/2 Riedell Street, Wagga Wagga NSW 2650

Pavement & Subgrade Investigation - Materials Schedule and Log

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW

PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
PROPOSED ALDI SUPERMARKET - MAIN STREET, MERIMBULA, NSW

STAFF: D.R.R **SAMPLING METHOD :** AS1289.1.2.1 **CLAUSE :** 6.5.3

DATE: 21/08/2017

REGO. NO.: S17-373

Borehole No. and Location	Layer Sample No.	Depth (mm)	Group Symbol	Field Description (layer, type, plasticity / particle size, colour, secondary components)	Moisture Conditions	Strength Comments	Moistures (FMC=Field MC) (OMC=Optimum MC) (FMC/OMC=Moisture Ratio)			Dynamic Cone Penetrometer (NB not equiv. to lab soaked CBR)		(CBR%)	Other Comments
							OMC	FMC	FMC/ OMC	Depth In Subgrade (mm)	Equiv. CBR %	4 day (95% Rel. Comp.)	
BH1		0-20		Bitumen									
	1A	20-300	GM	FILL: Silty Gravelly SAND; fine to coarse grained, yellow brown, fine to	D	MD-D	9.9	6.3		20-300	36	25	FILL: Appears moderately to well compacted
				coarse gravel, yellow brown, fines of low plasticity, yellow brown									'Uncontrolled'
	1B	300-500		SANDSTONE; extremely weathered, extremely low strength, red brown	D								NATURAL
	1C	500-800		SANDSTONE; extremely weathered, extremely low strength, yellow brown	D								
	1D	800-1500		SANDSTONE; extremely weathered, extremely low strength, red brown	D								
				End of Borehole (BH1) @ 1.5m									
BH2		0-30		Bitumen									
	2A	30-300	GM	FILL: Silty Gravelly SAND; fine to coarse grained, yellow brown, fine to	D	MD				30-300	9		FILL: Appears moderately compacted
				coarse gravel, yellow brown, fines of low plasticity, yellow brown									'Uncontrolled'
	2B	300-500		SANDSTONE; extremely weathered, extremely low strength, grey	D								NATURAL
				End of Borehole (BH2) @ 0.5m									Refusal on Sandstone Bedrock
BH5	5A	0-100	CL	FILL: Gravelly Sandy CLAY; low plasticity, fine to coarse sand, fine to coase	MC<PL	St.							FILL: Appears moderately to well compacted
				gravel, fines of low plasticity, orange red brown									'Uncontrolled'
	5B	100-300	ML	FILL: Sandy SILT; low plasticity, fine to coarse sand, with vegetation, brown	MC>PL	F-St.							FILL: Appears moderately compacted 'Uncontrolled'
	5C	300-700	CL	FILL: Sandy CLAY; low plasticity, grey brown orange, fine to coarse sand,	MC>PL	St.	17.0	19.6		0-200	6	7	FILL: Appears moderately to well compacted
				brown orange, trace gravel						200-700	12		'Uncontrolled'
	5D	700-1100	CL	Sandy CLAY; low plasticity, fine to coarse sand, orange grey brown	MC>PL	VSt.				700-1200	42		NATURAL
	5E	1100-1500		SANDSTONE; extremely weathered, extremely low strength, with clay	D-M								
				bands, orange yellow grey brown									
				End of Borehole (BH5) @ 1.5m									

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Pavement & Subgrade Investigation - Materials Schedule and Log

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW

PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
PROPOSED ALDI SUPERMARKET - MAIN STREET, MERIMBULA, NSW

STAFF: D.R.R **SAMPLING METHOD :** AS1289.1.2.1 **CLAUSE :** 6.5.3

PAGE: 2 OF 2

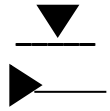
DATE: 23/08/2017

REGO. NO.: S17-373

Borehole No. and Location	Layer Sample No.	Depth (mm)	Group Symbol	Field Description (layer, type, plasticity / particle size, colour, secondary components)	Moisture Conditions	Strength Comments	Moistures (FMC=Field MC) (OMC=Optimum MC) (FMC/OMC=Moisture Ratio)			Dynamic Cone Penetrometer (NB not equiv. to lab soaked CBR)		(CBR%)	Other Comments
							OMC	FMC	FMC/ OMC	Depth In Subgrade (mm)	Equiv. CBR %	4 day (95% Rel. Comp.)	
BH6	6A	0-500	SM	FILL: Silty SAND; fine to coarse grained, trace gravel, with fines of low plastic	M	MD-D	10.0	5.8		0-600	33	11	FILL: Appears moderately to well compacted
				orange red brown grey									'Uncontrolled'
	6B	500-1000	SM	FILL: Silty SAND; fine to coarse grained, with fine to coarse gravel, fines	D	D							FILL: Appears moderately to well compacted
				of low plasticity, orange red brown grey									'Uncontrolled'
	6C	1000-1500	SM	FILL: Silty SAND; fine to coarse grained, with fine to coarse gravel, fines	D	D							FILL: Appears moderately to well compacted
				of low plasticity, yellow grey orange brown									'Uncontrolled'
				End of Borehole (BH6) @ 1.5m									

Form R21 Revised 26/03/2015

AITKEN ROWE TESTING LABORATORIES PTY LTD
LOG SYMBOLS

LOG COLUMN	SYMBOLS	DEFINITION
Groundwater Record		Standing water level. Time delay following completion of drilling may be shown. Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	**D** **B** **U**	Small disturbed bag sample taken between the depths indicated by lines. Bulk disturbed sample taken between the depths indicated by lines. Undisturbed 50mm diameter tube sample taken between the depths indicated by lines
Field tests	**N=17** **4, 7, 10**	Standard Penetration Test (S.P.T.) performed between depths indicated by lines. Individual figures show blows per 150mm penetration driven by SPT hammer.
	N_c **5** **7** **3**	Dynamic Cone Penetration Test performed between depths indicated by lines. Individual figures show blows per 100mm penetration for 60 degree solid cone driven by 9 Kg hammer.
Moisture Condition (Cohesive Soils) (Cohensionless Soils)	**MC >PL** **MC=PL** **MC<PL** **D** **M** **W**	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approx. equal to plastic limit. Moisture content estimated to be less than plastic limit. DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Consistency (Cohesive Soils)	**VS** **S** **F** **St.** **VSt.** **H**	VERY SOFT – unconfined compressive strength less than 25kPa. SOFT – unconfined compressive strength 25-50 kPa. FIRM – unconfined compressive strength 50-100kPa. STIFF – unconfined compressive strength 100-200kPa. VERY STIFF – unconfined compressive strength 200 – 400kPa. HARD – unconfined compressive strength greater than 400kPa.
Relative Density (Cohensionless Soils)	**VL** **L** **MD** **D** **VD**	ID – Density index Range % S.P.T. 'N' Value Range Blows/300mm Very Loose <15 0-4 Loose 15-35 4-10 Medium Dense 35-65 10-30 Dense 65-85 30-50 Very Dense >85 > 50
Hand Penetrometer Readings	**300** **250** **280**	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Laboratory Test	**L.S. %** **I_{ss}**	Linear Shrinkage (As per RTA Method T113) Shrink-Swell Index (As per Australian Standard AS1289.7.1.1)
Remarks	**'V' bit** **'TC' bit** **T^{60}**	Hardened steel 'V' shaped bit. Tungsten Carbide wing bit. Penetration of auger string in mm under static load of rig rear axle without rotation of augers.

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LOG SYMBOLS - ROCK FORMATION

DEGREE OF WEATHERING

TERM	SYMBOL	DEFINITION
Extremely Weathered	EW	Rock substance affected by weathering to the extent that the rock exhibits soil properties. i.e.it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly Weathered	HW	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of chemicals or physical decomposition are evident. Porosity and strength may be increased or decrease compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substances is no longer recognisible.
Moderately Weathered	MW	Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock is no longer recognisable.
Slightly Weathered	SW	Rock substance affected by weathering to the extent that partial staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is recognisable.
Fresh	Fr	Rock substance unaffected by weathering.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index(Is 50) and refers to the strength of the rock substances is the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics & AS 1726 - 1993 (Reference).

TERM	Is (50) Mpa	FIELD GUIDE	SYMBOL
Extremely Low:	0.03	Easily remoulded by hand to a material with soil properties.	XW
Very Low:	0.1	May be crumbled in the hand. Sandstone is "sugary" and friable.	VW
Low:	0.3	A piece of core 150mm long x 50mm dia. can be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	W
Medium:	1	A piece of core 150mm long x 50mm dia. can be broken by hand with considerable difficulty. Readily scored with knife.	MS
High:	3	A piece of core 150mm long x 50mm dia. cannot be broken by unaided hands, can be slightly scratched or scored with knife.	S
Very High:	10	A piece of core 150mm long x 50mm dia. may be broken readily with hand held hammer. Cannot be scratched with pen knife.	VS
Extremely High:		A piece of core 150mm long x 50mm dia. is difficult to break with hand held hammer. Rings when struck with hammer.	ES

DEGREES OF FRACTURING

This classification applies to diamond drill cores and referes to the spacing of all types of natural fractures along which the core is discontinous. These include bedding plane partings, joints and other rock defects, but exclude known artifical fractures such as drilling breaks.

TERM	DESCRIPTION
Fragmented	The core is comprised primarily of fragments of length less than 20mm, and mostly of width less than the core diameter.
Highly Fractured:	Core lengths are generally less than 20mm -- 40mm with occasional fragments.
Fractured:	Core lengths are mainly 30mm -- 100mm with occasional shorter and longer sections.
Slightly Fractured:	Core lengths are generally 300mm -- 1000mm with occasional longer sections and occasional sections of 10mm -- 300mm.
Unbroken:	The core does not contain any fractures.

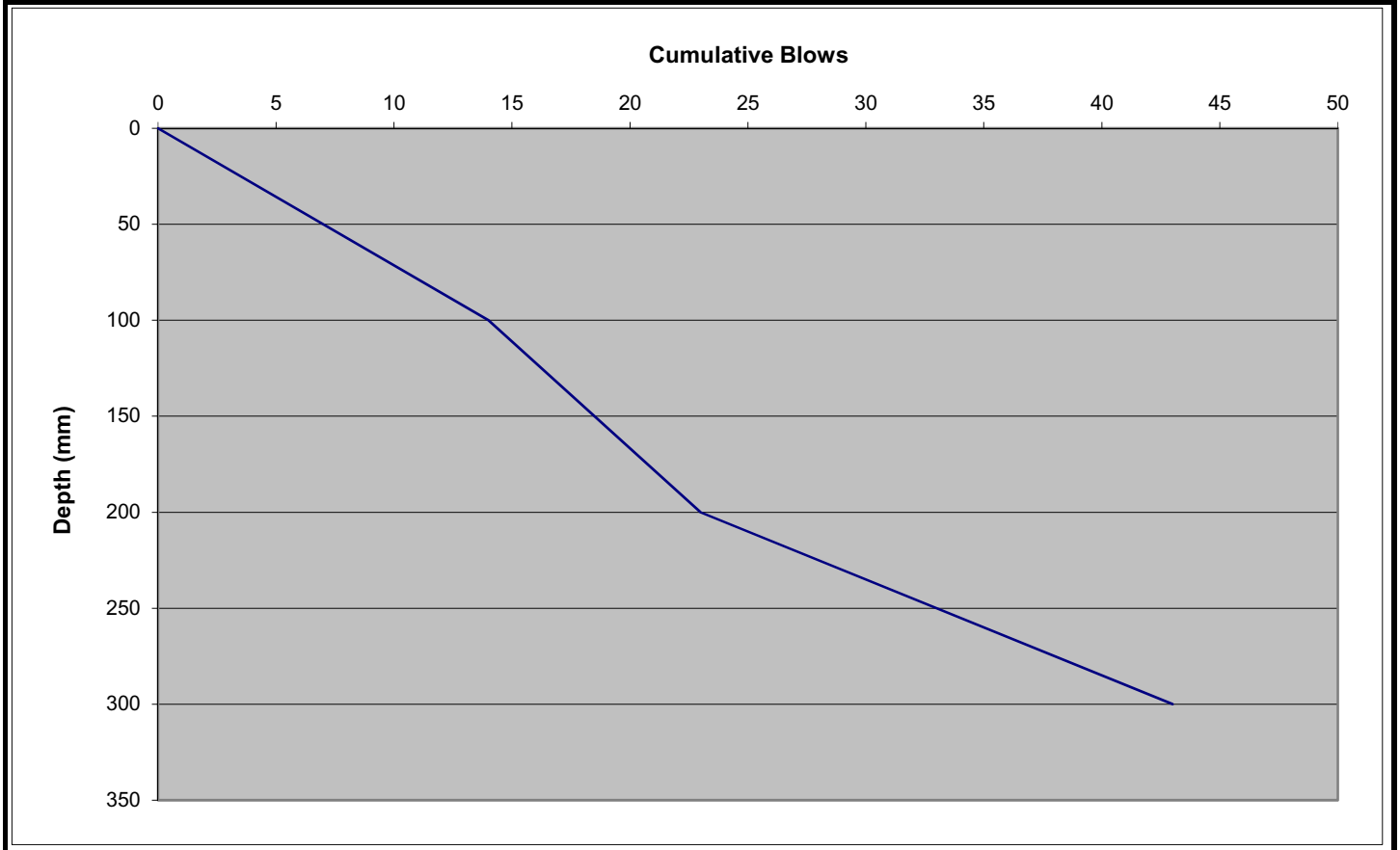
Aitken Rowe Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 1 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 21/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 1 (BH1)**	DEPTH BELOW FSL (mm): 20
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	14	35	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	9	20	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	20	55	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	END	*	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	*	*	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	*	*	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	*	*	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	*	*	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	*	*	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	*	*	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	*	*	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	*	*	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	*	*	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	*	*	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	*	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
J. GORNALL

DATE:

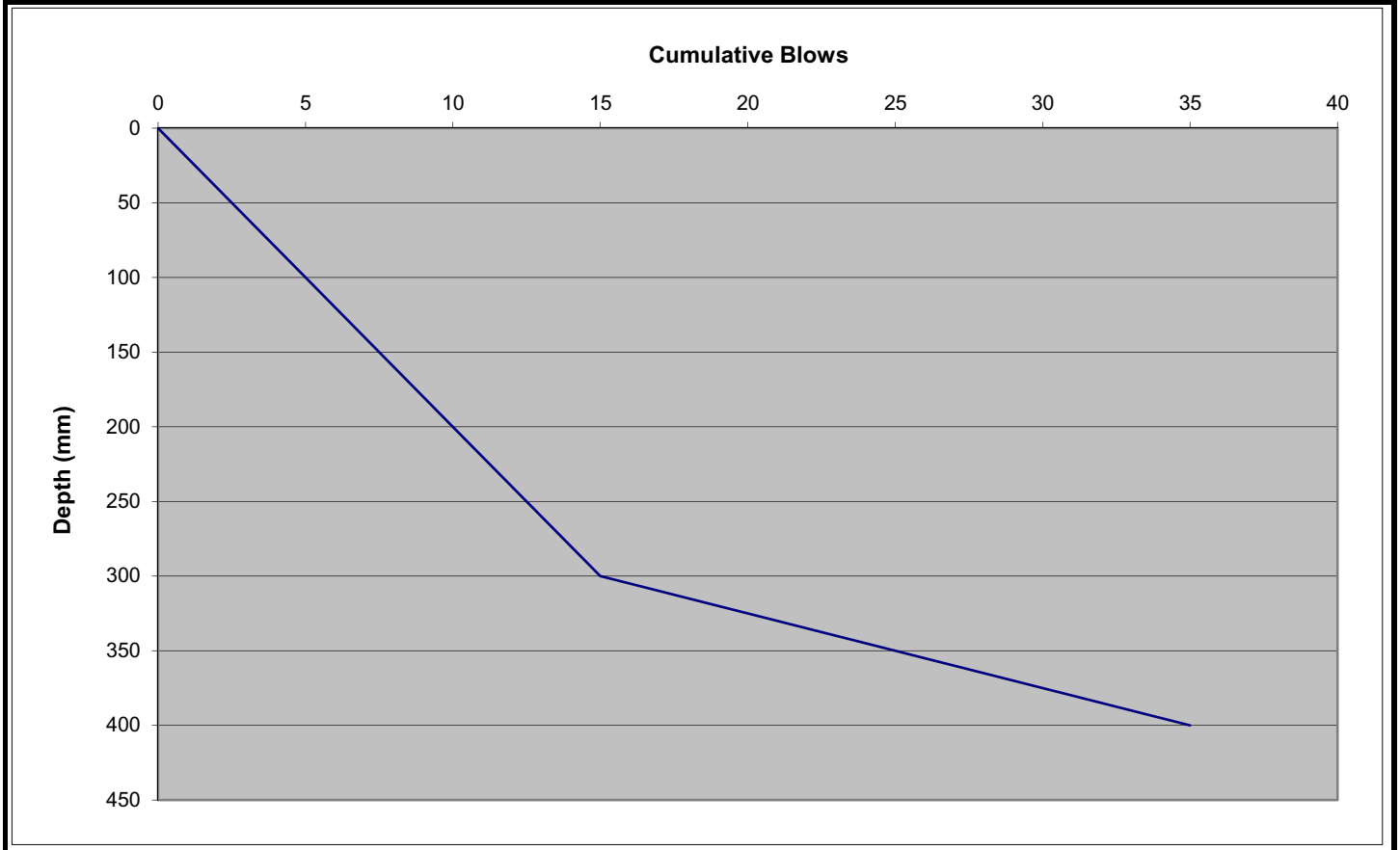
Aitken Rowe Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 2 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 21/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 2 (BH2)**	DEPTH BELOW FSL (mm): 30
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	5	9	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	5	9	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	5	9	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	20	55	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	END	*	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	*	*	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	*	*	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	*	*	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	*	*	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	*	*	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	*	*	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	*	*	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	*	*	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	*	*	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	*	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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Number: 4679

REMARKS:

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J. GORNALL

DATE:

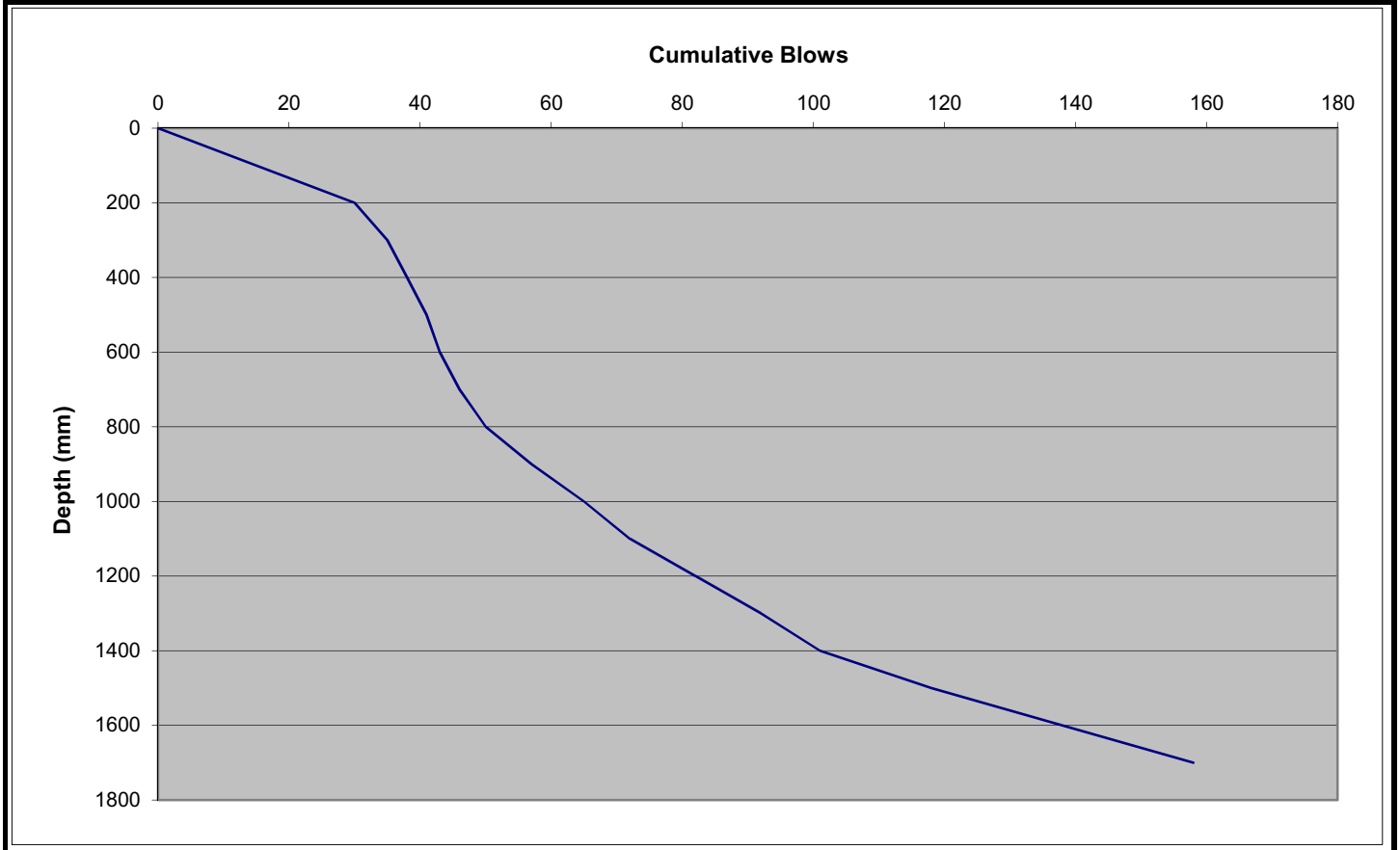
Aitken Rowe Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 3 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 22/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 3 (BH3)**	DEPTH BELOW FSL (mm): 20
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	15	38	1.5 - 1.6	17	44	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	15	38	1.6 - 1.7	20	55	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	5	9	1.7 - 1.8	END	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	3	5	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	3	5	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	2	3	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	3	5	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	4	7	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	7	14	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	8	17	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	7	14	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	10	23	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	10	23	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	9	20	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	12	28	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



NATA
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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
J. GORNALL

DATE:

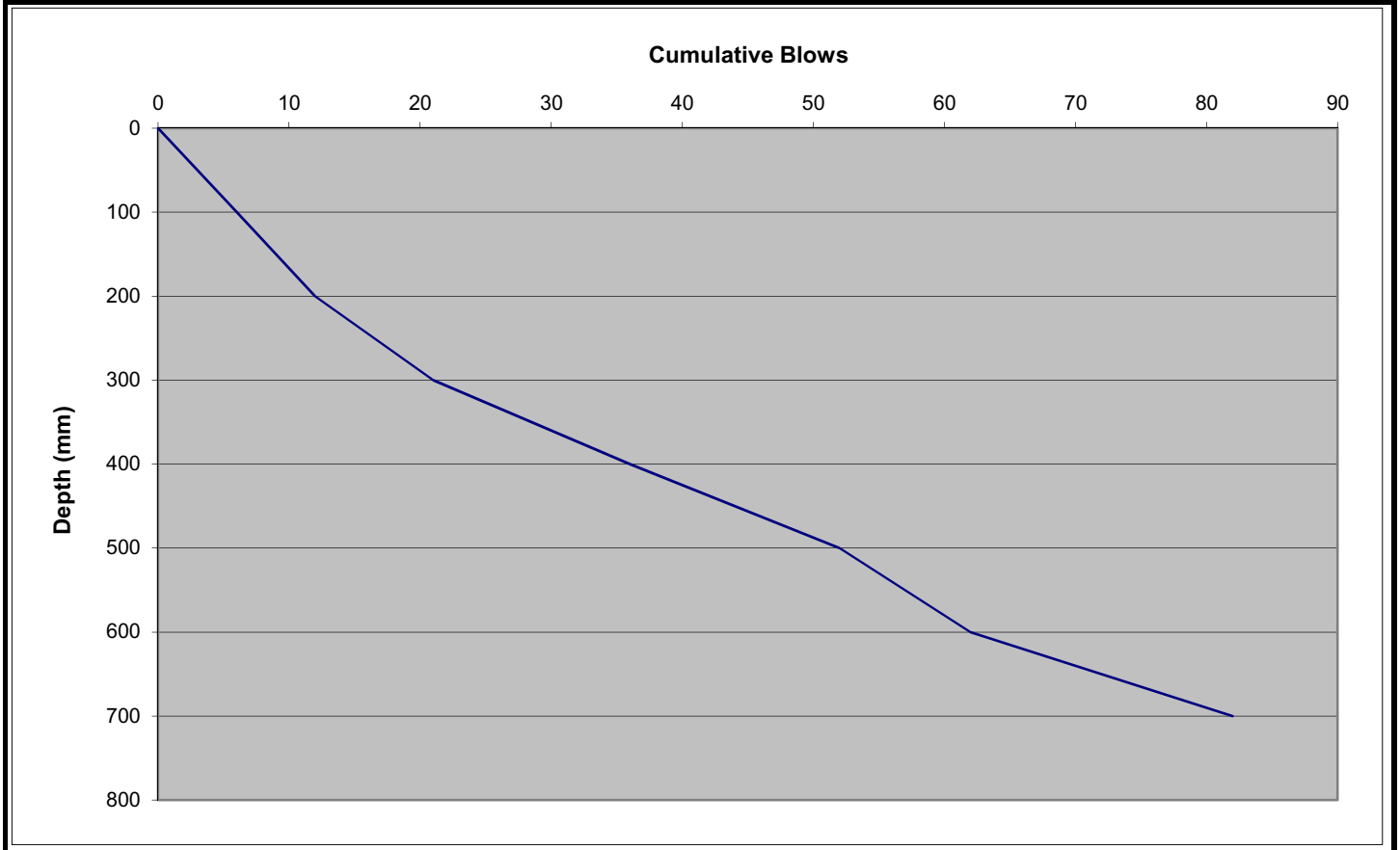
Aitken Rowe Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 4 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 22/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 4 (BH4)**	DEPTH BELOW FSL (mm): 20
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	6	12	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	6	12	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	9	20	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	15	38	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	16	41	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	10	23	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	20	55	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	END	*	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	*	*	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	*	*	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	*	*	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	*	*	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	*	*	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	*	*	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	*	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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REMARKS:

APPROVED SIGNATORY: .....
J. GORNALL

DATE:

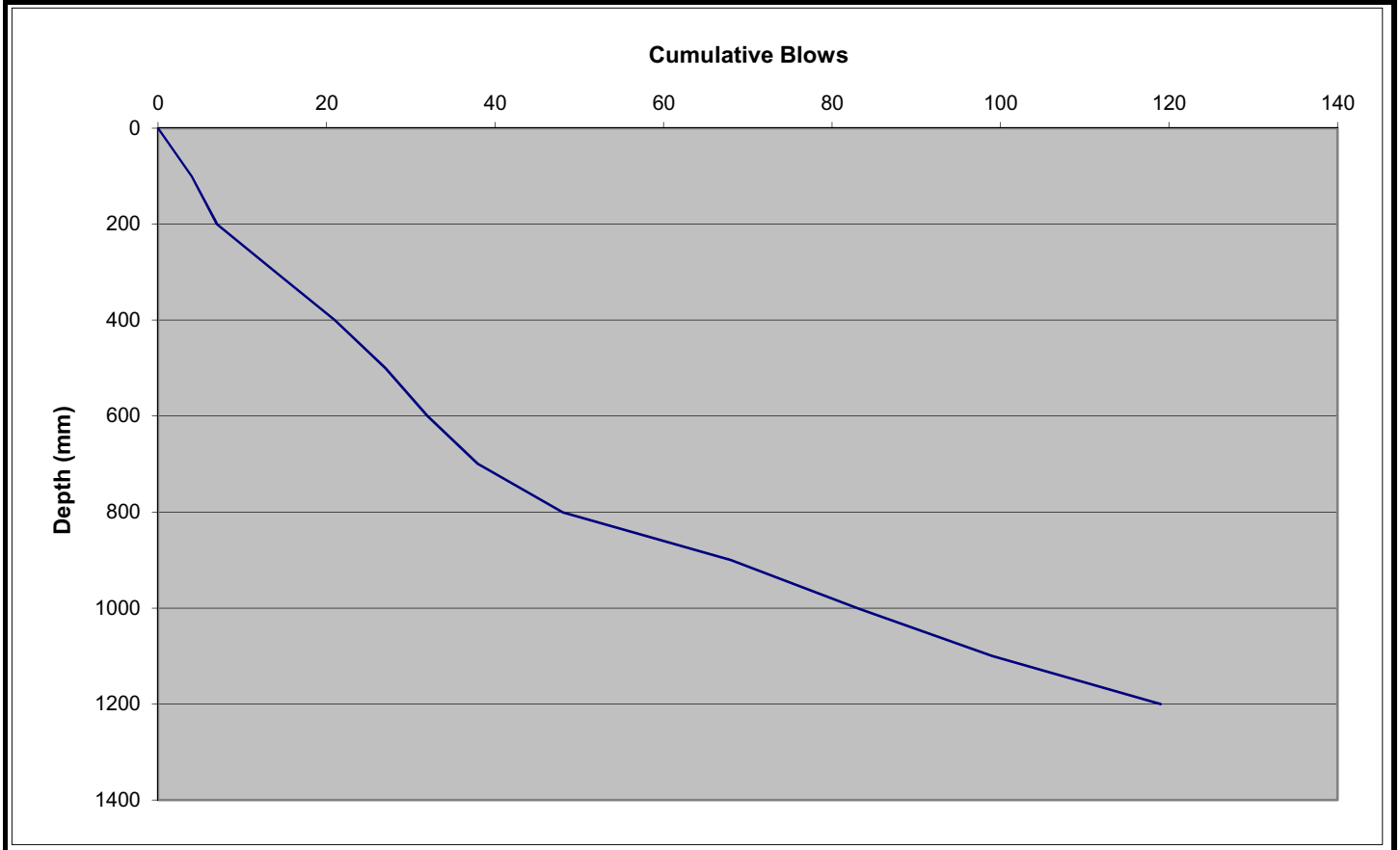
Aitken Rowe Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 5 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 23/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 5 (BH5)**	DEPTH BELOW FSL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	4	7	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	3	5	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	7	14	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	7	14	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	6	12	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	5	9	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	6	12	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	10	23	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	20	55	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	15	38	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	16	41	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	20	55	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	END	*	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	*	*	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	*	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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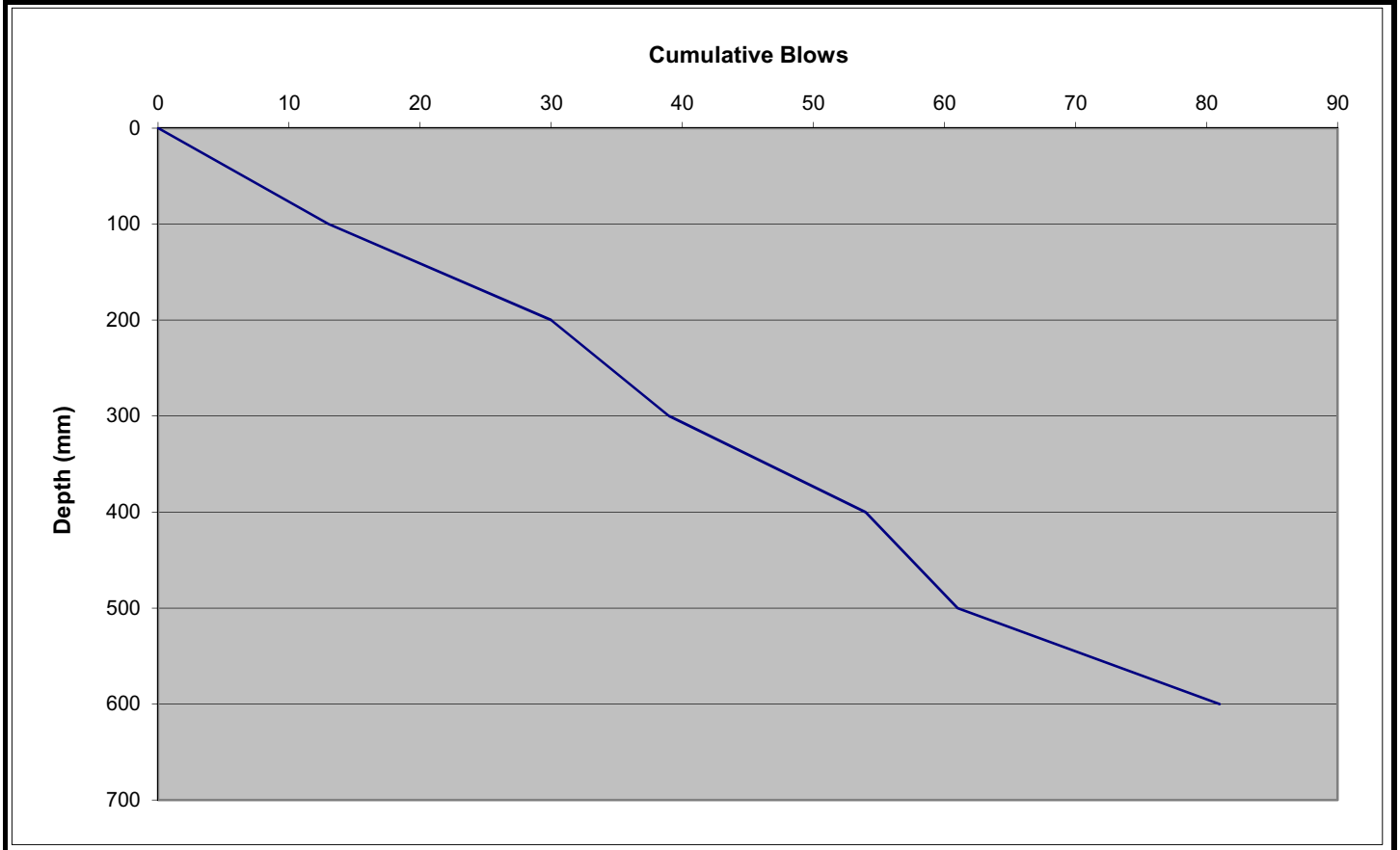
DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 6 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 23/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 6 (BH6)**	DEPTH BELOW FSL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	13	32	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	17	44	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	9	20	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	15	38	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	7	14	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	20	55	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	END	*	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	*	*	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	*	*	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	*	*	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	*	*	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	*	*	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	*	*	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	*	*	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	*	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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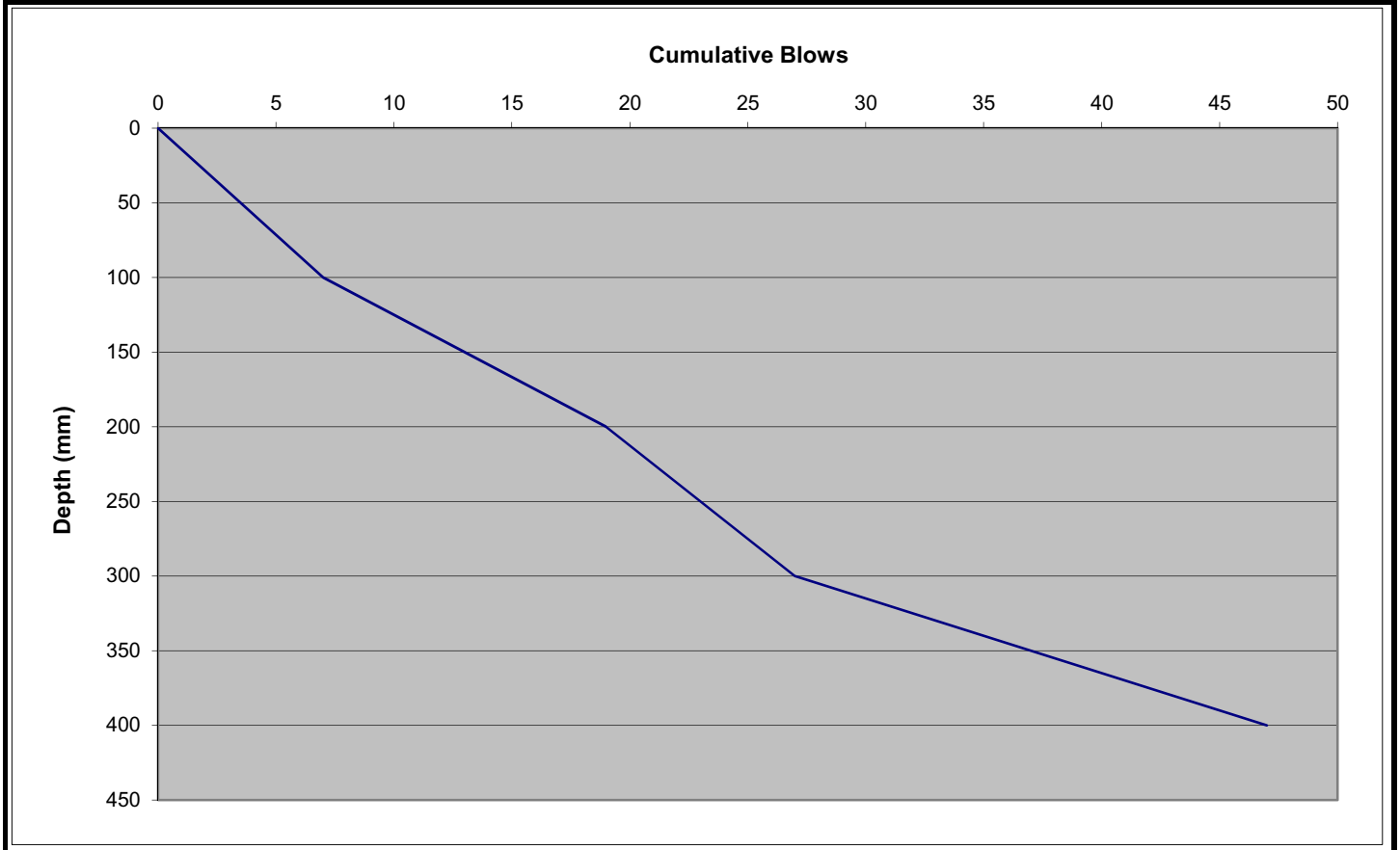
DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 7 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 23/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 7 (BH7)**	DEPTH BELOW FSL (mm): 20
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	7	14	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	12	28	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	8	17	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	20	55	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	END	*	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	*	*	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	*	*	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	*	*	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	*	*	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	*	*	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	*	*	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	*	*	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	*	*	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	*	*	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	*	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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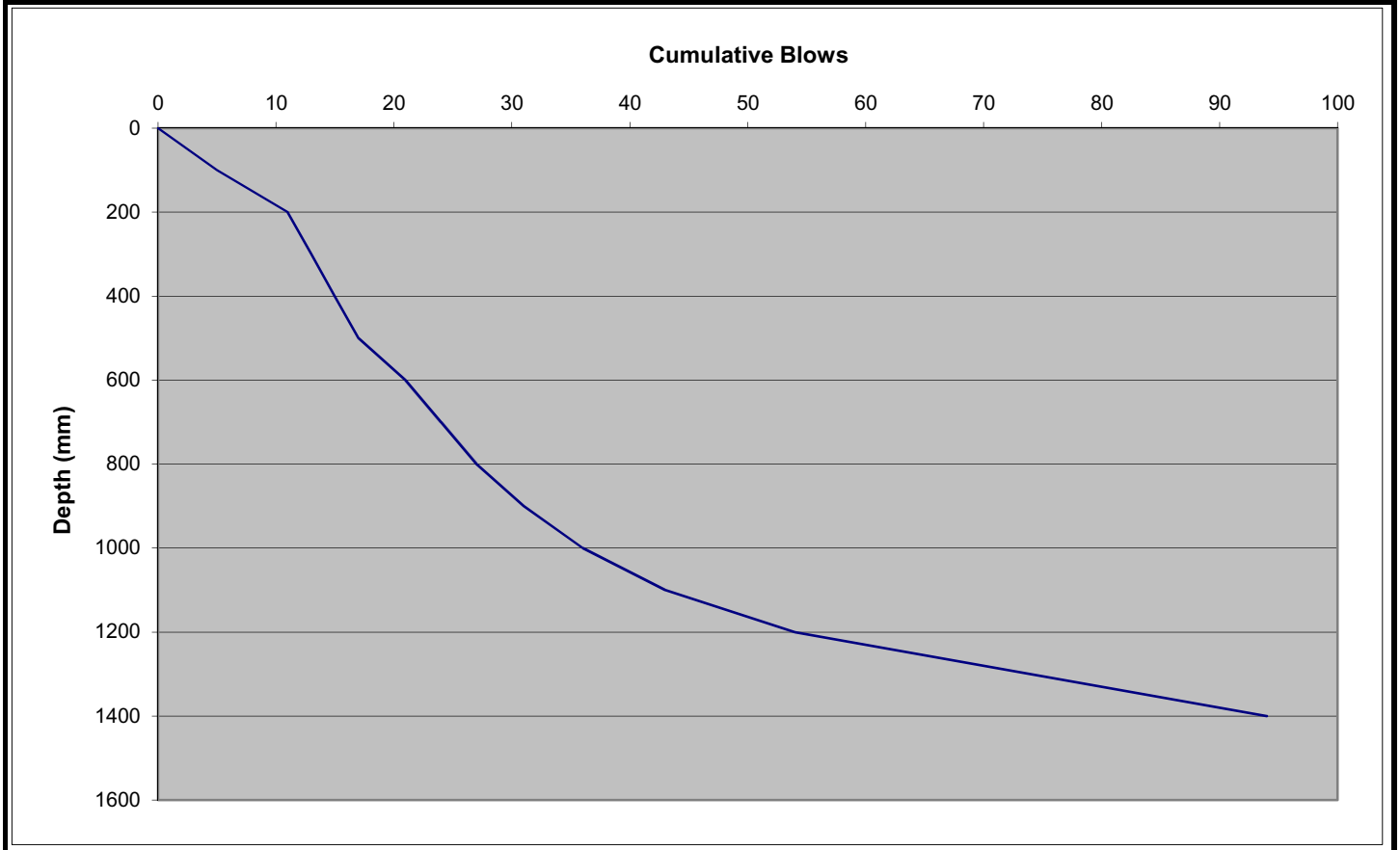
DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 8 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 23/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 8 (BH8)**	DEPTH BELOW FSL (mm): 30
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	5	9	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	6	12	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	2	3	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	2	3	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	2	3	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	4	7	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	3	5	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	3	5	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	4	7	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	5	9	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	7	14	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	11	25	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	20	55	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	20	55	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	END	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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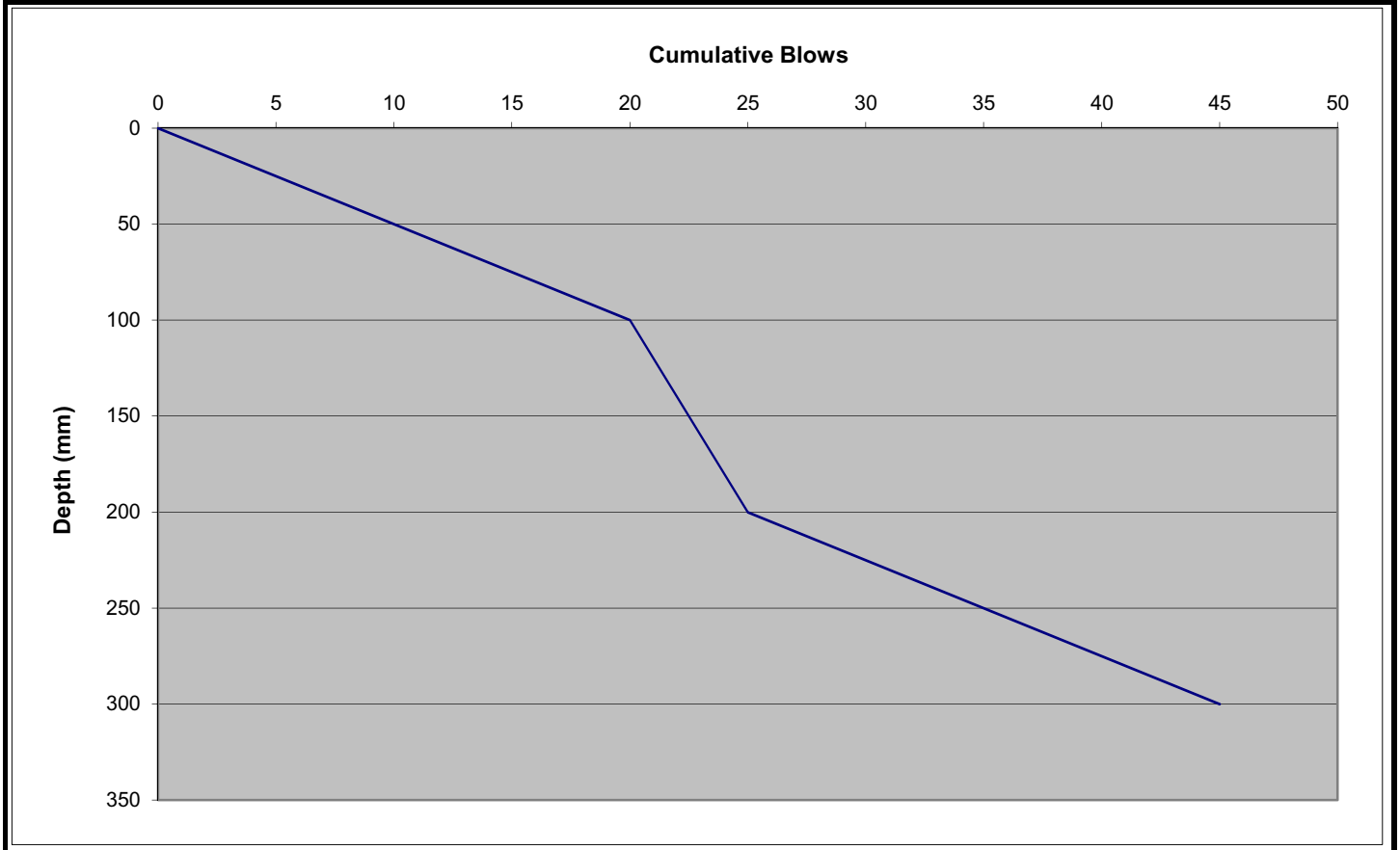
DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 9 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 24/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 9 (BH9)**	DEPTH BELOW FSL (mm): 20
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	20	55	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	5	9	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	20	55	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	END	*	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	*	*	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	*	*	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	*	*	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	*	*	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	*	*	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	*	*	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	*	*	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	*	*	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	*	*	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	*	*	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	*	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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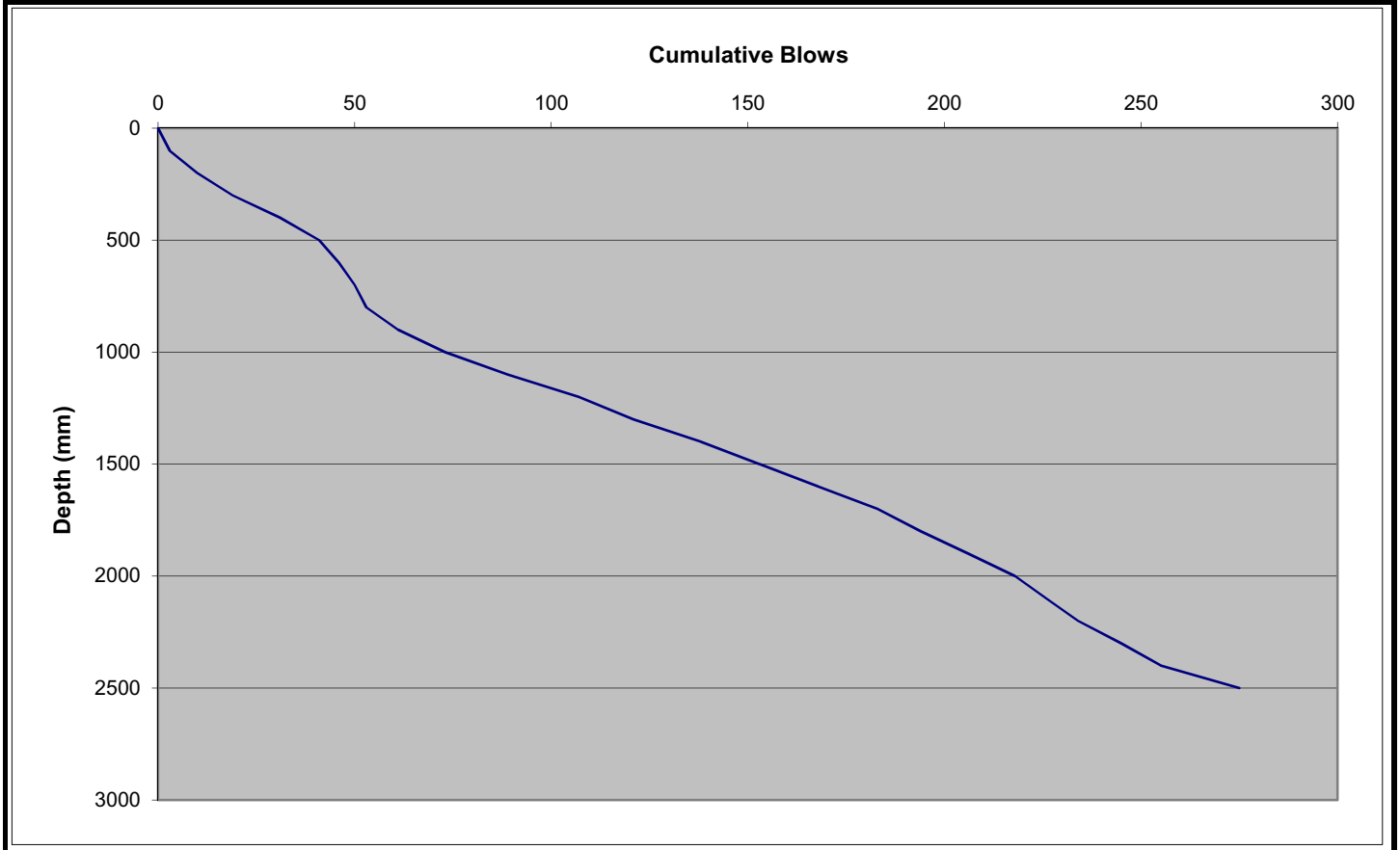
DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW	PAGE: 10 OF: 10
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN PROPOSED ALDI SUPERMARKET	REGISTRATION NO: **S17-373**
	DATE OF TEST: 24/08/2017
LOCATION: MAIN STREET, MERIMBULA, NSW **DCP: 10 (BH10)**	DEPTH BELOW FSL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	3	5	1.5 - 1.6	15	38	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	7	14	1.6 - 1.7	15	38	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	9	20	1.7 - 1.8	11	25	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	12	28	1.8 - 1.9	12	28	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	10	23	1.9 - 2.0	12	28	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	5	9	2.0 - 2.1	8	17	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	4	7	2.1 - 2.2	8	17	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	3	5	2.2 - 2.3	11	25	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	8	17	2.3 - 2.4	10	23	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	12	28	2.4 - 2.5	20	55	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	16	41	2.5 - 2.6	END	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	18	48	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	14	35	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	17	44	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	12	28	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....

J. GORNALL

DATE:

AITKEN ROWE Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650

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PAGE: 1
OF: 2

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW
JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
PROPOSED ALDI SUPERMARKET
MAIN STREET, MERIMBULA, NSW

SUBMITTED BY : ARTL
DATE SAMPLED: 21-24/08/2017
DATE SUBMITTED: 24/08/2017
SAMPLING METHOD: AS1289.1.2.1
SAMPLING CLAUSE: 6.5.3
ORDER No.: *

MATERIAL SOURCE : IN-SITU BOREHOLES
MATERIAL TYPE : REFER TO BOREHOLE LOGS
PROPOSED USE : DESIGN

REGISTRATION No : R28 S17-373

		SAMPLE NUMBER :	1A	3C	3D	5C	6A	7C
		SAMPLING LOCATION :	BH1	BH3	BH3	BH5	BH6	BH7
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	20-300	500-700	1000-1200	300-700	0-500	300-500
TESTS	TEST ELEMENT		*	*	*	*	*	*
T106		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	100	*	*	*	*	*
		PASS 26.5mm SIEVE %	99	*	*	*	*	*
		PASS 19.0mm SIEVE %	98	*	*	*	*	*
		PASS 13.2mm SIEVE %	94	*	*	*	*	*
		PASS 9.50mm SIEVE %	92	*	*	*	100	*
		PASS 6.70mm SIEVE %	87	*	*	*	99	*
		PASS 4.75mm SIEVE %	81	*	*	100	98	*
		PASS 2.36mm SIEVE %	66	*	*	99	96	*
T107	WHOLE SAMPLE	PASS 425 µm SIEVE %	25	*	*	90	86	*
		PASS 75 µm SIEVE %	13	*	*	51	44	*
		LESS THAN 13.5 µm %	8	*	*	41	29	*
T107	-2.36mm	PASS 425 µm SIEVE %	38	*	*	90	89	*
		PASS 75 µm SIEVE %	20	*	*	52	46	*
		LESS THAN 13.5 µm %	12	*	*	41	30	*
		OBSERVATIONS	*	*	*	*	*	*
RATIOS	A-	PASS 425 µm %	38	*	*	90	89	*
	B-	PASS 75/425 µm %	53	*	*	57	51	*
	C-	BELOW 13.5/75 µm %	62	*	*	80	66	*
AS1289.3.1.2		LIQUID LIMIT %	26	*	*	31	28	*
AS1289.3.2.1		PLASTIC LIMIT %	16	*	*	15	16	*
AS1289.3.3.1		PLASTICITY INDEX	10	*	*	16	12	*
		PREPARATION METHOD	AS1289.1.1-5.3	*	*	AS1289.1.1-5.3	AS1289.1.1-5.3	*
T111		STANDARD MAX. DRY DENSITY (1L MLD, A.1ii) t/m^3	2.02	*	*	1.75	2.03	*
		OPTIMUM MOISTURE CONTENT %	9.9	*	*	17.0	10.0	*
T113		LINEAR SHRINKAGE %	*	3.0	4.5	*	*	6.5
AS1289.2.1.1		FIELD MOISTURE CONTENT %	6.3	10.3	9.0	19.6	5.8	*

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ACCREDITATION NUMBER 4679

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All samples are oven dried and dry sieved during prep. unless otherwise stated

APPROVED SIGNATORY : .....
Jarrod Gornall

DATE: 12/09/2017

AITKEN ROWE Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650

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PAGE: 2
OF: 2

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

SUBMITTED BY : ARTL
DATE SAMPLED: 21-24/08/2017
DATE SUBMITTED: 24/08/2017
SAMPLING METHOD: AS1289.1.2.1
SAMPLING CLAUSE: 6.5.3
ORDER No.: *

CLIENT : ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW
JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
PROPOSED ALDI SUPERMARKET
MAIN STREET, MERIMBULA, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES
PROPOSED USE : DESIGN
MATERIAL TYPE : REFER TO BOREHOLE LOGS

REGISTRATION No : R28 S17-373

		SAMPLE NUMBER :	8B	8C	10A	10B	10C	*
		SAMPLING LOCATION :	BH8	BH8	BH10	BH10	BH10	*
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	500-700	1000-1200	100-300	300-500	1400-1600	*
TESTS	TEST ELEMENT		*	*	*	*	*	*
T106		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	*	*
		PASS 6.70mm SIEVE %	*	*	*	*	*	*
		PASS 4.75mm SIEVE %	*	*	*	*	*	*
		PASS 2.36mm SIEVE %	*	*	*	*	*	*
T107	WHOLE SAMPLE	PASS 425 µm SIEVE %	*	*	*	*	*	*
		PASS 75 µm SIEVE %	*	*	*	*	*	*
		LESS THAN 13.5 µm %	*	*	*	*	*	*
T107	-2.36mm	PASS 425 µm SIEVE %	*	*	*	*	*	*
		PASS 75 µm SIEVE %	*	*	*	*	*	*
		LESS THAN 13.5 µm %	*	*	*	*	*	*
		OBSERVATIONS	*	*	*	*	*	*
RATIOS	A-	PASS 425 µm %	*	*	*	*	*	*
	B-	PASS 75/425 µm %	*	*	*	*	*	*
	C-	BELOW 13.5/75 µm %	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	*	*	*	*	*	*
AS1289.3.2.1		PLASTIC LIMIT %	*	*	*	*	*	*
AS1289.3.3.1		PLASTICITY INDEX	*	*	*	*	*	*
		PREPARATION METHOD	*	*	*	*	*	*
T111		STANDARD MAX. DRY DENSITY (1L MLD, A.1ii) t/m^3	*	*	*	*	*	*
		OPTIMUM MOISTURE CONTENT %	*	*	*	*	*	*
T113		LINEAR SHRINKAGE %	4.5	8.0	2.0	4.5	3.0	*
AS1289.2.1.1		FIELD MOISTURE CONTENT %	*	17.8	*	*	*	*

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All samples are oven dried and dry sieved during prep. unless otherwise stated

APPROVED SIGNATORY : .....
Jarrod Gornall

DATE: 12/09/2017

AITKEN ROWE Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650

PAGE: 1
OF: 1

TEST REPORT

CALIFORNIA BEARING RATIO OF SOILS AND GRAVELS

SUBMITTED BY : ARTL
NO OF SAMPLES : 3

CLIENT: ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW
DATE RECEIVED : 25/08/2017

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
PROPOSED ALDI SUPERMARKET
MAIN STREET, MERIMBULA, NSW

TEST METHODS : T105/T111
* T117/T120
SAMPLING PROCEDURE: AS1289.1.2.1

SOURCE OF MATERIAL : IN-SITU BOREHOLES LOT NO: *
SAMPLING CLAUSE: 6.5.3

PROPOSED USE: DESIGN
REGISTRATION NO : R6 **S17-373**

SAMPLE NO:	1A	5C	6A	*	*
SITE OR LOCATION	BH1	BH5	BH6	*	*
DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm)	20-300	300-700	0-500	*	*
ADDITIVE IF STABILISED	*	*	*	*	*
AMOUNT OF ADDITIVE (%)	*	*	*	*	*
TYPE OF COMPACTION (Standard/modified)	STANDARD	STANDARD	STANDARD	*	*
MATERIAL RETAINED ON THE 19.0mm SIEVE (%)	2.2	0.0	0.0	*	*
OPTIMUM MOISTURE CONTENT (%)	9.9	17.0	10.0	*	*
MAXIMUM DRY DENSITY (t/m^3)	2.02	1.75	2.03	*	*
MOULDING MOISTURE CONTENT (%)	9.7	17.0	10.1	*	*
DRY DENSITY OF TEST SPECIMEN (t/m^3)	1.98	1.71	1.98	*	*
SPECIFIED LDR (%)	98	98	98	*	*
ACTUAL LDR (%)	98	98	98	*	*
MOISTURE CONTENTS : TOP 30 mm	11.0	20.1	12.7	*	*
WHOLE SAMPLE	10.8	18.9	12.1	*	*
ABSORPTION (%)	1.1	1.9	1.9	*	*
SPECIFIED LMR (%)	100	100	100	*	*
ACTUAL LMR (%)	98	100	101	*	*
NUMBER OF DAYS SOAKING	4	4	4	*	*
SWELL (%)	0.0	0.6	0.4	*	*
CBR OBTAINED FROM PENETRATION (mm)	5.0	2.5	5.0	*	*
CALIFORNIA BEARING RATIO (%)	**25**	**7**	**11**	*	*

NOTES: T117 specifications: LMR - 3% to +2%
LDR ± 1%

COMMENTS: *

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Number: 4679

APPROVED SIGNATORY: Jarrod Gornall

DATE: 12/09/2017

AITKEN ROWE Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650

PAGE: 1

OF: 1

POINT LOAD TEST REPORT

SUBMITTED BY : ARTL

DATE SUBMITTED : 25/08/2017

CLIENT : ALDI STORES C/- ROTHELOWMAN - DARLINGHURST, NSW

NO OF SAMPLES : 9

JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN

QUANTITY REP.: *

PROPOSED ALDI SUPERMARKET, MAIN STREET, MERIMBULA, NSW

SAMPLING METHOD: T223

MATERIAL SOURCE : IN-SITU CORED BOREHOLES

CLAUSE: *

PROPOSED USE : DESIGN

TEST METHOD: T223

MATERIAL TYPE : REFER TO CORED BOREHOLE LOGS

REGISTRATION No: R25 **S17-373**

Location	Sample No.	Description	Depth (m)	$I_{S(50)}$ Mpa	Remarks
BH3	3A	SANDSTONE	3.55	0.08	*
BH3	3B	SANDSTONE	4.54	0.02	*
BH3	3C	SANDSTONE	5.5	0.63	*
BH4	4A	SANDSTONE	3.17	0.02	*
BH4	4B	SANDSTONE	3.37	0.13	*
BH4	4C	SANDSTONE	6.08	0.08	*
BH10	10A	SANDSTONE	3.21	0.06	*
BH10	10B	SANDSTONE	4.37	0.05	*
BH10	10C	SANDSTONE	5.28	0.06	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*
*	*	*	*	*	*

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Number: 4679

APPROVED SIGNATORY : .....

Jarrod Gornall

DATE: 26/09/2017

SESL AUSTRALIA
Environment & Soil Sciences

Corrosion & Scaling Assessment:
Soil Reporting Profile

Sample Drop Off: 16 Chilvers Road, Thornleigh NSW 2120
Mailing Address: PO Box 357, Pennant Hills NSW 1715
Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 44904 **Sample N°: 1** **Date Received: 7/9/17** **Report Status: ○ Draft ◉ Final**

Client Name:	**Aitken Rowe Testing Laboratories**	Project Name:	**S17-373**
Client Contact:	**Gary Lyons**	SESL Quote N°:	
Client Job N°:		Sample Name:	**3C**
Client Order N°:		Description:	**Soil**
Address:	**PO Box 5158** **WAGGA WAGGA NSW 2650**	Test Type:	**ARTL**

TEST	RESULT	COMMENTS
pH in water (1:5)	6.2	Slight acidity
EC mS/cm (1:5)	0.33	Moderate
Texture Class	-	Did not test
Soil Condition Class (Permeability)	-	Did not test
SOLUBLE ANION ANALYSIS		
Sulphate (1:5) $mgSO_4$ / kg	210	Low (non to mildly aggressive)
Chloride (1:5) mgCl / kg	50	Low (non-aggressive)
* Resistivity Ω. m	11.1	Mild (mildly to moderately aggressive)

* Resistivity tested on a saturated sample/paste (Note:- 10,000 mg/kg = 1%)

Recommendations

For the purposes of this corrosion and scaling assessment of soils towards concrete structures with steel reinforcement, concrete and steel piles, this soil shows a slight acidity, moderate salinity, low sulphate, low chloride and mild resistivity.

According to Australian Standard (AS) 2159-2009, the pH is considered to be non - aggressive towards concrete and non-aggressive towards steel due to lack of permeability class. The sulphate levels are considered to be non to mildly aggressive towards concrete due to the lack of permeability class. The chloride levels are considered to be non-aggressive towards steel. The resistivity is considered to be mildly to moderately aggressive towards steel due to the lack of permeability class.

Factors affecting concrete scaling are: (a) elevated sulphate, becoming mildly aggressive at >2400mg/kg SO_4; and (b) low pH, becoming mildly aggressive at pH of <5-6.

Factors affecting steel corrosivity are: (a) elevated chloride, becoming mildly aggressive at >5,000mg/kg Cl; and (b) low pH, becoming mildly aggressive at pH of <4-5 and (d) low resistivity, becoming mildly aggressive with resistivity values less than 50Ω.m.

Overall, according AS2159:2009 the likelihood of aggressive corrosion is mild to moderate.

pH, EC, Soluble SO_4: Bradley et al., (1983); **Cl,** (4500-Cl- E; APHA, 1998);
Resistivity, AS1289.4.4.1:1997, **Texture** - PM0003 (Texture- "Northcote" (1992))

Date Report Generated
14/09/2017

Consultant:
Michelle Murphy

Authorised Signatory:
Kelly Lee

SESL AUSTRALIA
Environment & Soil Sciences

Corrosion & Scaling Assessment:
Soil Reporting Profile

Sample Drop Off: 16 Chilvers Road, Thornleigh NSW 2120
Mailing Address: PO Box 357, Pennant Hills NSW 1715
Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 44904 **Sample N°: 2** **Date Received: 7/9/17** **Report Status: ○ Draft ◉ Final**

Client Name:	**Aitken Rowe Testing Laboratories**	Project Name:	**S17-373**
Client Contact:	**Gary Lyons**	SESL Quote N°:	
Client Job N°:		Sample Name:	**10C**
Client Order N°:		Description:	**Soil**
Address:	**PO Box 5158** **WAGGA WAGGA NSW 2650**	Test Type:	**ARTL**

TEST	RESULT	COMMENTS
pH in water (1:5)	6.5	Very slight acidity
EC mS/cm (1:5)	0.04	Very low
Texture Class	-	Did not test
Soil Condition Class (Permeability)	-	Did not test
SOLUBLE ANION ANALYSIS		
Sulphate (1:5) $mgSO_4$ / kg	20	Low (non to mildly aggressive)
Chloride (1:5) mgCl / kg	100	Low (non-aggressive)
* Resistivity Ω. m	59.19	High (non-aggressive)

* Resistivity tested on a saturated sample/paste (Note:- 10,000 mg/kg = 1%)

Recommendations

Analysed by SESL Australia, NATA #15633

For the purpose of corrosion and scaling assessment of soils towards concrete structures with steel reinforcement, concrete and steel piles, this soil shows very slight acidity, very low salinity, low sulphate, low chloride levels and high resistivity.

According to Australian Standard (AS) 2159:2009, the pH is considered non-aggressive to mildly aggressive towards concrete and non-aggressive towards steel due to lack of permeability class. The sulphate levels are considered to be non-aggressive to mildly aggressive towards concrete due to lack of permeability class. The chloride levels are considered to be non-aggressive towards steel. The high resistivity is considered to be non-aggressive towards steel.

Factors affecting concrete scaling are: (a) elevated sulphate, becoming mildly aggressive at >2400mg/kg SO_4; and (b) low pH, becoming mildly aggressive at pH of <5-6.

Factors affecting steel corrosivity are: (a) elevated chloride, becoming mildly aggressive at >5,000mg/kg Cl; and (b) low pH, becoming mildly aggressive at pH of <4-5 and (c) low resistivity, becoming mildly aggressive with resistivity values less than 50Ω.m.

Overall, according AS2159:2009 the likelihood of aggressive corrosion is low to mild.

pH, EC, Soluble SO_4: Bradley et al., (1983); **Cl,** (4500-Cl- E; APHA, 1998);
Resistivity, AS1289.4.4.1:1997, **Texture** - PM0003 (Texture- "Northcote" (1992))

Date Report Generated
14/09/2017

Consultant:
Michelle Murphy

Authorised Signatory:
Kelly Lee

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12 Ashley St Chatswood NSW 2067
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www.envirolab.com.au

CERTIFICATE OF ANALYSIS 174986

Client Details

Client	Aitken Rowe Testing Laboratories Pty Ltd
Attention	Nathan McLaren
Address	4/2 Riedell St, Wagga Wagga, NSW, 2650

Sample Details

Your Reference	**S17-373, Aldi Merimbula**
Number of Samples	8 soils
Date samples received	06/09/2017
Date completed instructions received	06/09/2017

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	13/09/2017
Date of Issue	11/09/2017

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Report Comments

TRH Soil C10-C40 NEPM (Sample 2ms) - # Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Results Approved By
Giovanni Agosti, Group Technical Manager
Jeremy Faircloth, Organics Supervisor
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Chemist

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		174986-1	174986-2	174986-3	174986-4	174986-5
Your Reference	UNITS	1A	3A/3B/AC	5A	6A	7A/7B/7C
Depth		0.2-0.3	0.1-0.7	0-0.1	0-0.5	0-0.5
Date Sampled		21/08/2017	22/08/2017	23/08/2017	23/08/2017	23/08/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/09/2017	07/09/2017	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	08/09/2017	08/09/2017	08/09/2017	08/09/2017	08/09/2017
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	99	96	99	100	99

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		174986-6	174986-7	174986-8
Your Reference	UNITS	8B	9A	10A
Depth		0.5-0.7	0.1-0.3	0.1-0.3
Date Sampled		23/08/2017	24/08/2017	24/08/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	08/09/2017	08/09/2017	08/09/2017
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	94	94	95

svTRH (C10-C40) in Soil						
Our Reference		174986-1	174986-2	174986-3	174986-4	174986-5
Your Reference	UNITS	1A	3A/3B/AC	5A	6A	7A/7B/7C
Depth		0.2-0.3	0.1-0.7	0-0.1	0-0.5	0-0.5
Date Sampled		21/08/2017	22/08/2017	23/08/2017	23/08/2017	23/08/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/09/2017	07/09/2017	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	07/09/2017	07/09/2017	07/09/2017	07/09/2017	07/09/2017
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	240	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	200	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	120	350	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	120	560	<50	<50	<50
Surrogate o-Terphenyl	%	78	88	85	82	79

svTRH (C10-C40) in Soil				
Our Reference		174986-6	174986-7	174986-8
Your Reference	UNITS	8B	9A	10A
Depth		0.5-0.7	0.1-0.3	0.1-0.3
Date Sampled		23/08/2017	24/08/2017	24/08/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	07/09/2017	07/09/2017	07/09/2017
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	78	80	80

PAHs in Soil						
Our Reference		174986-1	174986-2	174986-3	174986-4	174986-5
Your Reference	UNITS	1A	3A/3B/AC	5A	6A	7A/7B/7C
Depth		0.2-0.3	0.1-0.7	0-0.1	0-0.5	0-0.5
Date Sampled		21/08/2017	22/08/2017	23/08/2017	23/08/2017	23/08/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/09/2017	07/09/2017	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	08/09/2017	08/09/2017	08/09/2017	08/09/2017	08/09/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	95	90	89	92	86

PAHs in Soil				
Our Reference		174986-6	174986-7	174986-8
Your Reference	UNITS	8B	9A	10A
Depth		0.5-0.7	0.1-0.3	0.1-0.3
Date Sampled		23/08/2017	24/08/2017	24/08/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	08/09/2017	08/09/2017	08/09/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	88	86	86

Acid Extractable metals in soil						
Our Reference		174986-1	174986-2	174986-3	174986-4	174986-5
Your Reference	UNITS	1A	3A/3B/AC	5A	6A	7A/7B/7C
Depth		0.2-0.3	0.1-0.7	0-0.1	0-0.5	0-0.5
Date Sampled		21/08/2017	22/08/2017	23/08/2017	23/08/2017	23/08/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/09/2017	07/09/2017	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	07/09/2017	07/09/2017	07/09/2017	07/09/2017	07/09/2017
Arsenic	mg/kg	7	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	6	21	23	14	21
Copper	mg/kg	4	9	1	<1	4
Lead	mg/kg	16	10	4	4	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	32	1	<1	5
Zinc	mg/kg	16	40	3	2	27

Acid Extractable metals in soil				
Our Reference		174986-6	174986-7	174986-8
Your Reference	UNITS	8B	9A	10A
Depth		0.5-0.7	0.1-0.3	0.1-0.3
Date Sampled		23/08/2017	24/08/2017	24/08/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	07/09/2017	07/09/2017	07/09/2017
Arsenic	mg/kg	<4	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	23	6	15
Copper	mg/kg	<1	8	7
Lead	mg/kg	11	7	11
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	1	4	22
Zinc	mg/kg	25	13	53

Misc Inorg - Soil						
Our Reference		174986-1	174986-2	174986-3	174986-4	174986-5
Your Reference	UNITS	1A	3A/3B/AC	5A	6A	7A/7B/7C
Depth		0.2-0.3	0.1-0.7	0-0.1	0-0.5	0-0.5
Date Sampled		21/08/2017	22/08/2017	23/08/2017	23/08/2017	23/08/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/09/2017	08/09/2017	08/09/2017	08/09/2017	08/09/2017
Date analysed	-	08/09/2017	08/09/2017	08/09/2017	08/09/2017	08/09/2017
pH 1:5 soil:water	pH Units	8.9	8.2	8.2	8.0	7.3
Electrical Conductivity 1:5 soil:water	µS/cm	27	120	140	87	250

Misc Inorg - Soil				
Our Reference		174986-6	174986-7	174986-8
Your Reference	UNITS	8B	9A	10A
Depth		0.5-0.7	0.1-0.3	0.1-0.3
Date Sampled		23/08/2017	24/08/2017	24/08/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	08/09/2017	08/09/2017	08/09/2017
Date analysed	-	08/09/2017	08/09/2017	08/09/2017
pH 1:5 soil:water	pH Units	7.4	8.7	8.5
Electrical Conductivity 1:5 soil:water	µS/cm	48	130	62

Moisture						
Our Reference		174986-1	174986-2	174986-3	174986-4	174986-5
Your Reference	UNITS	1A	3A/3B/AC	5A	6A	7A/7B/7C
Depth		0.2-0.3	0.1-0.7	0-0.1	0-0.5	0-0.5
Date Sampled		21/08/2017	22/08/2017	23/08/2017	23/08/2017	23/08/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/09/2017	07/09/2017	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	08/09/2017	08/09/2017	08/09/2017	08/09/2017	08/09/2017
Moisture	%	13	7.1	9.4	6.3	7.9

Moisture				
Our Reference		174986-6	174986-7	174986-8
Your Reference	UNITS	8B	9A	10A
Depth		0.5-0.7	0.1-0.3	0.1-0.3
Date Sampled		23/08/2017	24/08/2017	24/08/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	07/09/2017	07/09/2017	07/09/2017
Date analysed	-	08/09/2017	08/09/2017	08/09/2017
Moisture	%	15	6.4	6.9

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	174986-2
Date extracted	-			07/09/2017	1	07/09/2017	07/09/2017		07/09/2017	07/09/2017
Date analysed	-			08/09/2017	1	08/09/2017	08/09/2017		08/09/2017	08/09/2017
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	86	82
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	86	82
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	74	75
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	92	90
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	88	83
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	88	80
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	89	82
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	104	1	99	100	1	107	109

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	174986-2
Date extracted	-			07/09/2017	1	07/09/2017	07/09/2017		07/09/2017	07/09/2017
Date analysed	-			07/09/2017	1	07/09/2017	07/09/2017		07/09/2017	07/09/2017
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	101	119
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	99	116
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	120	18	91	#
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	101	119
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	99	116
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	120	170	34	91	#
Surrogate o-Terphenyl	%		Org-003	80	1	78	89	13	89	88

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	174986-2
Date extracted	-			07/09/2017	1	07/09/2017	07/09/2017		07/09/2017	07/09/2017
Date analysed	-			08/09/2017	1	08/09/2017	08/09/2017		08/09/2017	08/09/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	105	106
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	119	121
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	113	112
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	112	108
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	113	110
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	125	123
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	125	115
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	94	1	95	93	2	95	92

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	174986-2
Date prepared	-			07/09/2017	1	07/09/2017	07/09/2017		07/09/2017	07/09/2017
Date analysed	-			07/09/2017	1	07/09/2017	07/09/2017		07/09/2017	07/09/2017
Arsenic	mg/kg	4	Metals-020	<4	1	7	6	15	114	95
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	106	92
Chromium	mg/kg	1	Metals-020	<1	1	6	7	15	110	105
Copper	mg/kg	1	Metals-020	<1	1	4	3	29	112	114
Lead	mg/kg	1	Metals-020	<1	1	16	16	0	109	92
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	105	106
Nickel	mg/kg	1	Metals-020	<1	1	4	4	0	105	106
Zinc	mg/kg	1	Metals-020	<1	1	16	16	0	109	94

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			08/09/2017	1	08/09/2017	08/09/2017		08/09/2017	[NT]
Date analysed	-			08/09/2017	1	08/09/2017	08/09/2017		08/09/2017	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	8.9	8.6	3	100	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	1	27	39	36	101	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

CIRCLY Version 5.0u (8 April 2013)

Job Title: S17-373 Proposed Aldi Supermarket, Main Street, Merimbula, NSW

Damage Factor Calculation

Assumed number of damage pulses per movement:
One pulse per axle (i.e. use NROWS)

Traffic Spectrum Details:

ID: S17-373CP Title: Proposed Carpark, Merimbual

Load No.	Load ID	Movements
1	ESA75-Full	1.00E+04

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/ Ref. stress	Exponent
1	ESA75-Full	SA750-Full	Vertical Force	92.1	0.75	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA75-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA75-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA75-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA75-Full	1	1965.0	0.0	1.00E+00	0.00

Layout of result points on horizontal plane:
Xmin: 0 Xmax: 165 Xdel: 10
Y: 0

Details of Layered System:

ID: S17-373CP Title: Proposed Carpark, Merimbula

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	Asph1100	Iso.	1.10E+03	0.40			
2	rough	Gran_250	Aniso.	2.50E+02	0.35	1.90E+02	1.25E+02	0.35
3	rough	Sub_CBR12	Aniso.	1.20E+02	0.45	8.28E+01	6.00E+01	0.45

Performance Relationships:

Layer No.	Location	Performance ID	Component	Perform. Constant	Perform. Exponent	Traffic Multiplier
1	bottom	ShellA12.9	ETH	0.005889	5.000	1.100
3	top	Sub_2004	EZZ	0.009300	7.000	1.600

Reliability Factors:
Project Reliability: Austroads 90%

Layer No.	Reliability Factor	Material Type
1	1.50	Asphalt
3	1.00	Subgrade (Austroads 2004)

Details of Layers to be sublayered:
Layer no. 2: Austroads (2004) sublayering

Results:

Layer No.	Thickness	Material ID	Load ID	Critical Strain	CDF
1	40.00	Asph1100	ESA75-Full	-6.72E-04	1.42E-01
2	100.00	Gran_250		n/a	n/a
3	0.00	Sub_CBR12	ESA75-Full	2.02E-03	3.64E-01

CIRCLY Version 5.0u (8 April 2013)

Job Title: S17-373 Proposed Aldi Supermarket, Main Street, Merimbula, NSW

Damage Factor Calculation

Assumed number of damage pulses per movement:
One pulse per axle (i.e. use NROWS)

Traffic Spectrum Details:

ID: S17-373CP Title: Proposed Carpark, Merimbual

Load No.	Load ID	Movements
1	ESA75-Full	1.00E+04

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/ Ref. stress	Exponent
1	ESA75-Full	SA750-Full	Vertical Force	92.1	0.75	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA75-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA75-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA75-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA75-Full	1	1965.0	0.0	1.00E+00	0.00

Layout of result points on horizontal plane:
Xmin: 0 Xmax: 165 Xdel: 10
Y: 0

Details of Layered System:

ID: S17-373CP Title: Proposed Carpark, Merimbula

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	Gran_350	Aniso.	3.50E+02	0.35	2.60E+02	1.75E+02	0.35
2	rough	Sub_CBR12	Aniso.	1.20E+02	0.45	8.28E+01	6.00E+01	0.45

Performance Relationships:

Layer No.	Location	Performance ID	Component	Perform. Constant	Perform. Exponent	Traffic Multiplier
2	top	Sub_2004	EZZ	0.009300	7.000	1.600

Reliability Factors:
Project Reliability: Austroads 90%

Layer No.	Reliability Factor	Material Type
2	1.00	Subgrade (Austroads 2004)

Details of Layers to be sublayered:
Layer no. 1: Austroads (2004) sublayering

Results:

Layer No.	Thickness	Material ID	Load ID	Critical Strain	CDF
1	150.00	Gran_350		n/a	n/a
2	0.00	Sub_CBR12	ESA75-Full	2.31E-03	9.29E-01

CIRCLY Version 5.0u (8 April 2013)

Job Title: S17-373 Proposed Aldi Supermarket, Main Street, Merimbula, NSW

Damage Factor Calculation

Assumed number of damage pulses per movement: One pulse per axle (i.e. use NROWS)

Traffic Spectrum Details: ID: S17-373TS Title: Trucking Area & Service Road

Load No.	Load ID	Movements
1	ESA75-Full	1.00E+06

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/ Ref. stress	Exponent
1	ESA75-Full	SA750-Full	Vertical Force	92.1	0.75	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA75-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA75-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA75-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA75-Full	1	1965.0	0.0	1.00E+00	0.00

Layout of result points on horizontal plane:
Xmin: 0 Xmax: 165 Xdel: 10
Y: 0

Details of Layered System:

ID: S17-373TS Title: Trucking Area & Service Road

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	Asph1100	Iso.	1.10E+03	0.40			
2	rough	Gran_350	Aniso.	3.50E+02	0.35	2.60E+02	1.75E+02	0.35
3	rough	Gran_150	Aniso.	1.50E+02	0.35	1.11E+02	7.50E+01	0.35
4	rough	Sub_CBR7	Aniso.	7.00E+01	0.45	4.83E+01	3.50E+01	0.45

Performance Relationships:

Layer No.	Location	Performance ID	Component	Perform. Constant	Perform. Exponent	Traffic Multiplier
1	bottom	ShellA12.9	ETH	0.005889	5.000	1.100
4	top	Sub_2004	EZZ	0.009300	7.000	1.600

Reliability Factors:
Project Reliability: Austroads 90%

Layer No.	Reliability Factor	Material Type
1	1.50	Asphalt
4	1.00	Subgrade (Austroads 2004)

Details of Layers to be sublayered:
Layer no. 2: Austroads (2004) sublayering
Layer no. 3: Austroads (2004) sublayering

Results:

Layer No.	Thickness	Material ID	Load ID	Critical Strain	CDF
1	40.00	Asph1100	ESA75-Full	-3.78E-04	8.02E-01
2	160.00	Gran_350		n/a	n/a
3	120.00	Gran_150		n/a	n/a
4	0.00	Sub_CBR7	ESA75-Full	1.08E-03	4.58E-01

CIRCLY Version 5.0u (8 April 2013)

Job Title: S17-373 Proposed Aldi Supermarket, Main Street, Merimbula, NSW

Damage Factor Calculation

Assumed number of damage pulses per movement:
One pulse per axle (i.e. use NROWS)

Traffic Spectrum Details:

ID: S17-373TS Title: Trucking Area & Service Road

Load No.	Load ID	Movements
1	ESA75-Full	1.00E+06

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/ Ref. stress	Exponent
1	ESA75-Full	SA750-Full	Vertical Force	92.1	0.75	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA75-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA75-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA75-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA75-Full	1	1965.0	0.0	1.00E+00	0.00

Layout of result points on horizontal plane:
Xmin: 0 Xmax: 165 Xdel: 10
Y: 0

Details of Layered System:

ID: S17-373TS Title: Trucking Area & Service Road

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	Gran_350	Aniso.	3.50E+02	0.35	2.60E+02	1.75E+02	0.35
2	rough	Gran_150	Aniso.	1.50E+02	0.35	1.11E+02	7.50E+01	0.35
3	rough	Sub_CBR7	Aniso.	7.00E+01	0.45	4.83E+01	3.50E+01	0.45

Performance Relationships:

Layer No.	Location	Performance ID	Component	Perform. Constant	Perform. Exponent	Traffic Multiplier
3	top	Sub_2004	EZZ	0.009300	7.000	1.600

Reliability Factors:
Project Reliability: Austroads 90%

Layer No.	Reliability Factor	Material Type
3	1.00	Subgrade (Austroads 2004)

Details of Layers to be sublayered:
Layer no. 1: Austroads (2004) sublayering
Layer no. 2: Austroads (2004) sublayering

Results:

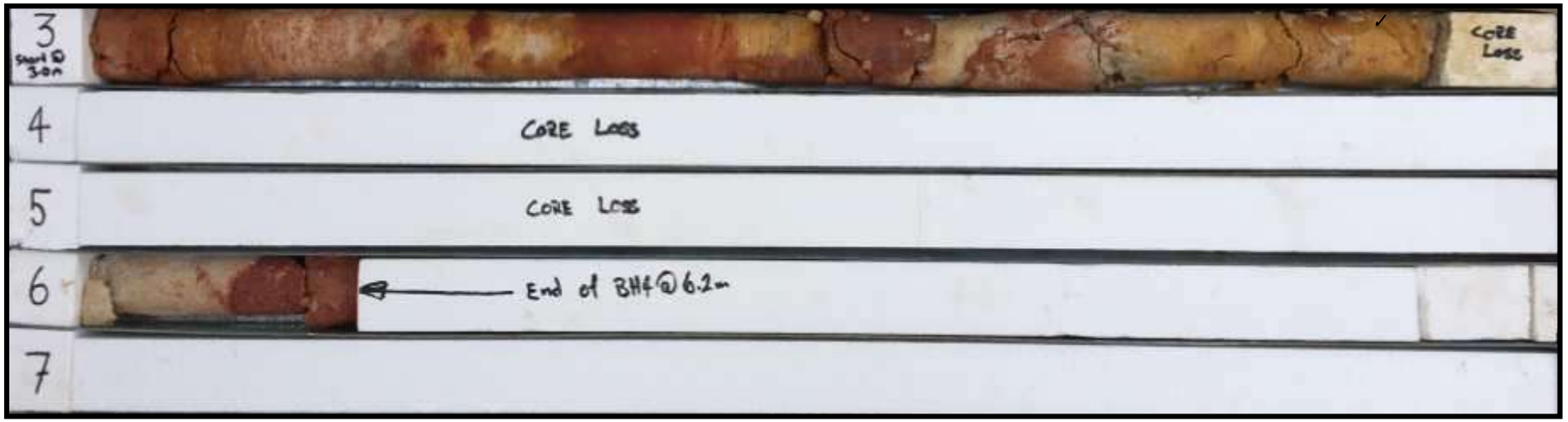
Layer No.	Thickness	Material ID	Load ID	Critical Strain	CDF
1	200.00	Gran_350		n/a	n/a
2	130.00	Gran_150		n/a	n/a
3	0.00	Sub_CBR7	ESA75-Full	1.21E-03	9.81E-01

CORED BOREHOLE 1 (BH3)

2.7m – 6.2m

CORED BOREHOLE 2 (BH4)

3.0m – 6.2m



CORED BOREHOLE 3 (BH10)

2.4m – 6.0m