# Attachments to item number 4.1

# RESULT OF SEARCH

RECORDER OF TITLES

*Issued Pursuant to the Land Titles Act 1980*

SEARCH OF TORRENS TITLE

| VOLUME | FOLIO |
|---|---|
| 127636 | 1 |
| EDITION | DATE OF ISSUE |
| 5 | 04-Feb-2014 |

SEARCH DATE : 12-Sep-2021
SEARCH TIME : 09.32 AM

## DESCRIPTION OF LAND

Town of SORELL
Lot 1 on Plan 127636
Derivation : Whole of 0A-0R-9.4/10Ps Section G Granted to D. Hildyard & Anor and Part of 0A-2R-3Ps Section G Granted to T. Bannister
Prior CT 113390/2 & Appln 16947

## SCHEDULE 1

D108750 TRANSFER to PHILLIP GORDON HOLMES and AMANDA JANE HOLMES Registered 04-Feb-2014 at noon

## SCHEDULE 2

Reservations and conditions in the Crown Grant if any
SP 113390 EASEMENTS in Schedule of Easements affecting the land formerly comprised in Lot 2 on S.P.No. 113390(hereafter called the affected land)
SP 113390 FENCING PROVISION in Schedule of Easements burdening the affected land

## UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

OWNER APPLICANTS: BOLAND ADMINISTRATION P/L. & J. L. WILLOUGHBY. (A.16947)

FOLIO REFERENCE CONV. 21-3606 (BALANCE) F/R113390-2

GRANTEE WHOLE OF 9.4/10 Ps. Sec. G. GTD. to D. HILDYARD AND ANR. and PART OF 0·2·3 Sec. G. GTD. TO T. BANNISTER. and PART OF 1·3·1

## PLAN OF SURVEY

BY SURVEYOR PETER D. RICHMOND

LOCATION

TOWN OF SORELL

(SECTION G)

SCALE 1: 300 LENGTHS IN METRES

REGISTERED NUMBER

**P127636**

APPROVED EFFECTIVE FROM 16 JUN 1988

Recorder of Titles

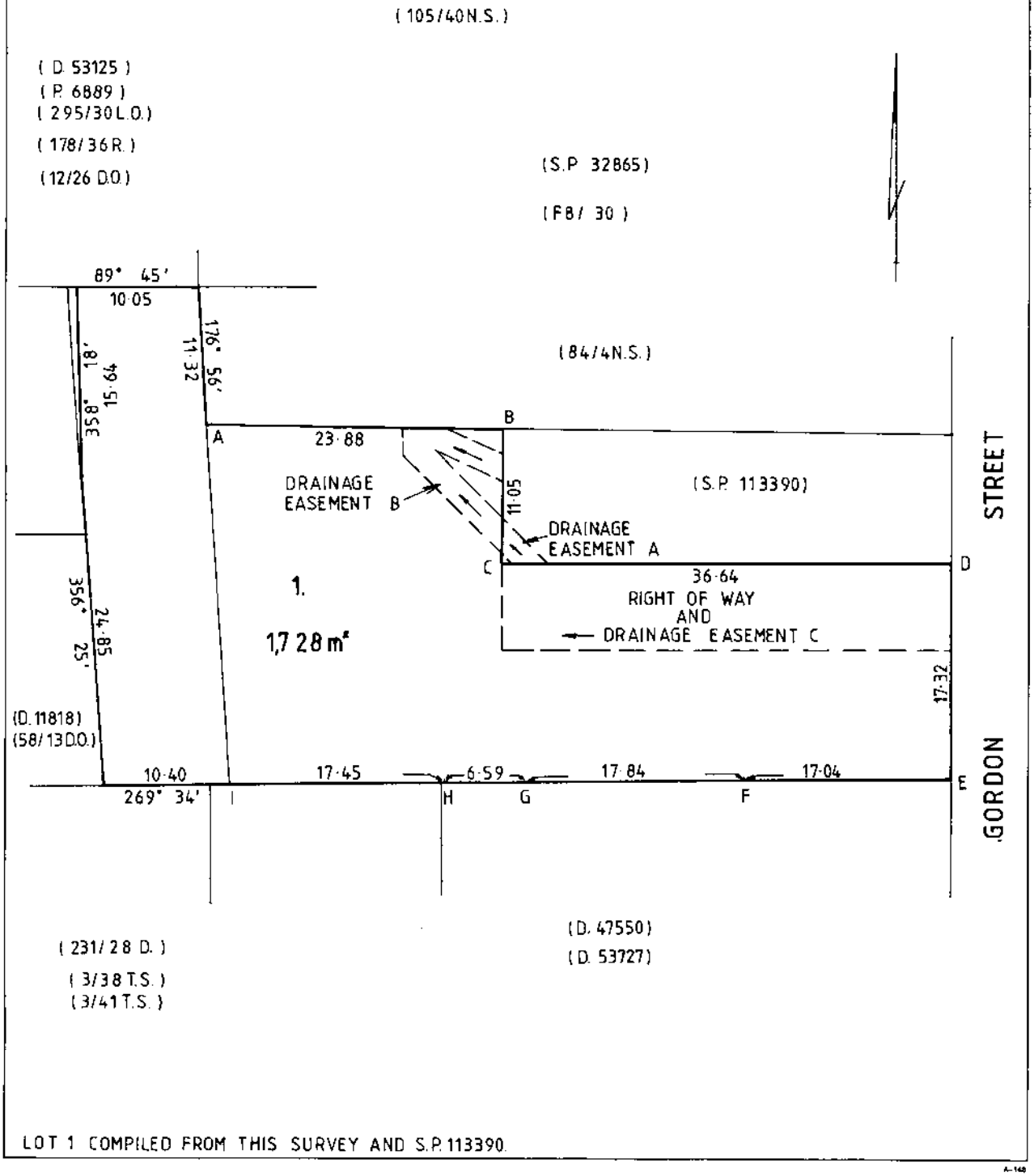
MAPSHEET MUNICIPAL CODE No. 124 / 5426-42

LAST UPI No. 2902860

LAST PLAN No. SP113390

ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN

GTD TO WILLIAM GARD.




LOT 1 COMPILED FROM THIS SURVEY AND S.P.113390.

A-148

REGISTERED NUMBER

SP 113390

## SCHEDULE OF EASEMENTS

NOTE:—The Town Clerk or Council Clerk must sign the certificate on the back page for the purpose of identification.

The Schedule must be signed by the owners and mortgagees of the land affected. Signatures should be attested.

## EASEMENTS AND PROFITS

Each lot on the plan is together with:—

(1) such rights of drainage over the drainage easements shewn on the plan (if any) as may be necessary to drain the stormwater and other surplus water from such lot; and

(2) any easements or profits à prendre described hereunder.

Each lot on the plan is subject to:—

(1) such rights of drainage over the drainage easements shewn on the plan (if any) as passing through such lot as may be necessary to drain the stormwater and other surplus water from any other lot on the plan; and

(2) any easements or profits à prendre described hereunder.

The direction of the flow of water through the drainage easements shewn on the plan is indicated by arrows.

**FENCING PROVISION**

The Vendors REGINALD ARTHUR HEANEY and DOREEN HEANEY shall not be required to fence.

~~COVENANT~~ EASEMENTS:

Lot 1 on the Plan of Survey by surveyor Peter D. Richmond ("the Plan") is subject to a drainage easement shown as Drainage Easement "A" on the Plan. (appurtenant to Lot 2 on the plan)

Lot 1 on the Plan is together with drainage easements shown as Drainage Easement "B" and Drainage Easement "C" on the Plan.

Lot 2 on the Plan is subject to drainage easements shown on Drainage Easement "B" and Drainage Easement "C" on the Plan. (appurtenant to Lot 1 on the plan)

Lot 2 on the Plan is together with a drainage easement shown as Drainage Easement "A" on the Plan.

Lot 2 on the Plan is subject to the right of way shown as RIGHT OF WAY carriage (Private) on the Plan.

Lot 1 on the Plan is together with the right of way shown as RIGHT OF WAY carriage (Private) on the Plan.

"Drainage easement" means and includes a right for the owner of Lot 1 or Lot 2 (as the case may require) from time to time and at all times to enter upon all or any part of the servient land with workmen and others and with any material, machinery, vehicles, tools or other equipment as may be required to open break up or excavate the servient land for the construction or laying either thereon or therein of pipes and to run and pass water through and along the same from time to time and at times to inspect, cleanse, repair or maintain the said pipes and when necessary to lay new pipes and to do all work necessary in connection therewith without doing unnecessary damage to the servient land and leaving the same in a clean and tidy condition.

**SIGNED** by **REGINALD ARTHUR HEANEY** in the presence of:- x R. A. Heaney.

**SIGNED** by **DOREEN HEANEY** in the presence of:- D Heaney

This is the schedule of easements attached to the plan of .....
*(Insert Subdivider's Full Name)*

..... affecting land in

.....
*(Insert Title Reference)*

Sealed by ..... on 22nd February 1994

Solicitor's Reference .....

Council Clerk/~~Town Clerk~~

05.X.3134

AllUrbanPlanning PTY LTD

# Planning Report
# Multiple Dwellings
# 11a Gordon Street, Sorell




Date 14 September 2021

19 Mawhera Ave, Sandy Bay Tasmania 7005 Call 0400 109 582
Email frazer@allurbanplanning.com.au allurbanplanning.com.au

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# 1. Introduction

All Urban Planning Pty Ltd has been engaged by the Young Group Pty Ltd on behalf of the property owners, Phillip and Amanda Holmes to prepare a planning assessment under the *Sorell Interim Planning Scheme 2015* (planning scheme) for development of eight multiple dwelling townhouses to the rear of 11a Gordon Street, Sorell.

The proposal is accompanied by:

- Plans and elevations prepared by Matt Gilley;
- Civil design and Stormwater Report prepared by Aldanmark; and
- Traffic Impact Assessment prepared by Joanne Fisher.

## 1.1Site & Surrounds

The site is 11a Gordon Street, Sorell

| ***Address*** | ***CT*** | ***Area*** | ***Owner*** |
|---|---|---|---|
| 11a Gordon Street | CT127636/1 | 1727m$^2$ | Phillip & Amanda Holmes |

The Sorell Veterinary Practice is located on the Gordon Street frontage of the site and is to be retained with five car parking spaces behind.



*Figure 1– Location Plan (source annotated plan from theList)*

# 2. Proposal

It is proposed to retain the existing vet clinic within the 145m$^2$ building on the Gordon Street frontage and develop eight, 2 bedroom multiple dwelling townhouses to the rear.

The proposal includes a double garage, private garden area and north facing living area and deck for each dwelling and two visitor parking spaces.

Four parking spaces will be retained directly behind the veterinary clinic plus an additional space (Car 5) to be sited near Unit 6 for use by that activity.

No change is proposed to the veterinary clinic building or the frontage of the site.

An indicative strata staging plan accompanies the application.

# 3. Planning Scheme

The site is zoned General Business and adjoins a General Residential zoned area to the rear (west and south west).

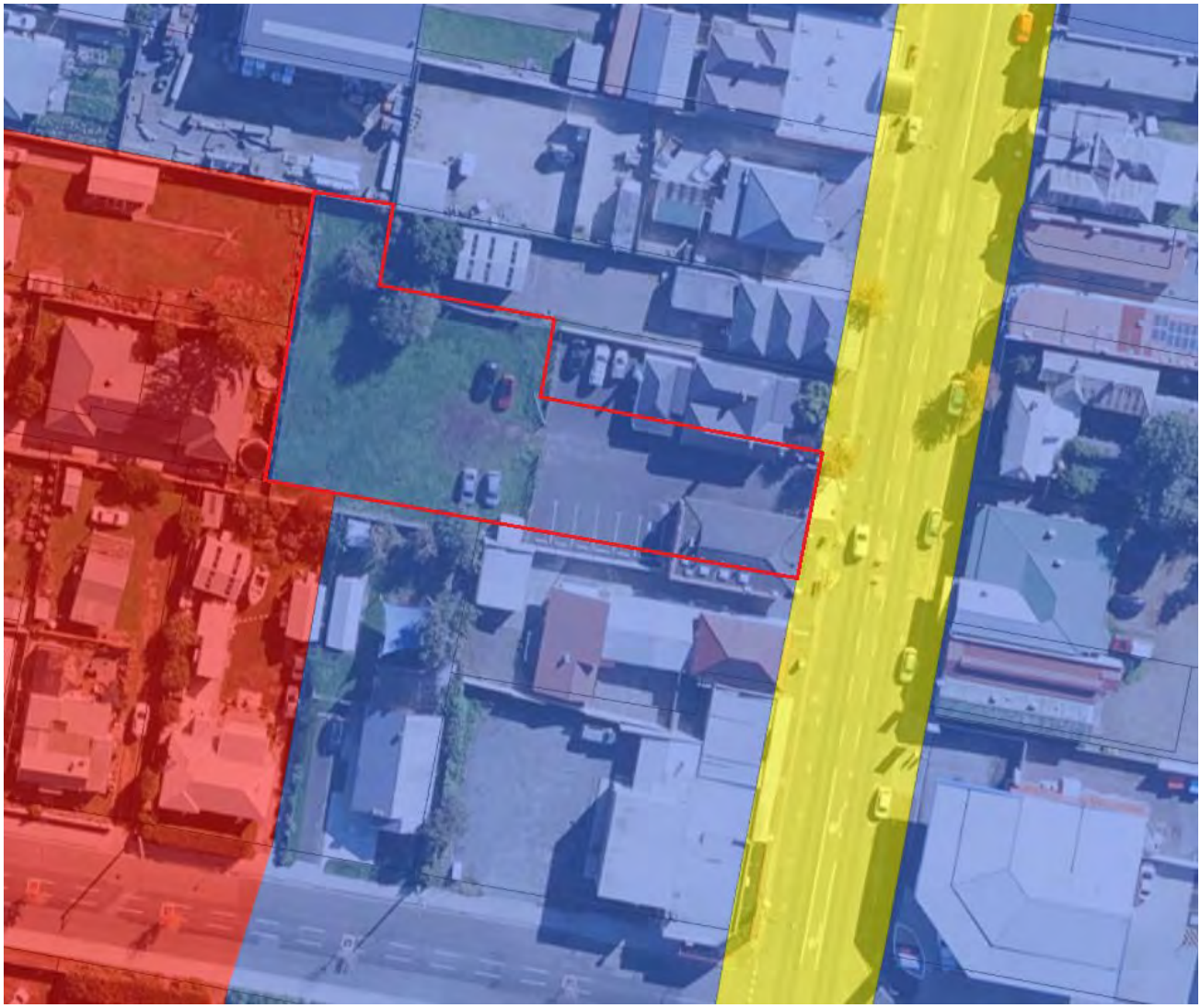

*Figure 2 - Zoning Plan (Source: theList)*

### 3.1 General Business Zone

*21.1.1 Zone Purpose Statements*

*21.1.1.1 To provide for business, community, food, professional and retail facilities serving a town or group of suburbs.*

*21.1.1.2 To ensure the rural service centres provide for the daily and weekly needs of the community.*

*21.1.1.3 To provide for a mix of retail and office based employment servicing the local area including a supermarket and a range of specialty shops.*

*21.1.1.4 To provide a safe, comfortable and pleasant environment for workers, residents and visitors through the provision of high quality urban spaces and urban design.*

*21.1.1.5 To provide a focus for employment primarily in retailing but complemented by a range of office based employment mainly in professional and personal services for the municipality and surrounding sub-region.*

*21.1.1.6 To ensure that the Sorell township is the rural service centre providing for a range of convenience, goods and services as well as community services and facilities for the municipal area and surrounds including Tasman and lower East Coast sub-region*

***21.1.2 Local Area Objectives***

*To develop and enhance the Sorell township role as the rural services centre for the municipal area through a mix of retail, commercial, administrative, residential and community services that complement this function and provide for the needs of the local and sub-regional community.*

***21.1.3 Desired Future Character Statements***

*Future development of the Sorell township is to:*

*(a) provide active and attractive streetscapes;*

*(b) improve access / permeability to the town centre from the adjacent residential areas;*

*(c) provide an open space hierachy incorporating open spaces that are accessible and appropriately landscaped providing both passive and active recreation for social interaction with particular attention to enhancing the Sorell Rivulet;*

*(d) provide for sustainable development to optimise water and energy conservation;*

*(e) use scale, proportion, materials and colour to ensure building facades positively contribute to the streetscape.*

The proposal is considered acceptable under the Zone Purpose, Local Area Objectives and Desired Future Character Statements in that:

- The proposal retains a commercial street frontage;
- Develops vacant land to the rear with infill medium density residential development that will complement the mixed use role of the Sorell township as identified in the Local Area Objectives at 21.1.2; and

- The townhouses will be setback 27m from the Gordon Street frontage behind the row of commercial buildings aligning the western side of Gordon Street and will not detract from the commercial streetscape.

## 3.2 Use

The proposed multiple dwellings fall within the Residential Use Class.

Residential is a Permitted Use in the Zone subject to the following Use Qualification:

*Only if above ground floor level (except for access)*

The proposed ground floor activities of the residential use include pedestrian accesses, vehicle access, manoeuvring and parking areas. These could be described as access in a general sense but are not in strict accordance with the Planning Scheme definition of access meaning: *land over which a vehicle enters or leaves a road from land adjoining a road.*

Unit 8 also includes a ground floor rumpus room.

The proposal is assessed as a discretionary use. Having regard to the relevant considerations for a discretionary use under Clause 8.10.2 and for the reasons set out in Section 3.1 above, the proposed residential use to the rear of the site behind the row of commercial buildings along the Gordon Street frontage is considered acceptable.

## 3.3 Use Standards

***21.3.1 Hours of Operation***

| ***Use Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Hours of operation of a use within 50 m of a residential zone must be within:*<br>*(a) 6.00 am to 10.00 pm Mondays to Saturdays inclusive;*<br>*(b) 7.00 am to 9.00 pm Sundays and Public Holidays.*<br>*except for office and administrative tasks.* | The proposal does not alter the existing hours of operation of the vet clinic that operates between 8.30-5.30 Monday to Friday and 9am to 12pm Saturdays.<br>This Use Standard does not apply. |

***21.3.2 Noise***

| ***Use Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Noise emissions measured at the boundary of a residential zone must not exceed the following:*<br>*(a) 55dB(A) (LAeq) between the hours of 7.00 am to 7.00 pm;* | The proposal for residential use does not involve noise emissions. The proposal complies with this Standard to the extent that it applies. |

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| | |
|---|---|
| *(b) 5dB(A) above the background (LA90) level or 40dB(A) (LAeq), whichever is the lower, between the hours of 7.00 pm to 7.00 am;*<br>*(c) 65dB(A) (LAmax) at any time.*<br>*Measurement of noise levels must be in accordance with the methods in the Tasmanian Noise Measurement Procedures Manual, issued by the Director of Environmental Management, including adjustment of noise levels for tonality and impulsiveness.*<br>*Noise levels are to be averaged over a 15 minute time interval.* | |

***21.3.3 External Lighting***

| ***Use Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*External lighting within 50 m of a residential zone must comply with all of the following:*<br>*(a) be turned off between 11:00 pm and 6:00 am, except for security lighting;*<br>*(b) security lighting must be baffled to ensure they do not cause emission of light outside the zone.* | This proposal for residential use does not conflict with this requirement. The existing vet does not have external lighting other than for security lighting and this is baffled to prevent emission of light outside the zone. |

***21.3.4 Commercial Vehicle Movements***

| ***Use Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Commercial vehicle movements, (including loading and unloading and garbage removal) to or from a site within 50 m of a residential zone must be within the hours of:*<br>*(a) 6.00 am to 10.00 pm Mondays to Saturdays inclusive;*<br>*(b) 7.00 am to 9.00 pm Sundays and public holidays.* | The proposal for residential use without any change to the operation of the vet centre does not involve commercial vehicle movements outside these hours does not conflict with this Standard. |

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## Development Standards

### *21.4.1 Building Height*

| ***Development Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Building height must be no more than:*<br>*10 m.* | The proposed buildings have a maximum height of 6.7m as shown on the elevations and comply with the 10m maximum under this Standard. |
| *A2*<br>*Building height within 10 m of a residential zone must be no more than 8.5 m.* | The proposal does not exceed 8.5m for any part of the building within 10m of the residential zone. The proposal therefore complies with A2. |

### *21.4.2 Setback*

*Objective:*

*To ensure that building setback contributes positively to the streetscape and does not result in unreasonable impact on residential amenity of land in a residential zone.*

| ***Development Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Building setback from frontage must be parallel to the frontage and must be no more than:*<br>*nil m, if fronting Gordon Street or Cole Street.*<br>*3 m, if fronting any other street.* | The proposal retains the existing vet clinic building on the Gordon Street frontage and complies with A1. |
| *A2*<br>*Building setback from a residential zone must be no less than:*<br>*(a) 5 m;*<br>*(b) half the height of the wall,*<br>*whichever is the greater.* | The site adjoins General Residential zoned land to the rear(west) at 6 and 8 Walker Street and south west at 13 Fitzroy Street. The requirement for a 5m setback under A2a) is the greater and therefore applies. Unit 5 and a portion of Unit 4 are setback within 900mm of the southern boundary with 13 Fitzroy Street and Unit 8 is setback within 4.2m of the rear, western boundary with 6 and 8 Walker Street. The proposal is therefore to be assessed under P2. |
| *P2*<br>*Building setback from a residential zone must be sufficient to prevent unreasonable adverse impacts on residential amenity by:*<br>*(a) overshadowing and reduction of sunlight to habitable rooms and private open space on adjoining lots to less than 3 hours* | The proposal is considered acceptable under P2 both in relation to the western boundary with the Walker Street properties and southern boundary with 13 Fitzroy Street. A detailed assessment for each is set out as follows:<br>**Western setback to Walker Street properties** |

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| | |
|---|---|
| *between 9.00 am and 5.00 pm on June 21 or further decrease sunlight hours if already less than 3 hours;*<br><br>*(b) overlooking and loss of privacy;*<br><br>*(c) visual impact when viewed from adjoining lots,*<br><br>*taking into account aspect and slope.* | a) The accompanying shadow diagrams show no shadowing impact to habitable areas of 6 Walker Street on 21 June. Although the shadow diagrams show some early morning shadowing to Unit 3/8 Walker Street at 9am, that shadow impact is likely to end by 10am as the sun moves around to the north with the remaining 5 hours to 3pm on 21 June unaffected. In my assessment this relatively minor shadow impact is not unreasonable given any increased shadowing impact from the 700mm variation to the 5m permitted setback (4.3m proposed) only relates to a small part of the proposed development along this western boundary. The majority of the buildings are setback beyond the 5m permitted standard and the proposal will have less impact than a compliant building that could be built to a height of 8.5m with a 5m setback along the entire length of this boundary.<br><br>b) The setback to the western boundary will not result in unacceptable overlooking or loss of privacy to 6 and 8 Walker Street in that the western elevations of Units 8 and 5 include a limited number of windows and these either have high sill heights, relate to a bedroom or are setback a compliant 5m from the boundary. As a comparison, all windows would also meet the 4m setback privacy requirement for the General Residential Zone (Clause 10.4.6 A2(a)ii). The small decks on the northern end of Units 5 and 8 will be setback beyond the 5m permitted setback.<br><br>c) The proposed residential dwellings are of a domestic scale and will have considerably less visual impact to 6 and 8 Walker Street than an alternative fully compliant development that could be built to 8.5m for the length of the boundary with a setback of 5m. |

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| | |
|---|---|
| | **Southern setback to 13 Fitzroy Street**<br><br>The siting relative to the southern boundary adjoining 13 Fitzroy Street is considered acceptable in that:<br><br>a) The rear yard area of this neighbouring property is occupied by a number of outbuildings and the habitable rooms and main private open space of that property are well setback from the common boundary and will not be overshadowed. The shadow diagrams also show that the entirety of this property will not be overshadowed at all for the three hours between 12pm and 3pm.<br><br>b) The southern elevation of Units 4 and 5 include limited windows relating to bedrooms (higher sill height) and bathroom (fixed obscure glazing) only and will not result in unacceptable overlooking or loss of privacy to this neighbouring property particularly given these characteristics and that the rear yard of 13 Fitzroy Street is occupied by outbuildings and the house and private open space areas are well setback from the common boundary.<br><br>c) The visual impact of the domestic scaled units as viewed from 13 Fitzroy Street is considered acceptable given that Unit 5 will occupy only approximately ¼ of the northern boundary of 13 Fitzroy Street (approximately 5m of the 20m boundary) and that the habitable spaces of this neighbouring property are well setback from the common boundary. |

***21.4.3 Design***

| ***Development Standard*** | ***Assessment*** |
|---|---|
| *A1*<br><br>*Building design must comply with all of the following:*<br><br>*(a) provide the main pedestrian entrance to the building so that it is clearly visible from the road or publicly accessible areas on the site;* | Complies.<br><br>The proposal retains the vet clinic building unaltered on the Gordon Street frontage of the site. |

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| | |
|---|---|
| *(b) for new building or alterations to an existing facade provide windows and door openings at ground floor level in the front façade no less than 40% of the surface area of the ground floor level façade;*<br>*(c) for new building or alterations to an existing facade ensure any single expanse of blank wall in the ground level front façade and facades facing other public spaces is not greater than 30% of the length of the facade;*<br>*(d) screen mechanical plant and miscellaneous equipment such as heat pumps, air conditioning units, switchboards, hot water units or similar from view from the street and other public spaces;*<br>*(e) incorporate roof-top service infrastructure, including service plants and lift structures, within the design of the roof;*<br>*(f) provide awnings over the public footpath if existing on the site or on adjoining lots;*<br>*(g) not include security shutters over windows or doors with a frontage to a street or public place.* | |
| *A2*<br>*Walls of a building facing a residential zone must be coloured using colours with a light reflectance value not greater than 40 percent.* | The western and southern walls will be coloured with a light reflectance value not greater than 40% and will satisfy this requirement. |

***21.4.4 Passive Surveillance***

| ***Development Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Building design must comply with all of the following:*<br>*(a) provide the main pedestrian entrance to the building so that it is clearly visible from the road or publicly accessible areas on the site;*<br>*(b) for new buildings or alterations to an existing facade provide windows and door openings at ground floor level in the front façade which* | The proposal is considered to satisfy A1 in that it involves no change to the vet clinic use and development including the Gordon Street façade. |

| | |
|---|---|
| *amount to no less than 40 % of the surface area of the ground floor level facade;*<br><br>*(c) for new buildings or alterations to an existing facade provide windows and door openings at ground floor level in the façade of any wall which faces a public space or a car park which amount to no less than 30 % of the surface area of the ground floor level facade;*<br><br>*(d) avoid creating entrapment spaces around the building site, such as concealed alcoves near public spaces;*<br><br>*(e) provide external lighting to illuminate car parking areas and pathways;*<br><br>*(f) provide well-lit public access at the ground floor level from any external car park.* | |

***21.4.5 Landscaping***

*Objective:*

*To ensure that a safe and attractive landscaping treatment enhances the appearance of the site and if relevant provides a visual break from land in a residential zone.*

| ***Development Standards*** | ***Assessment*** |
|---|---|
| *A1*<br><br>*Landscaping along the frontage of a site is not required if all of the following apply:*<br><br>*(a) the building extends across the width of the frontage, (except for vehicular access ways);*<br><br>*(b) the building has a setback from the frontage of no more than 1 m.* | The existing vet clinic building aligns the front boundary of the site other than the vehicle access. The proposal does not alter this arrangement. The proposal complies with A1. |
| *A2*<br><br>*Along a boundary with a residential zone landscaping must be provided for a depth no less than:*<br><br>*2 m.* | The proposal includes landscaping for a depth of 2m along the western rear boundary of the site adjoining the General Residential zone.<br><br>The proposal does not provide a 2m landscaped strip along the entire length of the common boundary with 13 Fitzroy Street within the General Residential Zone to the south and is therefore to be assessed under P2. |
| *P2*<br><br>*Along a boundary with a residential zone landscaping or a building design solution must be* | It is not considered necessary to maintain a landscaped buffer between the proposed residential development and the adjoining |

| | |
|---|---|
| *provided to avoid unreasonable adverse impact on the visual amenity of adjoining land in a residential zone, having regard to the characteristics of the site and the characteristics of the adjoining residentially-zones land.* | residential property at 13 Fitzroy Street particularly given that the proposal involves a compatible use, the existing landscaping on that property, the number of outbuildings that occupy the rear of that property and significant setback of the dwelling and private open space areas from the common boundary. For these reasons the proposal is considered to satisfy P2 having regard to the corresponding Objective for the standard to provide a break to development in the residential zone where appropriate. |

***21.4.6 Outdoor Storage Areas***

| ***Development Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Outdoor storage areas for non-residential uses must comply with all of the following:*<br>*(a) be located behind the building line;*<br>*(b) all goods and materials stored must be screened from public view;*<br>*(c) not encroach upon car parking areas, driveways or landscaped areas.* | The proposal does not include outdoor storage areas for non residential use and complies with this requirement. |

***21.4.7 Fencing***

| ***Development Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Fencing must comply with all of the following:*<br>*(a) fences, walls and gates of greater height than 1.5 m must not be erected within 4.5 m of the frontage;*<br>*(b) fences along a frontage must be at least 50% transparent above a height of 1.2 m;*<br>*(c) height of fences along a common boundary with land in a residential zone must be no more than 2.1 m and must not contain barbed wire.* | The proposal complies with A1 in that it does not involve a front fence or a rear fence exceeding 2.1m along the boundary with the residential zone. |

## 3.4 Road and Railway Assets Code

The requirements of this Code are assessed in the accompanying Traffic Impact Assessment by Joanne Fisher and determined to comply.

### 3.5 Parking and Access Code

The requirements of this Code are assessed in the accompanying Traffic Impact Assessment by Joanne Fisher and determined to comply.

Landscaping of the carpark is integrated into the design as shown on the site plan.

### 3.6 Stormwater Management Code

The accompanying civil engineering design confirms that the proposal will connect by gravity to existing public stormwater infrastructure.

The requirements of the Stormwater Management Code have been addressed by Aldanmark in the accompanying Stormwater report.

# 4. Conclusion

The proposed residential development makes good use of available land within the inner area of Sorell behind the existing veterinary clinic. The proposal maintains the commercial street frontage to Gordon Street and has been thoughtfully designed to transition to the adjacent residential zone.

The proposal is accompanied by a traffic impact assessment by Joanne Fisher and civil design and stormwater management report by Aldanmark.

In my assessment the proposal complies with the Planning Scheme and should be approved following public notification pursuant to Section 57 of the Act.

I would be pleased to discuss or clarify any aspects of the proposal as necessary.

Frazer Read

**Principal**

14 September 2021

31/8/2021

ALDANMARK
CONSULTING ENGINEERS
Lower Ground - 199 Macquarie Street, Hobart TAS 7000
GPO Box 1248, Hobart TAS 7001
03 6234 8666
mail@aldanmark.com.au
www.aldanmark.com.au

# ENGINEER'S ADVICE

**210831 INST 21E99-12 TasWater Demands**

**To:** Trent Young
trent@theyounggroup.com.au

**Cc:**

**Inspection** ☐
**Instruction** ☒
**Memo** ☐
**RFI Response** ☐
**Shop Drawing Approval** ☐

**Project:** The Young Group: 11a Gordon Street, SORELL
**Subject:** TasWater Demands

**Relevant documents:**
1. Architectural drawings by Matt Gilley, 9 pages, Revision A June 2021
2. Engineering design documents by Aldanmark 21E99-12 CIV Rev A

SEWER DEMANDS

The proposed development at 11a Gordon Street, Sorell of 8No. Townhouses and 1No. existing Veterinary Business. Sewerage loadings are in accordance with TasWater Sewerage Code Supplement to the Sewerage Code of Australia WSA 02-2014-3.1.

| TYPE | ET CODE | COMMENTS | QUANTITY | UNIT RATING (SEWER) | SEWERAGE ET'S | SEWERAGE EP'S |
|---|---|---|---|---|---|---|
| Townhouses | RM02 | 2 bedroom units | 8 | 0.750 | 6 | 18 |
| VET | BE07 | | 3 | 0.6 | 1.8 | 5.4 |
| | | | | TOTAL | 7.8 | 23.4 |

Based on the above information and WSA 02-2014 and 165 kL/ET/annum, the sewerage flows are:

$$Q_{ADWF} = 0.041\ L/s$$
$$Q_{PDWF} = 0.489\ L/s$$
$$Q_{RDI} = 0.32\ L/s$$
$$\mathbf{Q_{TOTAL} = 0.810 L/s}$$

WATER DEMANDS

As per TasWater Supplement to Water Supply Code of Australia WSA 03-2011-3.1 MRWA Edition V2.0, where ET's in the serviced zone is <100, probable simultaneous demand (PSD) effects shall be considered.

As per Section 3 of AS3500.1:2018 Table 3.2.3, the **PSD = 1.64 L/s** for 8 Dwellings plus 1 Business equals a total of 9 Dwellings. The site will require a DN40 (I.D) low hazard property service connection as per TWS-W-0002.

Regards,

**Toby Parrish**
Civil Engineering Technician

# STORMWATER REPORT

11a GORDON STREET
SORELL
TAS 7172

Aldanmark Reference: **20E52-58**

ALDANMARK
CONSULTING ENGINEERS

Lower Ground
199 Macquarie Street
Hobart TAS 7000

GPO Box 1248
Hobart TAS 7001

03 6234 8666

mail@aldanmark.com.au
www.aldanmark.com.au

ABN 79 097 438 714

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## DOCUMENT CONTROL

| VERSION | DATE | AUTHOR | | APPROVED | |
|---|---|---|---|---|---|
| A | 31/08/2021 | Toby Parrish |  | Nathan Morey |  |

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# 1. INTRODUCTION AND SCOPE OF ENGAGEMENT

Aldanmark have been engaged to design a stormwater system for the proposed Eight unit dwellings at 11a Gordon Street, Sorell. To meet Sorell Council Stormwater requirements, the sites post-development peak discharge must not exceed the pre-development peak discharge for stormwater runoff and the project must incorporate the principles of Water Sensitive Urban Design (WSUD). The following report outlines the methodology and assumptions used to ensure the proposed development complies with the permit conditions.

# 2. DETENTION MODEL

**11a Gordon Street**

| | |
|---|---|
| Total site area: | ≈ 1,727m² |

Pre-development residential

| | |
|---|---|
| Roof | ≈ 157.0m² |
| Driveway + Hard stand | ≈ 483.0m² |
| Pervious | ≈ 1087.0m² |

Coefficients of run-off adopted for design are as follows:

| | |
|---|---|
| 5-minute duration 5% AEP Hobart | I = 86mm/hr (BOM IFD) |
| Impervious areas: | |
| Roof | C = 1.0 |
| Pavements | C = 0.90 |
| Pervious areas: | C = 0.30 |

Calculations have been based on the Modified Rational Method for stormwater run-off:

$$Q = \frac{C \times I \times A}{3600}$$

Where: Q = Design Volumetric Flow Rate [L/s]
C = Runoff Coefficient
I = Rainfall Intensity [mm/hr] (5 minute - 5% AEP storm)
A = Sum of all equivalent areas [m²]

**Pre-Development Permissible Site Discharge (PSD):**

$$Q_{PSD} = \frac{(157 \text{ x } 1 + 483 \text{ x } 0.9 + 1087 \text{ x } 0.3) \times 86}{3600} = \mathbf{21.9\ L/s}$$

**Post-Development (POST):**

| | | |
|---|---|---|
| Post-development residential | | |
| | Roof Existing | ≈157.0 m² |
| | Roof units 1 to 5 | ≈283.0 m² |
| | Roof units 6 to 8 | ≈184.0 m² |
| Roofs Total | | ≈624.0 m² |
| | Driveway Existing (- unit 1 and - Grass portion) | ≈358.0 m² |
| | Driveway Proposed | ≈330.0 m² |
| Driveways Total | | ≈688.0 m² |
| | Paved Area | ≈172.0m² |
| | Garden Bed | ≈115.0 m² |
| | Grassed Area | ≈128.0 m² |

**Total ($Q_{POST}$)**

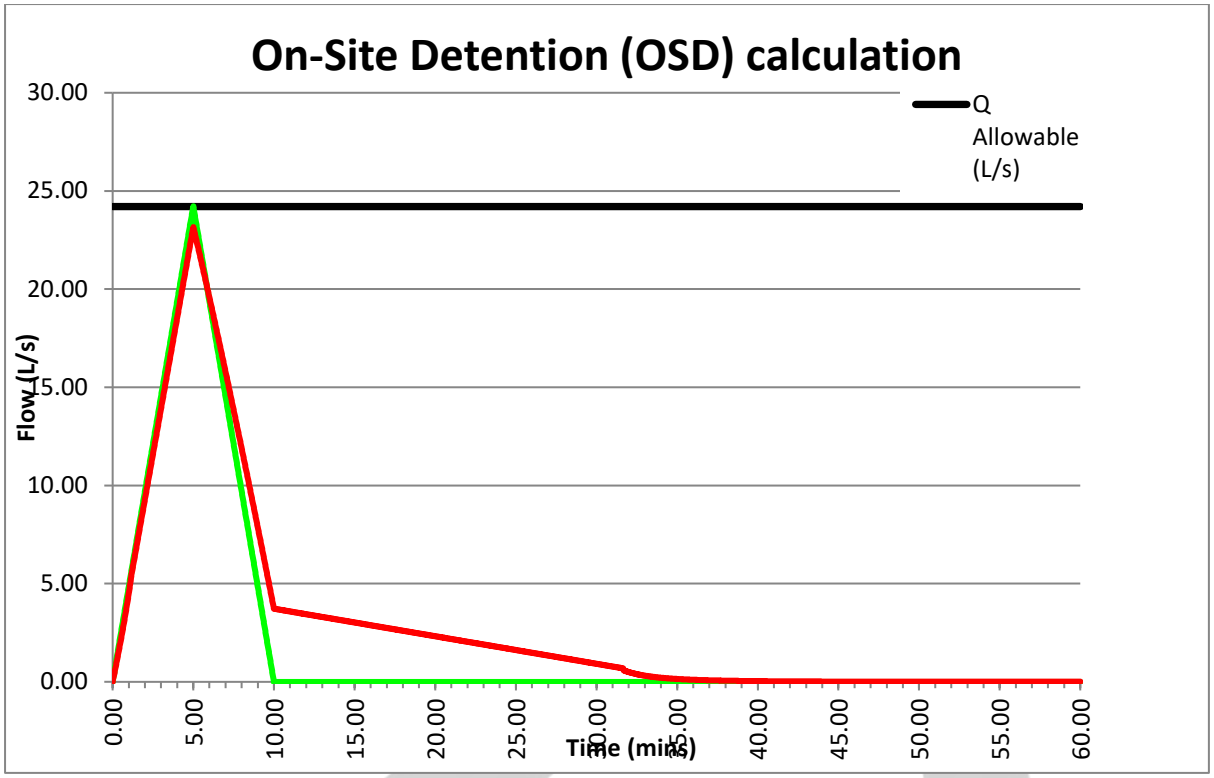
$$Q_{Post} = \frac{(624 \text{ x } 1.0 + 688 \text{ x } 0.9 + 172 \text{ x } 0.9 + 115 \text{ x } 0.3 + 128 \text{ x } 0.3) \times 86}{3600} = \mathbf{35.1\ L/s}$$

As shown above the post development flow $Q_{Post}$ is 13.2 L/s greater than the permissible site discharge $Q_{PSD}$ and therefore on-site detention (OSD) is required. To determine the volume of storage required to reduce the post development peak discharge to the permissible site discharge Autodesk Software - Storm and Sanitary Analysis was utilised.

## 3. STORMWATER SITE LAYOUT

The site stormwater runoff will be directed to an on site 5000 L capacity detention tank, fitted with a 40 mm low flow orifice device. The outflow from the Detention tank will go into an onsite SPEL or Ocean Protect filter system. The Discharge will then be directed into an on site pump, to discharge into the existing Stormwater system, which consists of 300dia pipe as per Sorell Council database, size to be confirmed on site.

**FIGURE 1: SITE OUTFLOW HYDROGRAPHS**




CONCLUSION

This report has demonstrated that the proposed development at 11a Gordon Street, Sorell, complies with the stormwater quantity and quality conditions of the Sorell Council's planning permit requirements.

**Note:**

- No assessment has been undertaken of Council's stormwater infrastructure and its capacity.
- This report assumes the Council stormwater main has capacity for the pre-development peak discharge.
- It is the responsibility of Council to assess their infrastructure and determine the impact (if any) of altered inflows into their stormwater network.

Please contact me at tparrish@aldanmark.com.au if you require any additional information.

Yours faithfully,

**Toby Parrish**
Civil Engineering Technician

Howarth Fisher and Associates
ACN 119 043 051
Structural, Civil and Traffic Engineering

Structural and Civil Engineering
Project Design and Management
Forensic Engineering and Structural Inspections
Research and Development Facilitators

Traffic Engineering
Traffic Management Studies and Traffic Impact Assessment
Expert Witness Representation
Road Safety Audits

# 11a Gordon Street, Sorell

Traffic Impact Assessment Report



**Prepared for**
The Young Group

Date
**July 2021**

Prepared by
**Joanne Fisher**

13 Willowdene Avenue
Sandy Bay, 7005
Tasmania
Australia

Phone +61 (0)3 6225 0619
Fax +61 (0)3 6225 0618
Email:info@howarthfisher.com

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Appendix B Autotrack paths via 8.8metre service vehicles

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| | Name | Signature | Date |
|---|---|---|---|
| **Authorised by:** | **Joanne Fisher** |  | **23rd July 2021** |

# 1. Introduction

## 1.1 Client Details

This document has been prepared for the following:

| | |
|---|---|
| Client Name: | The Young Group |
| Address: | Unit 1, 11 McRorie Court |
| | Cambridge |
| | Tasmania 7170 |
| Client Contact: | Trent Young |

## 1.2 Project Details

The proposal involves the redevelopment of the site at 11a Gordon Street, Sorell. The proposal involves the redesign of the existing car park to make provision for 5 bays associated with the existing veterinary clinic.

A copy of the development plans can be found at Appendix A of this report.

## 2. Scope of Consultancy

The scope of consultancy involves the following:

- Obtain background information and plans in CAD format.
- Provide concept design plans to maximise car park layout.
- Undertake a Traffic Impact Assessment report.
- Assess sight distance in accordance with the Sorell Interim Planning Scheme, 2015.
- Assess access provision in accordance with AS2890.1 and the Sorell Interim Planning Scheme.
- Assess trip generation rates associated with the proposed development and the impact on the road network.
- Assess parking layout and compliance - include accessible and bicycle parking requirement.
- Address performance criteria if a shortfall is calculated.
- Assess servicing requirement and run Autotrack to show the swept path through the site.
- Assess access to the site by sustainable transport modes.
- Document findings in a Traffic Impact Assessment report to accompany D/A

## 3. Location of the Development

Figure 1 shows the location of the proposed development in the context of the surrounding street network.




Figure 1: Location (source: Google Maps)

# 4. Existing Situation

## 4.1 Site Details

The proposed development is located at 11a Gordon Street in Sorell. Gordon Street is a category 2 road, as determined by the State Road Hierarchy. There function is to provide safe and efficient access to Tasmania's regions. They are also the Department of State Growth preferred heavy freight route.

11a Gordon Street is an internal block accessed via a right of way located on the site of 9 and 11 Gordon Street, one of which is the Sorell Veterinary Practice and the other an accountant's practice (commercial office).

## 4.2 Road Width

Gordon Street is approximately 13 metres wide in the vicinity of the site.

## 4.3 Traffic Volumes

Traffic volumes were most recently undertaken on Gordon Street (outside 21 Gordon Street) in May/June 2019. Over the survey period, an average of 8,034 vehicles per day travelled along Gordon Street in the vicinity of the site. These counts have been obtained from the Department of State Growth's website.

It should be noted that with the completion of the Sorell Bypass forecast in October 2022 there will be a slight reduction in the traffic flows along Gordon Street, given the removal of Southbound Arthur Highway traffic from Gordon Street.

## 4.4 Posted Speed Limits

The speed limit along Gordon Street, Sorell, in the vicinity of the site is 50km/hr. The site is located within a shopping zone.

## 4.5 Accident History

In line with standard traffic engineering practice, the Department of State Growth (DSG) has been contacted and has advised that the accident history in the vicinity of the site over the past five years is as follows:

- There have been no accidents near the access to the site.
- There has been a total of 8 accidents between Fitzroy Street and Coles Street.
- There have been two accidents on the link between Cole Street and Gordon Street.
- There have been three accidents at the intersection of Fitzroy Street and Gordon Street.
- There have been three accidents at the intersection of Cole Street and Gordon Street.
- There have been two midblock accidents between Cole Street and Gordon Street.
- One accident was of minor severity and the remaining seven were property damage only accidents.

Two of the accidents were rear end accidents, commonly occurring at traffic signals, one was a side swipe accident, two accidents were cross intersection accidents, and one involved a right turning vehicle.

## 5. Assessment of Trip Generation

The proposed development comprises of eight two-bedroom units, located behind an existing veterinarian clinic on the same property title. There is also an existing adjoining business which uses the same right of way/driveway, as shown in the photograph below:



Photograph 1: Showing the land to be developed for residential units (currently used for parking)



Photograph 2: Showing the access driveway Right of Way which will be required for the Veterinary Practice, the proposed residential development as well as the Accountant's Practice. (It is noted that a ROW should not be obstructed (i.e. not used for parking).

## 5.1 Existing Trip Rates

To obtain an indication of the trip rates to the existing veterinarian clinic, a survey was undertaken during the peak times.

Howarth Fisher and Associates undertook surveys on Tuesday 6th July 2021 between 4.30pm and 5.30pm. Surveys were undertaken at the access to the site. There were 5 trips recorded in the one hour evening peak survey period.

## 5.2 Proposed Trip Generation

The *New South Wales, Road Traffic Authority*[1]*, Guide to Trip Generating Developments* (is a nationally recognised reference document used for determining trip rates to various land uses) and updated *NSW, RMS, TDT2013/04a*. Alternatively, where data is not available, Howarth Fisher and Associates has undertaken surveys at similar land uses to obtain an estimate of likely trip generation rates.

### 5.2.1 NSW, RTA, Guide to Traffic Generating Developments, 2002

For comparison purposes, the NSW, RTA, Guide to Traffic Generating Developments has been used as a basis for determining trip rates to the proposed development. For the purposes of this assessment the rates for medium density, smaller units and flats (up to 2 bedrooms) have been used.

Table 1: Additional Trip Generation for Residential Units: Source NSW, RTA, Guide to Traffic Generating Developments, 2002.

| Land Use | Trip Generation Rates | Total |
|---|---|---|
| *8 two-bedroom units* | Medium Density Residential flat building<br>Smaller units and flats (up to 2 bedrooms)<br>Daily Vehicle Trips – 4-5 per dwelling<br>Weekday Peak Hour Vehicle Trips<br>0.4- 0.5 per dwelling | 32 – 40 per day<br>3.2 - 4 during the peak hour |
| *TOTAL* | | 4 |

The development will generate a maximum of 4 additional trips during the evening peak period.

[1]Alternatively, referred to as NSW Roads and Maritime Services (RMS)

# 6. Assessment of Parking

## 6.1 Existing Situation

There are currently six (6) parking spaces at the site dedicated to the veterinary clinic. There are 3 leased spaces for employees located behind the accountancy practice and 3 parallel parking spaces being used within the right of way (this is not permitted as a use within a Right of Way, given they should be unobstructed).

### 6.1.1 Parking Requirements

The following table has been used to determine the parking requirements for the various land uses.

Table 2: Parking requirements for Proposed Development (Sorell Interim Planning Scheme, 2015)

| Land Use | Parking Rates | Total Requirement |
|---|---|---|
| *8 two-bedroomed units*<br>*(Multiple dwelling con taining 2 or more bedrooms (including all rooms capable of being used as a bedroom))* | *2 for each dwelling and 1 dedicated visitor space per 4 dwellings* | **16 spaces + 2 visitor spaces = 18 spaces** |
| *Veterinary Clinic (145m$^2$)* | *3.5 spaces for each 100m$^2$ of floor area* | **145/100*3.5 = 5 spaces** |
| ***TOTAL*** | | **23 spaces** |

## 6.2 Proposed Parking Provision

It is proposed to provide 16 car parking spaces directly associated with the proposed units, and an additional two (2) visitor parking spaces. It is also proposed to provide five (5) parking spaces for the veterinarian clinic. The proposed parking meets the requirements outlined in the Sorell Interim Planning Scheme 2015.

The proposed layout of the parking can be found in Appendix A.

## 6.3 Dimensions and Manoeuvring

In line with the requirements of AS2890.1: Off street parking 2004, the spaces would be required to be either user class 1A bays for the proposed units, which are 2.4m wide x 5.4m long, and user class 3 for the veterinary clinic, which are 2.6metres wide x 5.4metres long with 5.8metre aisles as a minimum.

## 6.4 Impact of the Development on On-Street Parking

There will be no impact on on-street parking associated with the proposed development, given that the parking will be provided on site.

## 6.5 Bicycle Parking Requirements

In line with the requirements of the Sorell Interim Planning Scheme 2015, Table E6.2, the bicycle parking requirements for the proposed development has been assessed as follows.

### 6.5.1 8 x Two-bedroom Units

For 8 x two-bedroom units, there is no requirement for bicycle parking provision.

### 6.5.2 Veterinary Clinic

It has been advised that there is a maximum of three veterinary practitioners on the site at any one time.

**Employee Parking**
For Employee parking the bicycle parking provision is calculated as follows:

1 for each 8 practitioners

3/8 = 0.375, (rounded to 0) nearest whole number therefore no requirement.

**Visitor parking**

For visitor parking the bicycle parking provision is calculated as follows

1 for each 8 practitioners

3/8 = 0.375, (rounded to 0 the nearest whole number) therefore no requirement.

There is therefore no bicycle parking requirement associated with the veterinary practice.

## 6.6 Accessible Parking Bays

In line with the requirements of the Sorell Interim Planning Scheme, 2015.

**E6.6.2 Number of Accessible Car Parking Spaces for People with a Disability**

| **Objective:** | |
|---|---|
| To ensure that a use or development provides sufficient accessible car parking for people with a disability. | |
| **Acceptable Solutions** | **Performance Criteria** |
| **A1**<br><br>Car parking spaces provided for people with a disability must:<br><br>(a) satisfy the relevant provisions of the Building Code of Australia;<br><br>(b) be incorporated into the overall car park design;<br><br>(c) be located as close as practicable to the building entrance. | **P1**<br><br>No Performance Criteria. |

In line with D3.5 of the NCC (BCA) the accessible car parking requirement D3.5

> d) *Need not be identified with signage where there is a total of not more than 5 car parking spaces, so as to restrict the use of the car parking spaces for people with a disability.*

Therefore, based on the requirements of the NCC (BCA) there is no requirement to mark out the accessible bay given 5 spaces are being provided associated with the veterinary use.

It should also be noted that there is an accessible bay located on Gordon Street along the street frontage in the vicinity of the Veterinary Practice as shown below. Given that the number of proposed spaces was on the upper limit of the requirements, an accessibility consultant (Equality Building) has been contacted and a report will be provided in regard to the suitability of the onstreet accessible parking bay.




Photograph 3: On-street accessible bay is provided in the immediate vicinity of the site.

## 6.7 Motorcycle Parking

In line with the performance criteria outlined in section E6.6.3 of the Sorell Interim Planning Scheme, 2015.

The acceptable solution states:

> *'The number of on-site motorcycle spaces provided must be at a rate of 1 space to each 20 car parking spaces after the first 19 spaces.'*

There is therefore no requirement for motorcycle parking.

# 7. Assessment of Access

## 7.1 Existing Situation Access Width

The driveway access width into the site is 5metres wide which is in line with the Australian Standards 2890.1: Off street parking 2004 for a driveway servicing the existing spaces.

## 7.2 Planning Scheme Access Widths Requirement

In line with the provisions of the Sorell Interim Planning Scheme, the access needs to be designed as follows:

**E6.7.2 Design of Vehicular Accesses**

| **Objective:** | |
|---|---|
| To ensure safe and efficient access for all users, including drivers, passengers, pedestrians and cyclists by locating, designing and constructing vehicle access points safely relative to the road network. | |
| **Acceptable Solutions** | **Performance Criteria** |
| **A1**<br><br>Design of vehicle access points must comply with all of the following:<br><br>(a) in the case of non-commercial vehicle access; the location, sight distance, width and gradient of an access must be designed and constructed to comply with section 3 – "Access Facilities to Off-street Parking Areas and Queuing Areas" of AS/NZS 2890.1:2004 Parking Facilities Part 1: Off-street car parking;<br><br>(b) in the case of commercial vehicle access; the location, sight distance, geometry and gradient of an access must be designed and constructed to comply with all access driveway provisions in section 3 "Access Driveways and Circulation Roadways" of AS2890.2 - 2002 Parking facilities Part 2: Off-street commercial vehicle facilities. | **P1**<br><br>Design of vehicle access points must be safe, efficient and convenient, having regard to all of the following:<br><br>(a) avoidance of conflicts between users including vehicles, cyclists and pedestrians;<br><br>(b) avoidance of unreasonable interference with the flow of traffic on adjoining roads;<br><br>(c) suitability for the type and volume of traffic likely to be generated by the use or development;<br><br>(d) ease of accessibility and recognition for users. |

## 7.3 Australian Standard Requirement

### 7.3.1 Classification of Off-Street Car Parking Facility

In line with Australian Standard AS2890.1 Off-street car parking facilities the class of the proposed parking facility is determined from the table 1.1 below:



TABLE 1.1

CLASSIFICATION OF OFF-STREET CAR PARKING FACILITIES

| User class | Required door opening | Required aisle width | Examples of uses (Note 1) |
|---|---|---|---|
| 1 | Front door, first stop | Minimum for single manoeuvre entry and exit | Employee and commuter parking (generally, all-day parking) |
| 1A | Front door, first stop | Three-point turn entry and exit into 90° parking spaces only, otherwise as for User Class 1 | Residential, domestic and employee parking |
| 2 | Full opening, all doors | Minimum for single manoeuvre entry and exit | Long-term city and town centre parking, sports facilities, entertainment centres, hotels, motels, airport visitors (generally medium-term parking) |
| 3 | Full opening, all doors | Minimum for single manoeuvre entry and exit | Short-term city and town centre parking, parking stations, hospital and medical centres |
| 3A | Full opening, all doors | Additional allowance above minimum single manoeuvre width to facilitate entry and exit | Short term, high turnover parking at shopping centres |
| 4 | Size requirements are specified in AS/NZS 2890.6 (Note 2) | | Parking for people with disabilities |

From Table 1.1, the type of the proposed parking facility is a user class 1A for residential parking, and user class 3 for the veterinary clinic (generally short-term parking), similar to hospital and medical centres.

**Category of Access Driveway**

In line with AS2890.1 *to determine access driveway widths and restrictions on their location along frontage road table 3.1 categorizes driveways according to –*

*a) the class of parking facility as shown is table 1.1;*

*b) the frontage road type, either arterial (including sub-arterial) or local (including collector):and*

c) *the number of parking spaces served by the access driveway.*

TABLE 3.1

SELECTION OF ACCESS FACILITY CATEGORY

| Class of parking facility (see Table 1.1) | Frontage road type | Access facility category | | | | |
|---|---|---|---|---|---|---|
| | | Number of parking spaces (Note 1) | | | | |
| | | <25 | 25 to 100 | 101 to 300 | 301 to 600 | >600 |
| 1,1A | Arterial | 1 | 2 | 3 | 4 | 5 |
| | Local | 1 | 1 | 2 | 3 | 4 |
| 2 | Arterial | 2 | 2 | 3 | 4 | 5 |
| | Local | 1 | 2 | 3 | 4 | 4 |
| 3,3A | Arterial | 2 | 3 | 4 | 4 | 5 |
| | Local | 1 | 2 | 3 | 4 | 4 |

NOTES:

1 When a car park has multiple access points, each access should be designed for the number of parking spaces effectively served by that access.

2 This Table does not imply that certain types of development are necessarily suitable for location on any particular frontage road type. In particular, access to arterial roads should be limited as far as practicable, and in some circumstances it may be preferable to allow left-turn-only movements into and out of the access driveway.

From Table 3.1 above it can be shown that the proposed driveway of the user class 1A/class 3, with a total of 26 parking spaces (18 + 5 + 3 associated with the office, which are currently being leased to the vet clinic), falls into category 2 driveway.

### 7.3.2 Access Driveway Widths Requirement

Given the driveway is only 5 metres currently, it will be necessary to increase the access driveway width to 6 metres to comply with the requirement of the AS2890.1: off street parking 2004. It is recommended that, given the number of spaces that are served by the access, the driveway be slightly widened to 6 metres to ensure that an incoming vehicle is not obstructing through traffic movements, given Gordon Street's strategic importance within the State Road Hierarchy. This would facilitate 2 vehicles to more easily manoeuvre at the intersection of the access driveway and Gordon Street.

The location of the access and egress points can be found on the plan at **Appendix A**.

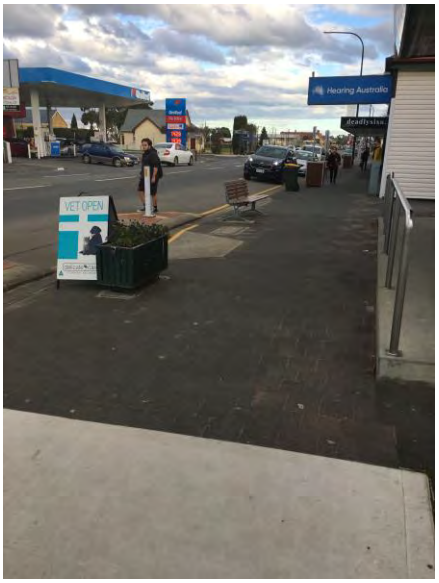
# 8. Assessment of Sight Distance

## 8.1 Sorell Interim Planning Scheme 2015.

As stated in the Sorell City Council Interim Planning Scheme, 2015, at section E5.6.4, regarding sight distances:

> *To ensure that accesses, junctions and level crossings provide sufficient sight distance between vehicles and between vehicles and trains to enable safe movement of traffic. The acceptable solution is outlined as follows:*
>
> *A1 Sight distances at:*
>
> *a) An access or junction must comply with the Safe Intersection Sight Distance shown at Table E5.1. In accordance with Table E5.1 a 50km/hr frontage road speed requires a sight distance of 80 metres.*

The sight distances at the access to the site onto Gordon Street are shown in the photographs below:




Photograph 4: Sight Distance to the south is greater than 200metres.



Photograph 5: Sight Distance to the north is 115 metres (the maximum distance to the intersection).

The sight distance availability exceeds the requirements of *Acceptable Solution*, as required by the Sorell City Council Interim Planning Scheme, 2015.

# 9. Sustainable Transport

## 9.1 Buses

There are a several bus services which operate near the site along Gordon Street, served by Tassielink and Redline bus numbers, 731, X31, 732, X32, X33, 734, 736 and 737. These routes service a range of locations, between Nubeena, Bicheno and Hobart. The predominant routes traverse between Sorell and Hobart, as shown in the web link below:
https://www.transport.tas.gov.au/__data/assets/pdf_file/0017/219104/Sorell_to_Hobart_timetable.pdf

## 9.2 Bicycles

There is no requirement to provide bicycle parking associated with this use, based upon the provisions of the Sorell Interim Planning Scheme, 2015.

## 9.3 Pedestrians

There is good pedestrian access to the site. The development is located within Sorell's shopping zone, meaning that pedestrian paths are in good condition. There is a pedestrian refuge located directly outside the clinic, providing pedestrians with a safe staged crossing facility in the immediate vicinity of the site.



Photograph 6: Showing the staged pedestrian crossing facility in the vicinity of the site.

# 10. Service Vehicles

## 10.1 Sorell Interim Planning Scheme, 2015

In line with the provision of the Sorell Interim Planning Scheme, 2015, an assessment has been made against the performance criteria, given that service vehicles cannot turn within the confines of the site.

**E6.7.13 Facilities for Commercial Vehicles**

| **Objective:** | |
|---|---|
| To ensure that facilities for commercial vehicles are provided on site, as appropriate. | |
| **Acceptable Solutions** | **Performance Criteria** |
| **A1**<br><br>Commercial vehicle facilities for loading, unloading or manoeuvring must be provided on-site in accordance with Australian Standard for Off-street Parking, Part 2 : Commercial. Vehicle Facilities AS 2890.2:2002, unless:<br><br>(a) the delivery of all inward bound goods is by a single person from a vehicle parked in a dedicated loading zone within 50 m of the site;<br><br>(b) the use is not primarily dependent on outward delivery of goods from the site. | **P1**<br><br>Commercial vehicle arrangements for loading, unloading or manoeuvring must not compromise the safety and convenience of vehicular traffic, cyclists, pedestrians and other road users. |

Gordon Street in the vicinity of the site is subject to the 50km/hr urban default speed limit, it is proposed that a refuse collection vehicle reverse into the site and access the bin storage, it is suggested that a spotter be used to direct the reversing vehicle through the site and manage any other on-site vehicles.

It is also recommended that the servicing occur outside peak periods.

# 11. Conclusion and Recommendations

The proposed development has been assessed in relation to the following:

**Trip Generation**

Howarth Fisher and Associates undertook surveys on Tuesday 6th July 2021 between 4.30pm and 5.30pm. Surveys were undertaken at the access to the site. There were 5 trips recorded in the one hour evening peak survey period.

The proposed trip generation into the site for the residential component has been calculated based upon the NSW, RTA Guide to Traffic Generating Developments, 2002. Using medium density residential flat building rates, the development will generate a maximum of 4 additional trips during the evening peak period.

**Parking**

A total of 23 car parking spaces are proposed as part of the development (18 associated with new units, and 5 spaces for the veterinary clinic). This is in line with the acceptable solution provided under the planning scheme.

There is no requirement for either accessible bays or bicycle or motorcycle parking based upon the requirements of the Sorell Interim Planning Scheme, 2015. It should however be noted that there is an accessible bay located on Gordon Street along the street frontage in the vicinity of the Veterinary Practice as shown below. Given that the number of proposed spaces was on the upper limit of the requirements, an accessibility consultant (Equality Building) has been contacted and a report will be provided in regard to the suitability of the onstreet accessible parking bay.

There is additional on and off-street parking in the vicinity of the site which can also be utilised by customers and visitors. On street parking restrictions are in operation along Gordon Street, which are used for the communal benefit of all land uses in the area. Both the Veterinary Practice and visitors to the residential unit developments will benefit from their use.

**Access**

The access into the development from Gordon Street is currently 5 metres, it is proposed that this be increased to a minimum of 6 metres excluding the splays to comply with the requirements of the Australian Standard: 2890.1 Off street parking 2004, and E6.7.2 of the Sorell Interim Planning Scheme 2015 for the number of car parking spaces it services. This will prevent an incoming vehicle obstructing the traffic on Gordon Street.

**Sight Distance**

The sight distance from the main access along Gordon Road complies with the requirements of the acceptable solution of the Sorell Interim Planning Scheme for a road subject to a 50km/hr speed restriction in both directions.

**Sustainable Transport**

**Buses/Coaches**

There are several bus services which operate near the site along Gordon Street, served by Tassielink and Redline bus numbers, 731, X31, 732, X32, X33, 734, 736 and 737. These routes service a range of locations, between Nubeena, Bicheno and Hobart. The predominant routes traverse between Sorell and Hobart. The frequency of bus services has been attached as a weblink within the body of the report.

**Bicycles**

Based on the requirements of the Sorell Interim Planning Scheme, 2015, there is no requirement to provide any visitor or staff bicycle parking.

**Pedestrians**

There is good pedestrian access to the site. The development is located within Sorell's shopping zone, which has 3.6 metre wide footpaths along Gordon Street. There is a pedestrian refuge located directly outside the clinic, providing pedestrians with a safe staged crossing facility in the immediate vicinity of the site. Thereby facilitating access to the site by pedestrians.

**Service Vehicles**

Autotrack has been used to model the swept path of an 8.8metre service vehicle in and out of the site. It will be necessary for a truck to reverse from Gordon Street into the site given the site constraints. The Autotrack paths can be found at Appendix B of this report.

It is recommended that the servicing is managed so that it is scheduled to occur outside peak hours to minimise the disruption to traffic flows.

Appendix A

**DEVELOPMENT PLANS**

Appendix B

AUTOTRACK PATHS

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| NO. | ISSUE DETAILS | BY | APPROVED | DATE |
|---|---|---|---|---|
| 1 | FOR CLIENT REVIEW | JSR | JF | 22/07/2021 |
| | | | | |
| | | | | |
| | | | | |

ALL DIMENSION IN MILLIMETERS UNLESS NOTED OTHERWISE (U.N.O)

MINIMUM TOLERANCES (U.N.O)
MACHINING ±0.3
FABRICATION ±1
ASSEMBLY ±2
ANGULAR ±1

REMOVE BURRS, BREAK SHARP EDGES, STAMP PART NUMBER IN NON-FUNCTIONAL AREA

UNSPECIFIED 3.2 SURFACE FINISH

THIRD ANGLE PROJECTION

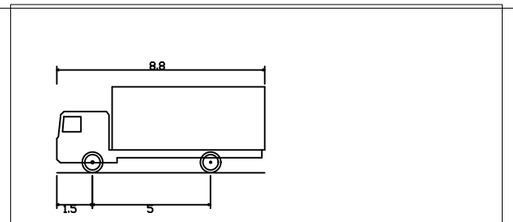
HF

**HOWARTH FISHER & ASSOCIATES**
PTY LTD ACN 119 043 051
**STRUCTURAL, CIVIL & TRAFFIC ENGINEERS**
13 WILLOWDENE AVE. SANDY BAY, 7005
PH +61(3)62250619
FAX. +61(3)62250618
EMAIL info@howarthfisher.com

**THE YOUNG GROUP**
**11A GORDON STREET, SORELL**
**PROPOSED DEVELOPMENT**

**VISITOR PARKING**

| | | | |
|---|---|---|---|
| APPROVED | DATE / / | | |
| SCALES | NTS | | |
| DRAWN | JSR | REV NO. | 01 |
| DESIGN | JF | | |
| PROJECT NUMBER | | DRAWING NUMBER | |
| 20J553 | | P1 | |




MRV - Medium Rigid Vehicle

| | |
|---|---|
| Overall Length | 8.800m |
| Overall Width | 2.500m |
| Overall Body Height | 3.633m |
| Min Body Ground Clearance | 0.428m |
| Track Width | 2.500m |
| Lock-to-lock time | 4.00s |
| Curb to Curb Turning Radius | 10.000m |

SERVICE VEHICLE TO REVERSE INTO DRIVEWAY.

MRV - Medium Rigid Vehicle

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| NO. | ISSUE DETAILS | BY | APPROVED | DATE |
|---|---|---|---|---|
| 1 | FOR CLIENT REVIEW | JSR | JF | 22/07/2021 |
| | | | | |
| | | | | |
| | | | | |

ALL DIMENSION IN MILLIMETERS UNLESS NOTED OTHERWISE (U.N.O)

MINIMUM TOLERANCES (U.N.O)

| | |
|---|---|
| MACHINING | ±0.3 |
| FABRICATION | ±1 |
| ASSEMBLY | ±2 |
| ANGULAR | ±1 |

REMOVE BURRS, BREAK SHARP EDGES, STAMP PART NUMBER IN NON-FUNCTIONAL AREA

UNSPECIFIED 3.2 SURFACE FINISH

THIRD ANGLE PROJECTION

HF

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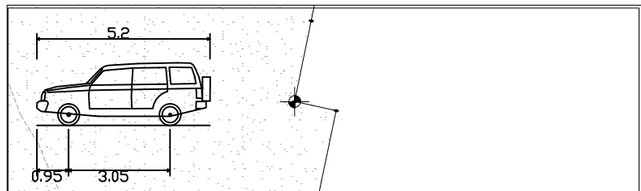
**THE YOUNG GROUP**
**11A GORDON STREET, SORELL**
**PROPOSED DEVELOPMENT**

**SERVICE VEHICLE (8.8M MRV) AUTOTRACK PATH**

| | | | |
|---|---|---|---|
| APPROVED | DATE / / | | |
| SCALES | NTS | | |
| DRAWN | JSR | REV NO. | 01 |
| DESIGN | JF | | |

PROJECT NUMBER DRAWING NUMBER
20J553 P2




| B99 Vehicle (Realistic min radius) (2004) | |
|---|---|
| Overall Length | 5.200m |
| Overall Width | 1.940m |
| Overall Body Height | 1.878m |
| Min Body Ground Clearance | 0.272m |
| Track Width | 1.840m |
| Lock-to-lock time | 4.00s |
| Curb to Curb Turning Radius | 6.250m |

THIS SPACE DOES NOT NEED TO BE ACCESSIBLE. THIS HAS BEEN CLARIFIED BY EQUALITY BUILDING THEREFORE, BRING BACK INLINE WITH OTHERS. THE ON-STREET ACCESSIBLE PARKING BAY IS DEEMED SUFFICIENT AND A REPORT WILL BE PROVIDED BY EQUALITY BUILDING.

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| NO. | ISSUE DETAILS | BY | APPROVED | DATE |
|---|---|---|---|---|
| 1 | FOR CLIENT REVIEW | JSR | JF | 22/07/2021 |
| | | | | |
| | | | | |
| | | | | |

ALL DIMENSION IN MILLIMETERS UNLESS NOTED OTHERWISE (U.N.O)

MINIMUM TOLERANCES (U.N.O)

| | |
|---|---|
| MACHINING | ±0.3 |
| FABRICATION | ±1 |
| ASSEMBLY | ±2 |
| ANGULAR | ±1 |

REMOVE BURRS, BREAK SHARP EDGES, STAMP PART NUMBER IN NON-FUNCTIONAL AREA

UNSPECIFIED 3.2 SURFACE FINISH

THIRD ANGLE PROJECTION

HF

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PTY LTD ACN 119 043 051
**STRUCTURAL, CIVIL & TRAFFIC ENGINEERS**
13 WILLOWDENE AVE. SANDY BAY, 7005
PH +61(3)62250619
FAX. +61(3)62250618
EMAIL info@howarthfisher.com

**THE YOUNG GROUP**
**11A GORDON STREET, SORELL**
**PROPOSED DEVELOPMENT**

**AUTOTRACK PATH**

| | | | |
|---|---|---|---|
| APPROVED | DATE / / | | |
| SCALES | NTS | | |
| DRAWN | JSR | REV NO. | 01 |
| DESIGN | JF | | |
| PROJECT NUMBER | | DRAWING NUMBER | |
| 20J553 | | P3 | |

# CIVIL DRAWINGS
# PROPOSED UNIT DEVELOPMENT
# 11a GORDON STREET
# SORELL

| | | | |
|---|---|---|---|
| C001 | COVER SHEET | A | 31/08/2021 |
| C100 | LAYOUT PLAN | A | 31/08/2021 |
| C103 | TURNPATH PLAN | A | 31/08/2021 |
| C300 | LONGSECTION | A | 31/08/2021 |
| C400 | PROPOSED STORMWATER DETAILS | A | 31/08/2021 |

| REV | DESCRIPTION | DATE | APPROVAL | |
|---|---|---|---|---|
| | | | DRAWN: | TP |
| | | | CHECKED: | |
| | | | DESIGN: | |
| | | | CHECKED: | |
| A | DEVELOPMENT APPROVAL | 31/08/2021 | CERTIFIED: | |

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03 6234 8666
mail@aldanmark.com.au
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| | | | |
|---|---|---|---|
| PROJECT: | 11a GORDON STREET | STAGE: | |
| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET<br>SORELL<br>TAS 7172 | | |

| | | | |
|---|---|---|---|
| SHEET: | COVER SHEET | | |
| SCALE: | | TOTAL SHEETS: 5 | SIZE: |
| PROJECT No. | 21E99-12 | SHEET: C001 | REV: A |

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## LEGEND

| | | | |
|---|---|---|---|
| NEW WATER | W | PERVIOUS AREA | |
| NEW DN100 SEWER AT 1.75% | S | PAVED AREA | |
| NEW DN150 STORMWATER AT 1% | SW | EXISTING EASEMENT | |
| NEW RAIN WATER CHARGED | RWC | NO PARKING AREA | |
| EXISTING WATER MAIN | ex W | PROPOSED DRIVEWAY | |
| EXISTING DN150 SEWER | EX S | | |
| EXISTING COUNCIL DN300 SW | EX SWD | | |
| WATER VALVE | | | |
| FIRE HYDRANT | | | |
| WATER METER | | | |

*INTERNAL HYDRAULICS BY OTHERS

GROUND FINISHED SURFACE HEIGHT RAISED IN THIS AREA FOR STORMWATER MINIMUM PIPE COVER.

450sq ACO POLYCRETE STORMWATER PIT WITH CLASS 'B' HEELGUARD TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK

EXISTING NEIGHBOUR SHED

EXISTING TASWATER DN150 SEWER MAIN AS PER SURVEYOR

EXISTING EASEMENT

ON SITE DETENTION TANK 2.0m x 0.9m x 1.5m HIGH 2400 LITRE CAPACITY WITH DN30mm ORIFICE

PROPOSED UNIT 8 FFL 13.55

PROPOSED UNIT 7 FFL 13.55

PROPOSED UNIT 6 FFL 13.55

CAR PARK 6 VISITOR

CAR PARK 5 VET

EXISTING BITUMEN CAR PARK

EXISTING BUSINESS

PROVIDE DN40 WATER METER AS PER TWS-W-0002 SHEET 11 OF 19 REV. 5 WITH DN50 (ID 40mm) HDPE PN16 SDR11 OFFTAKE BY TASWATER AT DEVELOPERS COST

GORDON STREET

EXISTING PIPELINE EASEMENT OVER ADJACENT PROPERTY TO BE REMOVED

CONNECT TO EXISTING PRIVATE SEWER FROM VET AND BRING IO TO SURFACE

450sq ACO POLYCRETE STORMWATER PITS WITH CLASS 'B' TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK DRAINAGE LOCATED AT GRADED SAG. REFER LONG SECTIONS PROVIDED

SPEL HYDROSYSTEM SHS.400.H.1.100 PVC REFER TO DRAWING SP20-HY-12420-S

PROVIDE 8No. DN20 WATER METER IN NON TRAFFICABLE LID REFER: TASWATER TWS-W-0002 SHEET 6 of 19 REV 5

EXISTING BITUMEN DRIVEWAY

CENTERELINE ALIGNMENT CL-1

PROVIDE DN20 WATER METER ABOVE GROUND CONNECT INTO EXISTING VETERINARY BUSINESS REFER: TASWATER TWS-W-0002 SHEET 01 of 19 REV 5

PROVIDE 50mm STEP AT GARAGE ENTRANCE TYP.

CAR PARK 7 VISITOR

CAR PARK 4 VET

CAR PARK 3 VET

CAR PARK 2 VET

CAR PARK 1 VET

PROPOSED UNIT 5 FFL 13.50

PROPOSED UNIT 4 FFL 13.50

PROPOSED UNIT 3 FFL 13.65

PROPOSED UNIT 2 FFL 13.65

PROPOSED UNIT 1 FFL 13.80

EXISTING RPZD FOR BUSINESS (VET)

EXISTING VETERINARY (VET) BUSINESS

EXISTING FENCE AS SURVEYED

BOUNDARY AS SURVEYED

ON SITE DETENTION TANK 2.0m x 0.9m x 1.5m HIGH 2400 LITRE CAPACITY WITH DN30mm ORIFICE

LOCALIZED 200mm HIGH BARRIER KERB TO BRING CAR PARK UP FOR COVER FOR PIPES FROM SW 2/1. PIT

450sq ACO POLYCRETE STORMWATER PIT WITH CLASS 'B' HEELGUARD TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK

350sq ACO POLYCRETE STORMWATER PIT WITH CLASS 'B' HEELGUARD TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK

450sq ACO POLYCRETE STORMWATER PIT WITH CLASS 'B' HEELGUARD TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK

EXISTING WATER METER TO BE CAPPED AND SEALED BY TASWATER AT DEVELOPERS COST

EXISTING NEIGHBOUR GARAGE

EXISTING NEIGHBOUR DWELLING

CONNECT NEW 50 OD (40 ID) PN16 PE100 REFER: MRWA-W-107 STD. DRG. FIGURE 107-F WITH TRAFFICABLE LID REFER MRWA-W-302 FIGURE 302-B BY TASWATER AT DEVELOPERS COST

BEWARE OF UNDERGROUND SERVICES

THE LOCATION OF UNDER GROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT LOCATION SHOULD BE PROVEN ON SITE BY THE RELEVANT AUTHORITIES. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN.

THESE DRAWINGS SHALL BE APPROVED BY RELEVANT AUTHORITIES (INCL. COUNCIL & TASWATER) PRIOR TO CONSTRUCTION

## DESIGN LEVELS & GRADING PLAN

SCALE 1:100 (A1)

| REV | DESCRIPTION | DATE | APPROVAL |
|---|---|---|---|
| | | | DRAWN: TP |
| | | | CHECKED: |
| | | | DESIGN: |
| | | | CHECKED: |
| A | DEVELOPMENT APPLICATION | 31/08/2021 | CERTIFIED: |

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| | | | |
|---|---|---|---|
| PROJECT: | 11a GORDON STREET | STAGE: | |
| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET SORELL TAS | | |

| | | | |
|---|---|---|---|
| SHEET: | LAYOUT PLAN | | |
| SCALE: | | TOTAL SHEETS: 5 | SIZE: |
| PROJECT No. | 21E99-12 | SHEET: C100 | REV: A |

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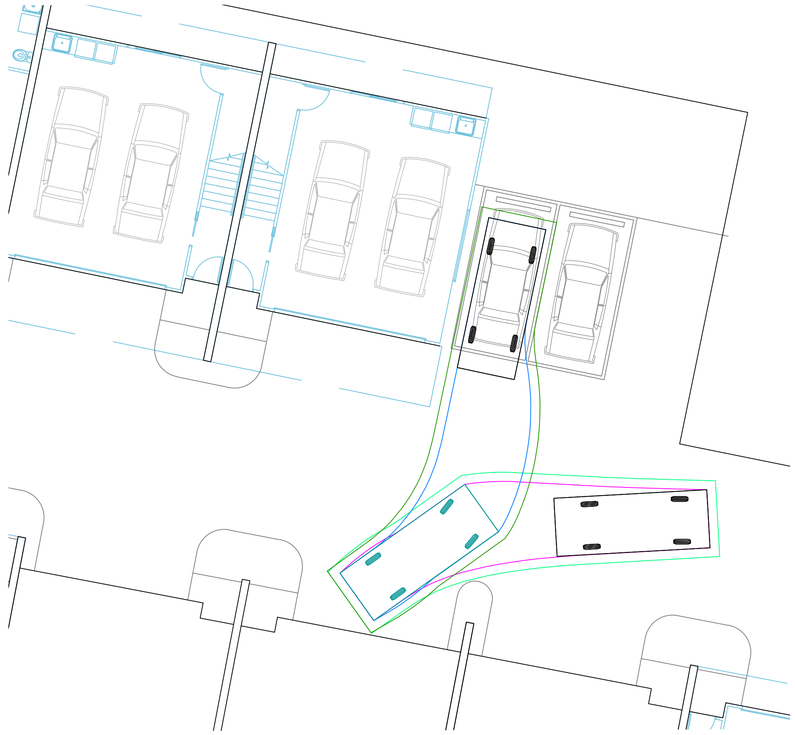



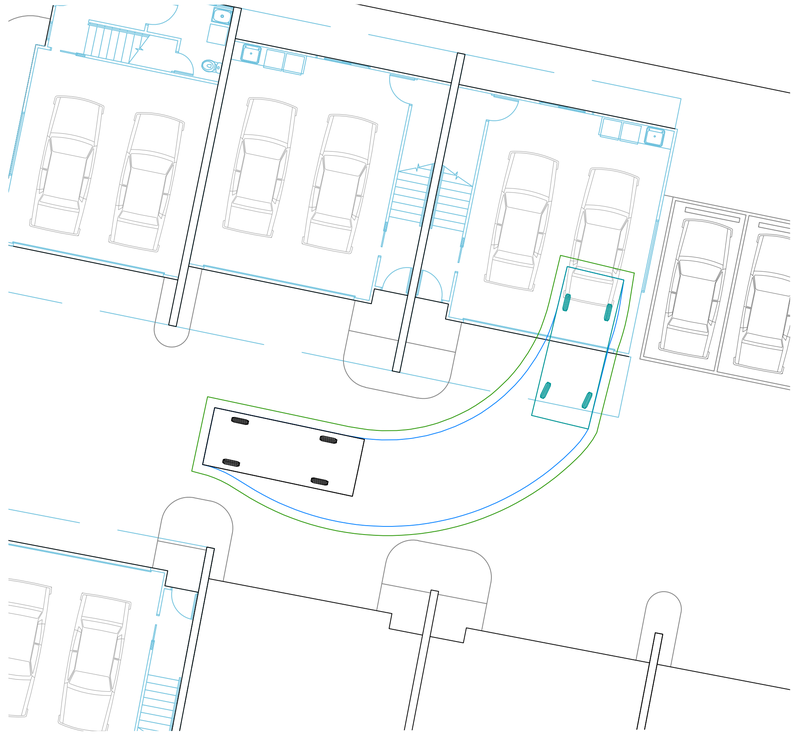

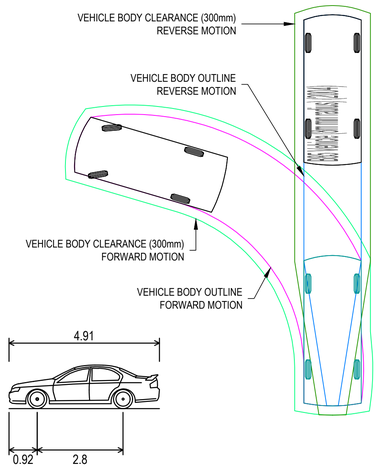


B85 Vehicle (8m min radius) (2004)

| | |
|---|---|
| Overall Length | 4.910m |
| Overall Width | 1.870m |
| Overall Body Height | 1.421m |
| Min Body Ground Clearance | 0.159m |
| Track Width | 1.770m |
| Lock-to-lock time | 4.00s |
| Curb to Curb Turning Radius | 8.000m |

## VEHICLE TURNPATH - LEGEND

SCALE 1:100 (A1)

FROM AUTOCAD CIVIL 3D VEHICLE TRACKING SOFTWARE

THESE DRAWINGS SHALL BE APPROVED BY RELEVANT AUTHORITIES (INCL. COUNCIL & TASWATER) PRIOR TO CONSTRUCTION

## VEHICLE TURNPATH

SCALE 1:100 (A1)

BEWARE OF UNDERGROUND SERVICES

THE LOCATION OF UNDER GROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT LOCATION SHOULD BE PROVEN ON SITE BY THE RELEVANT AUTHORITIES. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN.

| REV | DESCRIPTION | DATE | APPROVAL |
|---|---|---|---|
| | | | DRAWN: TP |
| | | | CHECKED: |
| | | | DESIGN: |
| | | | CHECKED: |
| A | DEVELOPMENT APPROVAL | 31/08/2021 | CERTIFIED: |

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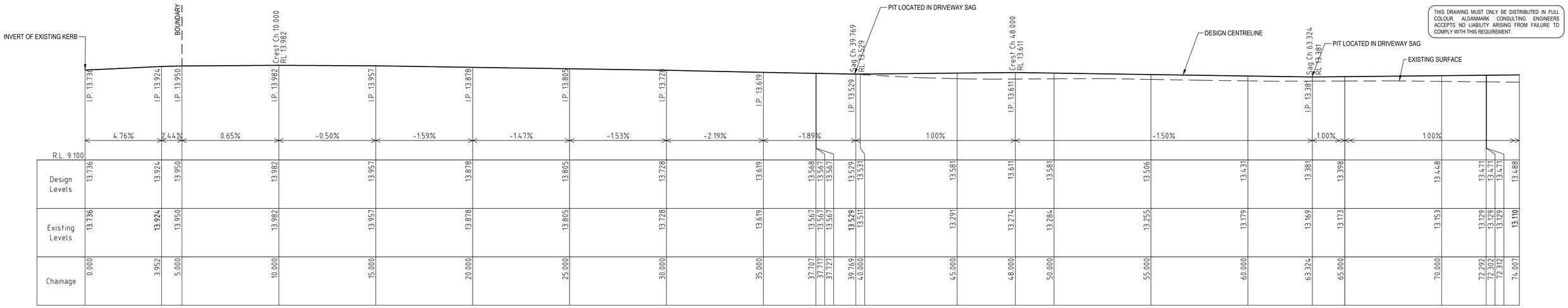
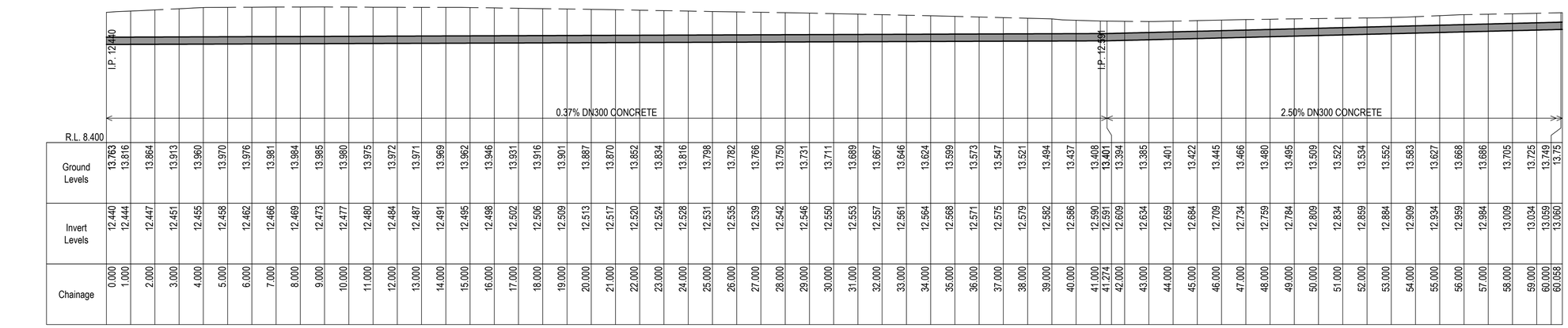
|---|---|---|---|
| PROJECT: | 11a GORDON STREET | STAGE: | |
| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET<br>SORELL<br>TAS | | |

| | | | |
|---|---|---|---|
| SHEET: | TURNPATH PLAN | | |
| SCALE: | | TOTAL SHEETS: 5 | SIZE: |
| PROJECT No. | 21E99-12 | SHEET: C103 | REV: A |



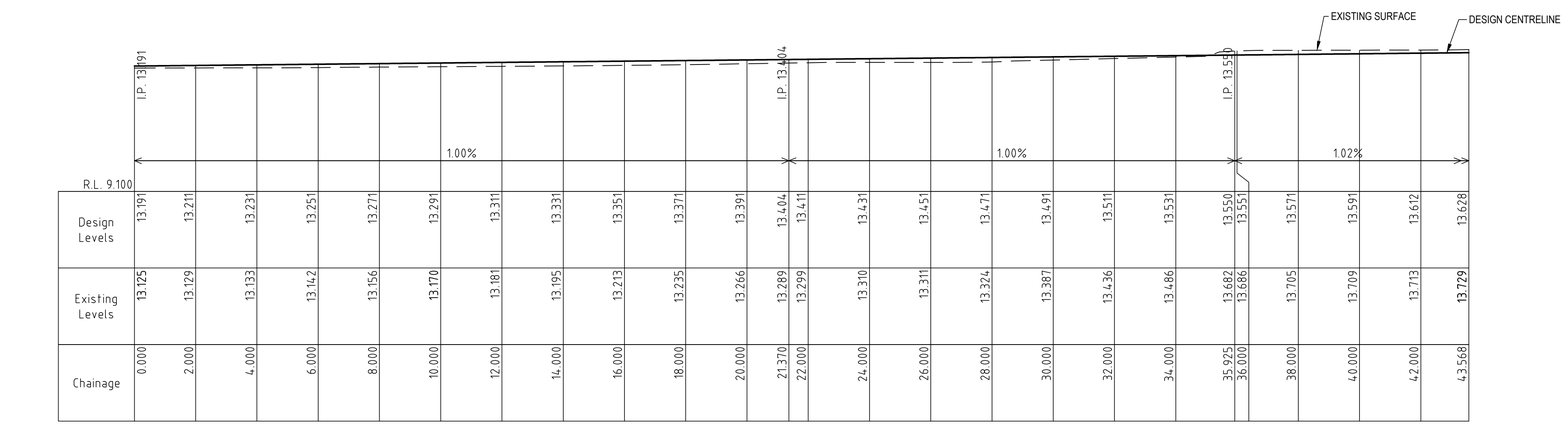

## CENTRELINE ALIGNMENT CL-1

SCALE 1:100 (A1) HORIZ
SCALE 1:100 (A1) VERT




## EXISTING STORMWATER LONG SECTION

SCALE 1:100 (A1) HORIZ
SCALE 1:100 (A1) VERT




## UNIT 1 TO 5 REAR PAVED AREA

SCALE 1:100 (A1) HORIZ
SCALE 1:100 (A1) VERT

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BEWARE OF UNDERGROUND SERVICES
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| REV | DESCRIPTION | DATE | APPROVAL | |
|---|---|---|---|---|
| | | | DRAWN: | TP |
| | | | CHECKED: | |
| | | | DESIGN: | |
| | | | CHECKED: | |
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Hobart TAS 7000
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mail@aldanmark.com.au
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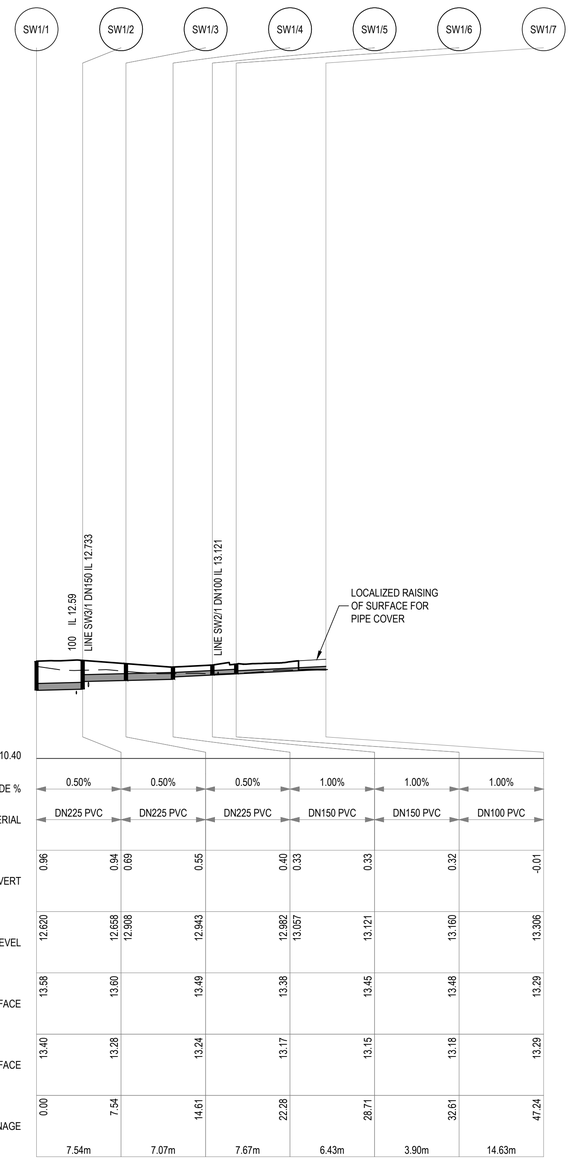
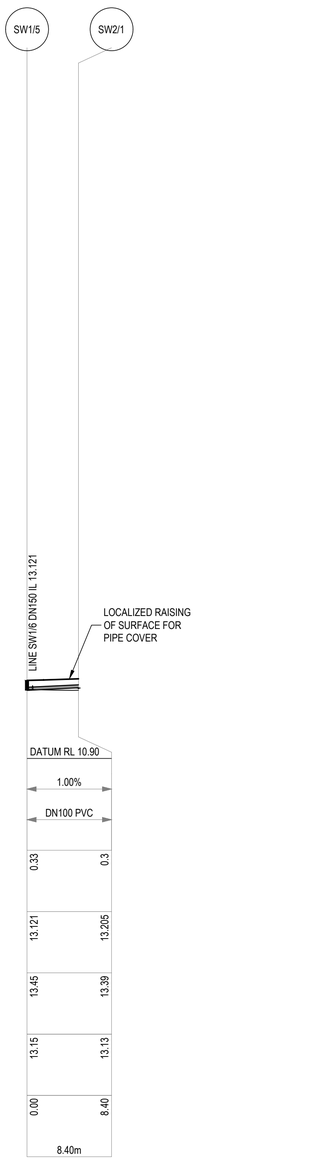
|---|---|---|---|
| PROJECT: | 11a GORDON STREET | STAGE: | |
| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET<br>SORELL<br>TAS | | |

| | | | |
|---|---|---|---|
| SHEET: | LONGSECTIONS | | |
| SCALE: | | TOTAL SHEETS: 5 | SIZE: |
| PROJECT No. | 21E99-12 | SHEET: C300 | REV: A |



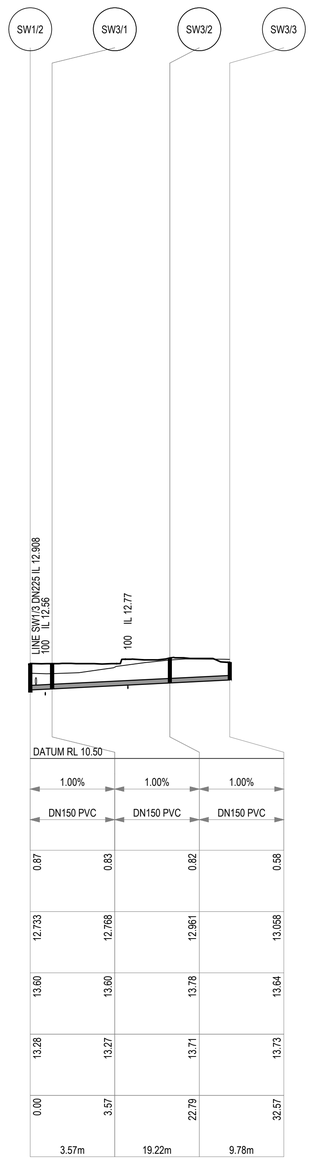

## DRAINAGE LONGITUNDINAL SECTION FOR LINE SW1

SCALE 1:500 (A1) HORIZ
SCALE 1:100 (A1) VERT



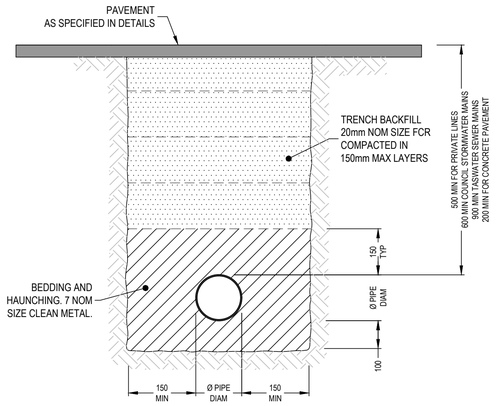

## DRAINAGE LONGITUNDINAL SECTION FOR LINE SW2

SCALE 1:500 (A1) HORIZ
SCALE 1:100 (A1) VERT



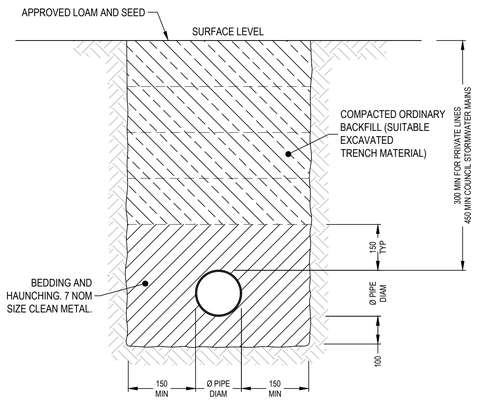

## DRAINAGE LONGITUNDINAL SECTION FOR LINE SW3

SCALE 1:500 (A1) HORIZ
SCALE 1:100 (A1) VERT




## TYPICAL CROSS SECTION - TRAFFICABLE

SCALE 1:10 (A1)




## TYPICAL CROSS SECTION - NON TRAFFICABLE STORMWATER

REFER: LGAT TSD-G02.v2

SCALE 1:10 (A1)

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| REV | DESCRIPTION | DATE | APPROVAL |
|---|---|---|---|
| | | | DRAWN: TP |
| | | | CHECKED: |
| | | | DESIGN: |
| | | | CHECKED: |
| A | DEVELOPMENT APPROVAL | 31/08/2021 | CERTIFIED: |

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| | | | |
|---|---|---|---|
| PROJECT: | 11a GORDON STREET | STAGE: | |
| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET<br>SORELL<br>TAS | | |

SHEET: PROPOSED STORMWATER DETAILS

| | | | |
|---|---|---|---|
| SCALE: AS SHOWN | TOTAL SHEETS: 5 | SIZE: A1 | |
| PROJECT No. 20E100-16 | SHEET: C400 | REV: A | |




## SUN SHADOW PLAN 1:250

9am, JUNE 21st

*shadows not shown for neighbouring residences.




## SUN SHADOW PLAN 1:250

12pm, JUNE 21st

*shadows not shown for neighbouring residences.




## SUN SHADOW PLAN 1:250

3pm, JUNE 21st

*shadows not shown for neighbouring residences.


# MATT GILLEY
BUILDING DESIGNER

PO BOX 224 LINDISFARNE TASMANIA 7015
matt.gilley@bigpond.com
0437 499 238
LICENCE No. CC5666C


PROJECT:

**UNIT DEVELOPMENT**

**No. 11A GORDON STREET**
**SORELL**

**THE YOUNG GROUP**

DATE: **SEP 2021**
PROJECT No. **1690**

ISSUE/REV:

A. DA ISSUE. 05.06.21
B. DRIVEWAY REV 09.07.21
C. UPDATE TO MATCH CIVIL. 02.09.21

TITLE:

**SUN SHADOWING**

SCALE: **1:200 (A1)**

DRAWING No:

# A08

SHEET: **8** OF 8

19th October 2021

Attn: John Molnar
Sorell Council
47 Cole Street
SORELL TAS 7172

Dear John,

**Re: Development Application No. DA 2021 / 00314 – 11A Gordon Street, Sorell**

We refer to Council's Request for Further Information dated 29th September 2021 and write in relation to Council's query in relation to the location of where wheelie bins will be placed at the street frontage for collection.

We advise that preliminary discussions have been had with Veolia and it is intended that a Veolia will be contracted to provide ongoing rubbish removal service to 11A Gordon Street, Sorell.

Large communal rubbish and recycling bins will be provided and stored within the strata complex and bins will remain within the strata complex for rubbish collections.

Wheelie bins will not need to be placed at the street frontage for collection.

As a Waste Management Plan is yet to be finalised, we ask that Council consider including a condition within the planning permit which requires a Waste Management Plan to be submitted to Council for approval prior to the issue of Building Approval. This will ensure that a Waste Management Plan has been established prior to construction.

Should you have any queries or require any further information in relation to this matter, please do not hesitate to contact the undersigned.

Yours faithfully,

Claire Tucker

Project Coordinator

# CIVIL DRAWINGS
# THE YOUNG GROUP
# 11a GORDON STREET
# SORELL

| | | | |
|---|---|---|---|
| C001 | COVER SHEET | B | 15/10/2021 |
| C100 | LAYOUT PLAN | B | 15/10/2021 |
| C102 | SEWER AND WATER PLAN | A | 21/07/2021 |
| C103 | TURNPATH PLAN | A | 21/07/2021 |
| C300 | LONGSECTION | A | 21/07/2021 |
| C301 | PROPOSED SEWER | A | 21/07/2021 |
| C400 | PROPOSED STORMWATER DETAILS | A | 21/07/2021 |

| REV | DESCRIPTION | DATE | APPROVAL | |
|---|---|---|---|---|
| | | | DRAWN: | TP |
| | | | CHECKED: | |
| | | | DESIGN: | |
| B | DEVELOPMENT APPROVAL | 15/10/2021 | CHECKED: | |
| A | DEVELOPMENT APPROVAL | 21/07/2021 | CERTIFIED: | |

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Lower Ground
199 Macquarie Street
Hobart TAS 7000
03 6234 8666
mail@aldanmark.com.au
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| | | | |
|---|---|---|---|
| PROJECT: | THE YOUNG GROUP | STAGE: | |
| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET<br>SORELL<br>TAS 7172 | | |

| | | | |
|---|---|---|---|
| SHEET: | COVER SHEET | | |
| SCALE: | | TOTAL SHEETS: 7 | SIZE: |
| PROJECT No. | 21E99-12 | SHEET: C001 | REV: |

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## LEGEND

| | | | |
|---|---|---|---|
| NEW WATER | W | PERVIOUS AREA | |
| NEW DN100 SEWER AT 1.75% | S | PAVED AREA | |
| NEW DN150 STORMWATER AT 1% | SW | EXISTING EASEMENT | |
| NEW RAIN WATER CHARGED | RWC | NO PARKING AREA | |
| EXISTING WATER MAIN | ex W | PROPOSED DRIVEWAY | |
| EXISTING DN150 SEWER | EX S | | |
| EXISTING COUNCIL DN300 SW | EX SWD | | |
| WATER VALVE | | | |
| FIRE HYDRANT | | | |
| WATER METER | | | |

*INTERNAL HYDRAULICS BY OTHERS

GROUND FINISHED SURFACE HEIGHT RAISED IN THIS AREA FOR STORMWATER MINIMUM PIPE COVER.

450sq ACO POLYCRETE STORMWATER PIT WITH CLASS 'B' HEELGUARD TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK

EXISTING NEIGHBOUR SHED

EXISTING TASWATER DN150 SEWER MAIN AS PER SURVEYOR

EXISTING EASEMENT

ON SITE DETENTION TANK 2.0m x 0.9m x 1.5m HIGH 2400 LITRE CAPACITY WITH DN30mm ORIFICE

PROPOSED UNIT 8 FFL 13.55

PROPOSED UNIT 7 FFL 13.55

PROPOSED UNIT 6 FFL 13.55

CAR PARK 6 VISITOR

CAR PARK 5 VET

EXISTING BITUMEN CAR PARK

EXISTING BUSINESS

EXISTING PIPELINE EASEMENT OVER ADJACENT PROPERTY TO BE REMOVED

CONNECT TO EXISTING PRIVATE SEWER FROM VET AND BRING IO TO SURFACE

450sq ACO POLYCRETE STORMWATER PITS WITH CLASS 'B' TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK DRAINAGE LOCATED AT GRADED SAG. REFER LONG SECTIONS PROVIDED

SPEL HYDROSYSTEM SHS.400.H.1.100 PVC REFER TO DRAWING SP20-HY-12420-S

PROVIDE 50mm STEP AT GARAGE ENTRANCE TYP.

CAR PARK 7 VISITOR

PROPOSED UNIT 5 FFL 13.50

PROPOSED UNIT 4 FFL 13.50

PROPOSED UNIT 3 FFL 13.65

PROPOSED UNIT 2 FFL 13.65

PROPOSED UNIT 1 FFL 13.80

CAR PARK 4 VET

CAR PARK 3 VET

CAR PARK 2 VET

CAR PARK 1 VET

EXISTING VETERINARY (VET) BUSINESS

EXISTING RPZD FOR BUSINESS (VET)

EXISTING NEIGHBOUR GARAGE

EXISTING NEIGHBOUR DWELLING

EXISTING BITUMEN DRIVEWAY

CENTERELINE ALIGNMENT CL-1

DRIVEWAY TO WIDENED FROM 5.0m TO 6.0m

CARPARKING SPACE, ASSOCIATED SIGNAGE AND LINE MARKING TO BE MOVED 1.0m MIN. FINAL LOCATION TO BE ADVISED BY SORELL COUNCIL

LIGHT POLE TO BE RELOCATED OUT OF DRIVEWAY EXTENTS. DETAILED DESIGN TO BE COMPLETED BY TASNETWORKS APPROVED DESIGNER PRIOR TO BUILDING APPROVAL

PROVIDE DN40 WATER METER AS PER TWS-W-0002 SHEET 11 OF 19 REV. 5 WITH DN50 (ID 40mm) HDPE PN16 SDR11 OFFTAKE BY TASWATER AT DEVELOPERS COST

PROVIDE 8No. DN20 WATER METER IN NON TRAFFICABLE LID REFER: TASWATER TWS-W-0002 SHEET 6 of 19 REV 5

PROVIDE DN20 WATER METER ABOVE GROUND CONNECT INTO EXISTING VETERINARY BUSINESS REFER: TASWATER TWS-W-0002 SHEET 01 of 19 REV 5

EXISTING WATER METER TO BE CAPPED AND SEALED BY TASWATER AT DEVELOPERS COST

CONNECT NEW 50 OD (40 ID) PN16 PE100 REFER: MRWA-W-107 STD. DRG. FIGURE 107-F WITH TRAFFICABLE LID REFER MRWA-W-302 FIGURE 302-B BY TASWATER AT DEVELOPERS COST

GORDON STREET

EXISTING FENCE AS SURVEYED

BOUNDARY AS SURVEYED

LOCALIZED 200mm HIGH BARRIER KERB TO BRING CAR PARK UP FOR COVER FOR PIPES FROM SW 2/1. PIT

450sq ACO POLYCRETE STORMWATER PIT WITH CLASS 'B' HEELGUARD TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK

ON SITE DETENTION TANK 2.0m x 0.9m x 1.5m HIGH 2400 LITRE CAPACITY WITH DN30mm ORIFICE

350sq ACO POLYCRETE STORMWATER PIT WITH CLASS 'B' HEELGUARD TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK

450sq ACO POLYCRETE STORMWATER PIT WITH CLASS 'B' HEELGUARD TRAFFICABLE GRATE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS WITH SPEL STORMSACK

THESE DRAWINGS SHALL BE APPROVED BY RELEVANT AUTHORITIES (INCL. COUNCIL & TASWATER) PRIOR TO CONSTRUCTION

BEWARE OF UNDERGROUND SERVICES

THE LOCATION OF UNDER GROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT LOCATION SHOULD BE PROVEN ON SITE BY THE RELEVANT AUTHORITIES. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN.

## DESIGN LEVELS & GRADING PLAN

SCALE 1:100 (A1)

| REV | DESCRIPTION | DATE | APPROVAL | |
|---|---|---|---|---|
| | | | DRAWN: | TP |
| | | | CHECKED: | |
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|---|---|---|---|
| PROJECT: | THE YOUNG GROUP | STAGE: | |
| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET SORELL TAS 7172 | | |

| | | | |
|---|---|---|---|
| SHEET: | LAYOUT PLAN | | |
| SCALE: | | TOTAL SHEETS: 7 | SIZE: |
| PROJECT No. | 21E99-12 | SHEET: C100 | REV: |

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I.L. 12.252 - EXISTING SEWER HCD
AS PER DRAWING BY MATT GILLEY BUILDING DESIGNER , PROJECT 1690 REV. B.
DATED 09 July 2021

PROPOSED UNIT 8 FFL 13.55
PROPOSED UNIT 7 FFL 13.55
PROPOSED UNIT 6 FFL 13.55
PROPOSED UNIT 5 FFL 13.50
PROPOSED UNIT 4 FFL 13.50
PROPOSED UNIT 3 FFL 13.65
PROPOSED UNIT 2 FFL 13.65
PROPOSED UNIT 1 FFL 13.80

CH_74 CH_60 CH_40 CH_20 CH_0

EX S EX SWD EX W ex w

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SCALE 1:100 (A1)

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PROJECT: THE YOUNG GROUP
CLIENT: THE YOUNG GROUP
ADDRESS: 11a GORDON STREET SORELL TAS 7172
STAGE:
ISSUE:
0 .05 .1 .15 .2 .25 .3 .35 .4 .45 .5m

SHEET: SEWER AND WATER PLAN
SCALE:
TOTAL SHEETS: 7
SIZE:
PROJECT No. 21E99-12
SHEET: C102
REV:

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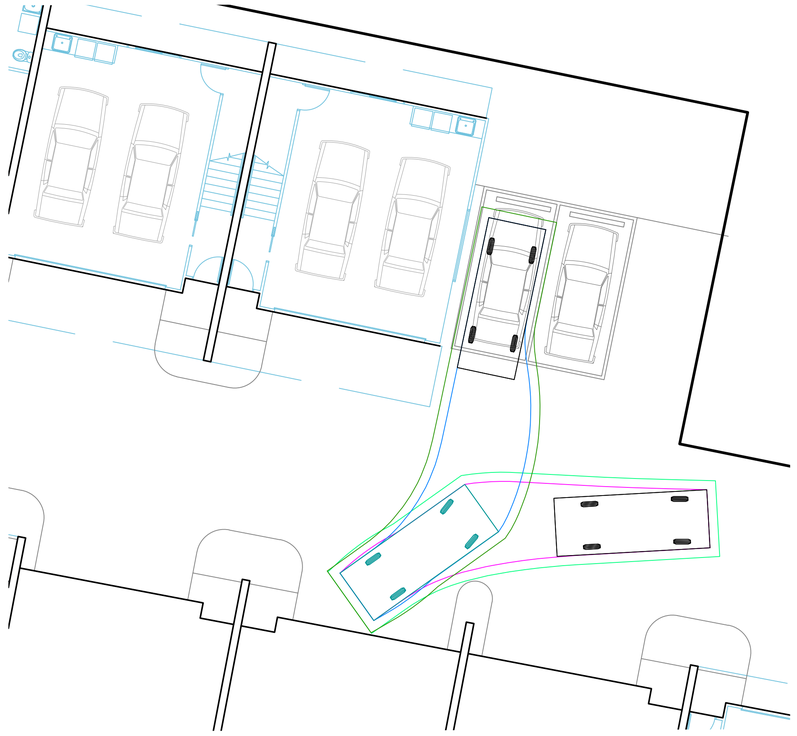



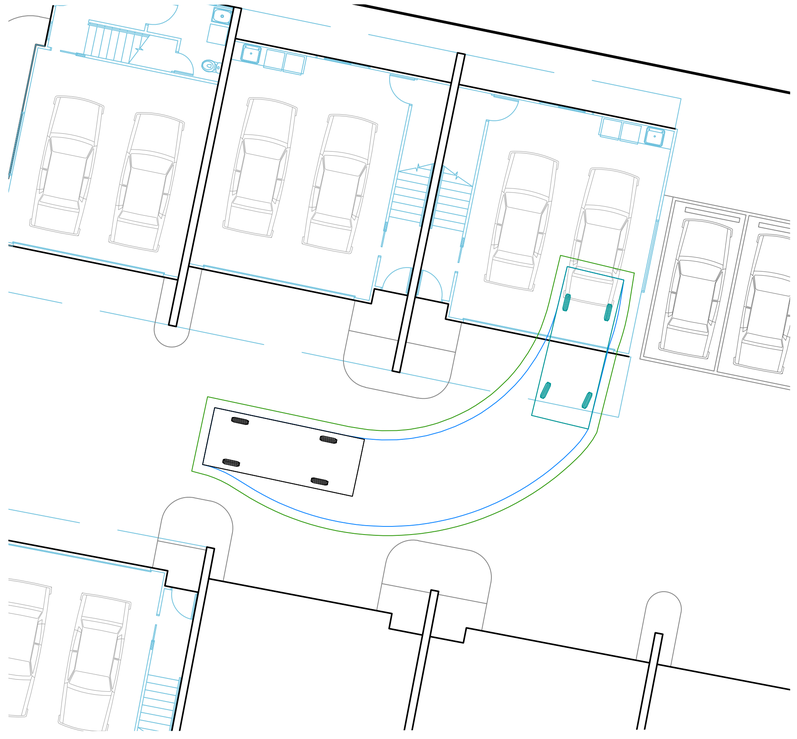

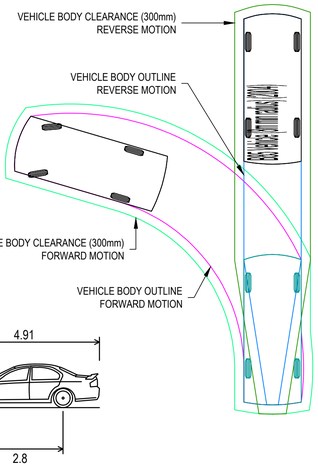


B85 Vehicle (8m min radius) (2004)

| | |
|---|---|
| Overall Length | 4.910m |
| Overall Width | 1.870m |
| Overall Body Height | 1.421m |
| Min Body Ground Clearance | 0.159m |
| Track Width | 1.770m |
| Lock-to-lock time | 4.00s |
| Curb to Curb Turning Radius | 8.000m |

## VEHICLE TURNPATH - LEGEND

SCALE 1:100 (A1)

FROM AUTOCAD CIVIL 3D VEHICLE TRACKING SOFTWARE

THESE DRAWINGS SHALL BE APPROVED BY RELEVANT AUTHORITIES (INCL. COUNCIL & TASWATER) PRIOR TO CONSTRUCTION

## VEHICLE TURNPATH

SCALE 1:100 (A1)

BEWARE OF UNDERGROUND SERVICES
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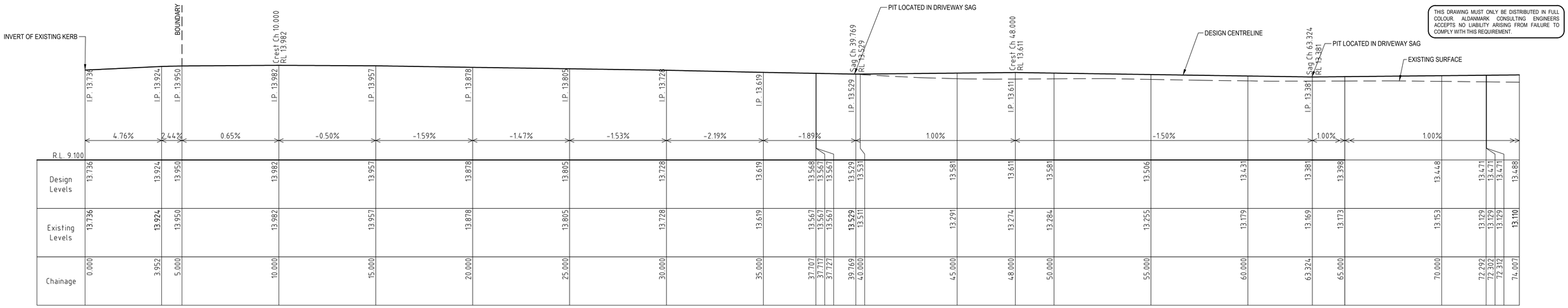
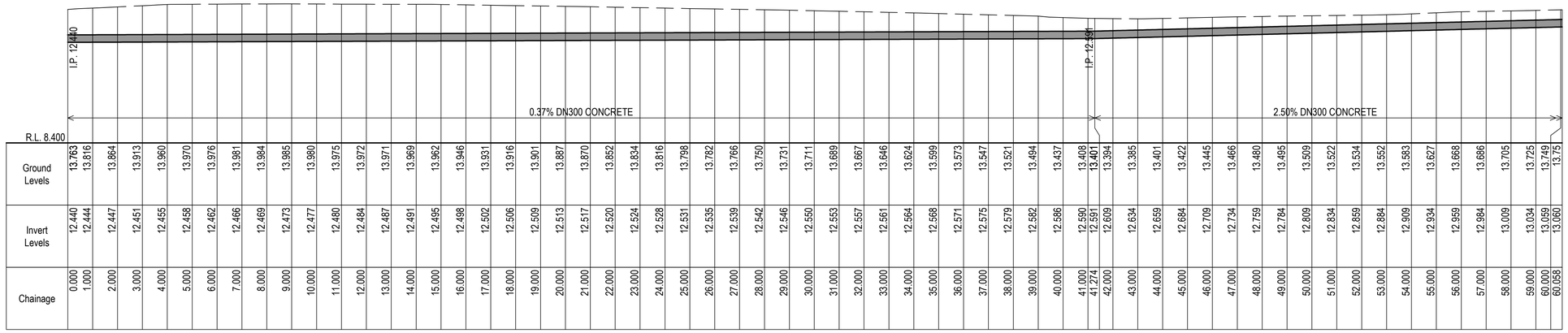
|---|---|---|---|
| PROJECT: | THE YOUNG GROUP | STAGE: | SHEET: TURNPATH PLAN |
| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET<br>SORELL<br>TAS 7172 | | SCALE: / TOTAL SHEETS: 7 / SIZE: |
| | | | PROJECT No. 21E99-12 / SHEET: C103 / REV: |



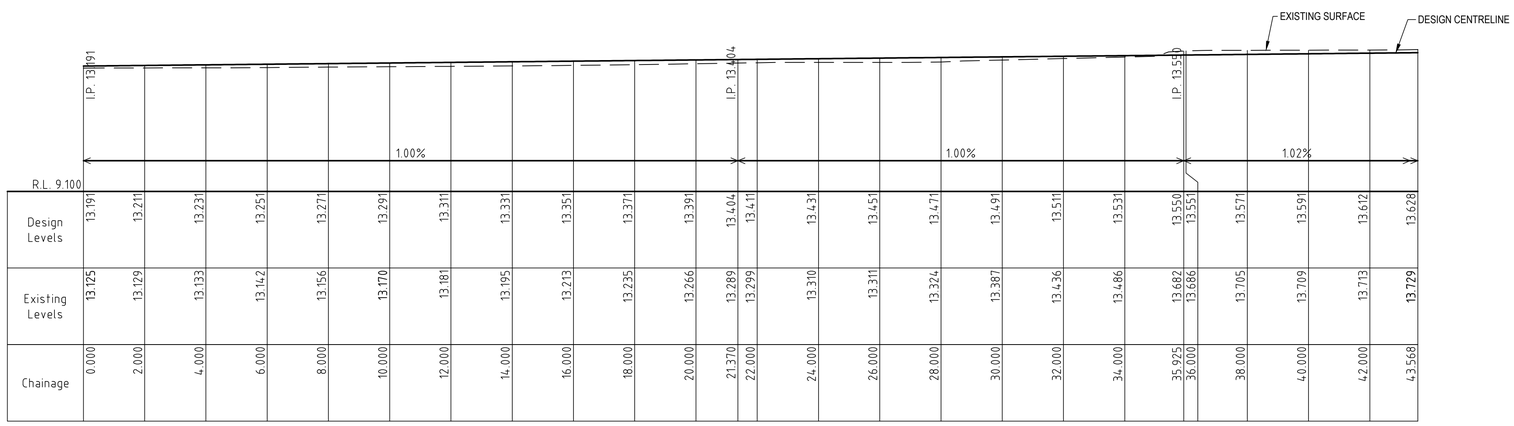

## CENTRELINE ALIGNMENT CL-1

SCALE 1:100 (A1) HORIZ
SCALE 1:100 (A1) VERT




## EXISTING STORMWATER LONG SECTION

SCALE 1:100 (A1) HORIZ
SCALE 1:100 (A1) VERT




## UNIT 1 TO 5 REAR PAVED AREA

SCALE 1:100 (A1) HORIZ
SCALE 1:100 (A1) VERT

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| | | | |
|---|---|---|---|
| PROJECT: THE YOUNG GROUP | STAGE: | SHEET: LONGSECTIONS | |
| CLIENT: THE YOUNG GROUP | ISSUE: | | |
| ADDRESS: 11a GORDON STREET SORELL TAS 7172 | | SCALE: | TOTAL SHEETS: 7 / SIZE: |
| | | PROJECT No. 21E99-12 | SHEET: C300 / REV: |

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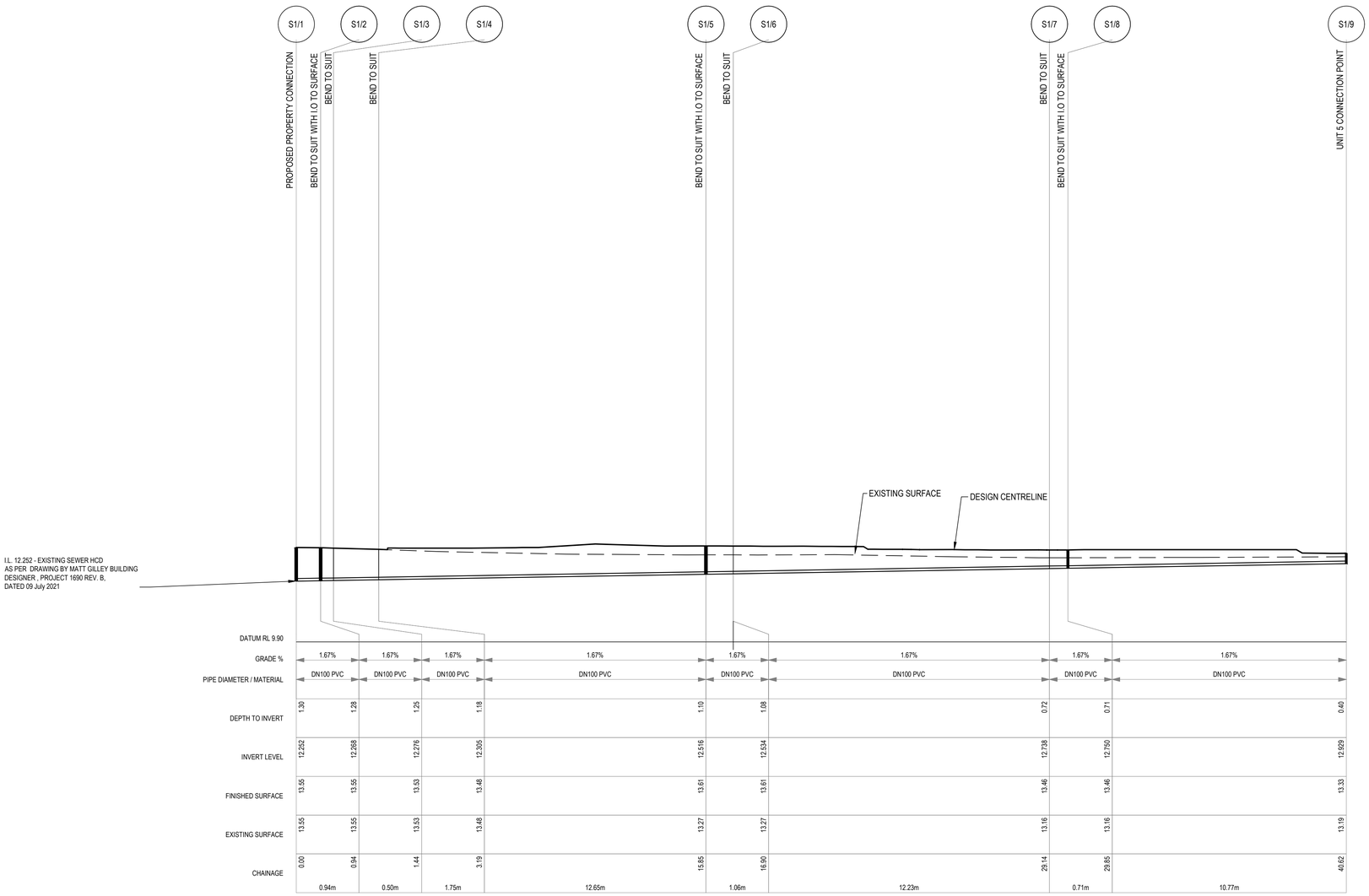


## PROPOSED SEWER LONG SECTION

SCALE 1:100 (A1) HORIZ
SCALE 1:100 (A1) VERT

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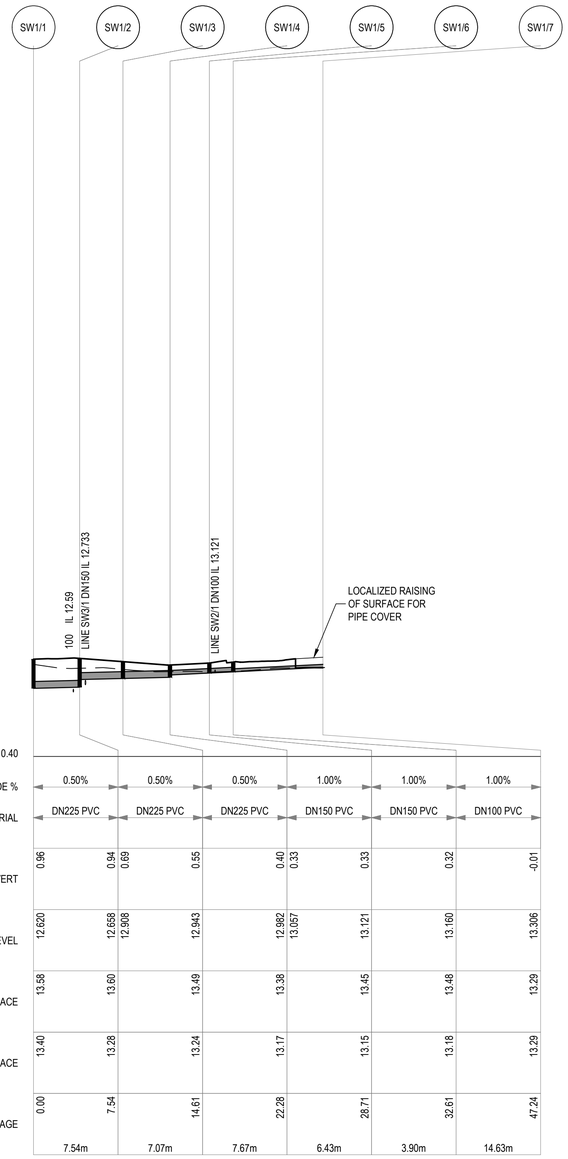
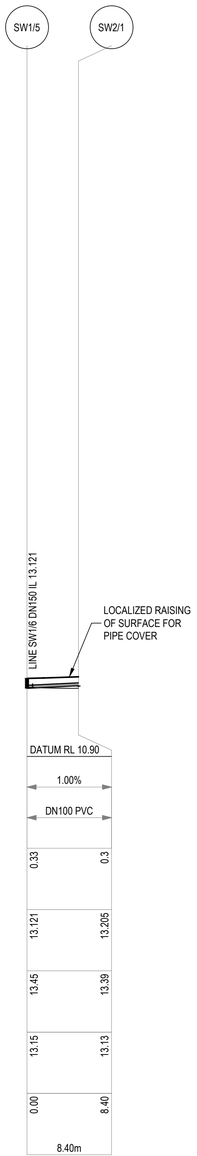
|---|---|---|---|
| PROJECT: | THE YOUNG GROUP | STAGE: | SHEET: PROPOSED SEWER |
| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET<br>SORELL<br>TAS 7172 | | SCALE: / TOTAL SHEETS: 7 / SIZE: |
| | | | PROJECT No. 21E99-12 / SHEET: C301 / REV: |



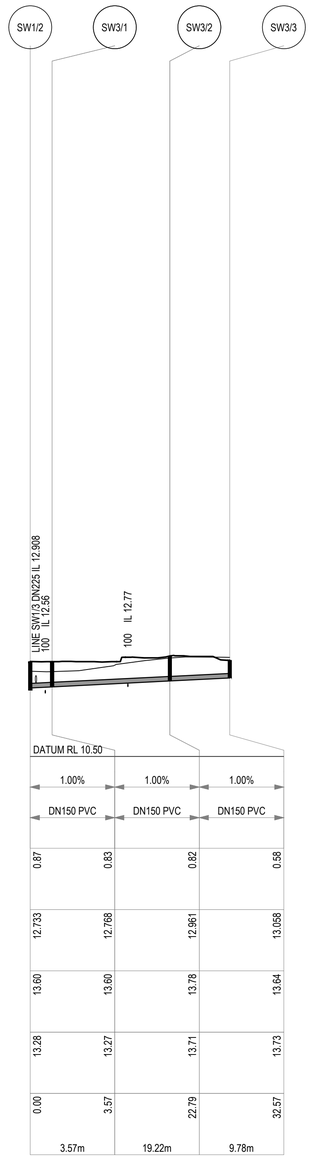

## DRAINAGE LONGITUNDINAL SECTION FOR LINE SW1

SCALE 1:500 (A1) HORIZ
SCALE 1:100 (A1) VERT



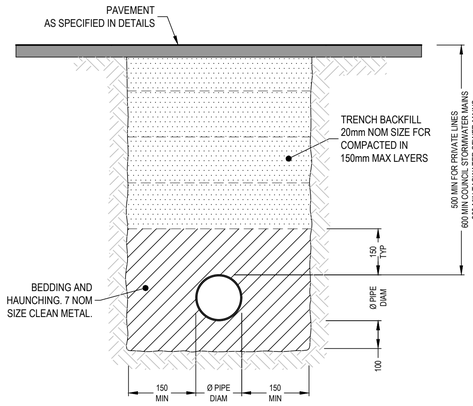

## DRAINAGE LONGITUNDINAL SECTION FOR LINE SW2

SCALE 1:500 (A1) HORIZ
SCALE 1:100 (A1) VERT



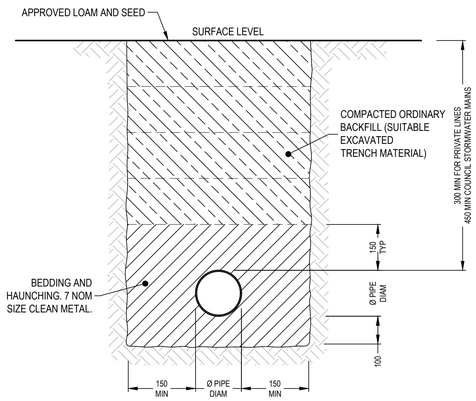

## DRAINAGE LONGITUNDINAL SECTION FOR LINE SW3

SCALE 1:500 (A1) HORIZ
SCALE 1:100 (A1) VERT




## TYPICAL CROSS SECTION - TRAFFICABLE

SCALE 1:10 (A1)




## TYPICAL CROSS SECTION - NON TRAFFICABLE STORMWATER

REFER: LGAT TSD-G02.v2

SCALE 1:10 (A1)

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| CLIENT: | THE YOUNG GROUP | ISSUE: | |
| ADDRESS: | 11a GORDON STREET SORELL TAS 7172 | | |

SHEET: PROPOSED STORMWATER DETAILS

| | | | |
|---|---|---|---|
| SCALE: | TOTAL SHEETS: 7 | SIZE: | |
| PROJECT No. 21E99-12 | SHEET: C400 | REV: | |




## LOCATION PLAN

GENERAL RESIDENTIAL ZONE

BOUNDARY 15.64m

BOUNDARY 10.05m

BOUNDARY 11.32m

BOUNDARY 23.89m

BOUNDARY 24.85m

BOUNDARY 10.40m

BOUNDARY 17.45m

BOUNDARY 6.59m

BOUNDARY 11.05m

BOUNDARY 17.84m

BOUNDARY 36.64m

BOUNDARY 17.04m

EXISTING SHED

ex. SEWER M/H

ex. Ø150 CONC. SEWER

ex. S/W PIT
TOP 13.783
I.L. 13.123

EX. SEWER HCD
I.L. 12.252

DRAINAGE EASEMENT "B"

DRAINAGE EASEMENT "A"

SPIKE:
RL 13.30

SPIKE:
RL 13.17

SPIKE:
RL 13.70

OLD REF. MARK:
RL 13.41

OLD REF. MARK:
RL 13.70

OLD REF. MARK:
RL 14.97

OLD REF. MARK:
RL 14.00

OLD REF. MARK:
RL 14.36

REMOVE EXISTING
VEGETATION & TREES.

REMOVE EXISTING
METAL GATE.

REMOVE PART OF EXISTING
POST & WIRE FENCING BACK
TO CORNER BOUNDARY.

REMOVE PART OF EXISTING
POST & WIRE FENCING.

REMOVE EXISTING
VEGETATION.

DEMOLISH EX. SHED.

EXISTING GRASS AREA

EXISTING
BITUMEN SEALED
CAR PARKING AREA

EXISTING
BITUMEN SEALED
CAR PARKING AREA

CAR 1
CAR 2
CAR 3
CAR 4
CAR 5
CAR 6

EXISTING GARAGE

C.T. 113390/1
No. 11

EXISTING BUSINESS
"JOHN HYLAND ACCOUNTANT"
FFL 13.99

C.T. 127636/1
No. 11a

EXISTING BUSINESS
"SORELL VETERINARY CENTRE"
FFL 14.15

EXISTING BUSINESS
"HEARING AUSTRALIA"

RIGHT OF WAY & DRAINAGE EASEMENT "C"
(existing bitumen driveway surface)

ex. STORMWATER DRAIN

ex. STORMWATER DRAIN

I.L. 12.71

ex. S/W PIT
TOP 13.34

I.L. 12.68

ex. S/W PIT
TOP 13.732
I.L. 12.292

ex. paling fence

ex. paling fence

ex. TREE

ex. sign

ex. sign

LIGHT POLE

TELSTRA PIT
RL 13.90

TELSTRA PIT
RL 13.89

TELSTRA PIT
RL 13.80

TELSTRA PIT
RL 13.97

ex. vehicle cross-over

ex. shelter box

ex. bench seat

WATER
METER
RL 14.15

EX. CONCRETE RAMP

GORDON STREET

## EXISTING SITE PLAN 1:100


MATT GILLEY
BUILDING DESIGNER

PO BOX 224 LINDISFARNE TASMANIA 7015
matt.gilley@bigpond.com
0437 499 238
LICENCE No. CC5666C


PROJECT:

**UNIT DEVELOPMENT**

**No. 11A GORDON STREET**
**SORELL**

**THE YOUNG GROUP**

DATE: **SEP 2021**
PROJECT No. **1690**

ISSUE/REV:

A. DA ISSUE. 05.06.21
B. UPDATE TO MATCH CIVIL. 02.09.21

TITLE:

**EXISTING SITE PLAN**

SCALE: **1:100 (A1)**

DRAWING No:

**A01**

SHEET: **1** OF 8

## LANDSCAPING SCHEDULE

| SYMBOL | NAME | SIZE (h x w) | QUANTITY | EXAMPLE IMAGE |
|---|---|---|---|---|
| SA | SYZYGIUM AUSTALE (lilly pilly) | 6.0m H x 3.0m W | 16No. |  |
| PL | POA LABILLARDIEREI (common tussock grass) | 0.8m H x 0.8m W | 51No. |  |
| DM | DIPLARRENA MORAEA (white flag iris) | 0.8m H x 0.6m W | 19No. |  |
| LL | LOMANDRA LONGIFOLIA (tanika) | 0.6m H x 1.0m W | 52No. |  |

- STRIP TOP SOIL OF EXISTING WEEDS AND GRASS COVER.
- INSTALL NEW TOP SOIL WHERE NECESSARY, AND NEW GARDEN DRIP SYSTEM (with fitted timer device) TO ALL NEW LANDSCAPED AREAS.
- MULCHING SHALL BE PROVIDED TO ALL GARDEN BEDS. BUILDER TO CONFIRM TYPE TO BE USED. PROVIDE 75 - 100mm LAYER FOR ORGANIC TYPE or 50mm LAYER IF PEBBLES ARE USED.
- PROVIDE TREE GUARDS (nom. 500mm high) TO PROTECT YOUNG PLANTS UNTIL ESTABLISHED. MINIMUM 3No. TREATED PINE STAKES (driven into ground), PLASTIC or GEO-FABRIC SURROUND.
- REGULAR WEEDING & FERTILIZING SHOULD BE CARRIED OUT.

## SITE COVERAGE (as per the Sorell Interim Planning Scheme 2015)

EXISTING BUSINESS "SORELL VETERINARY CENTRE" - 144.98m²

PROPOSED UNITS 1 to 5 (overall footprint) - 328.18m²

PROPOSED UNITS 6 to 8 (overall footprint) - 233.34m²

TOTAL - 706.50m²

SITE AREA - 1 727m²

**TOTAL SITE COVERAGE - 40.91%**

SITE IS LOCATED WITHIN THE FOLLOWING ZONES OF THE SORELL INTERIM PLANNING SCHEME 2015:-

- 21.0 GENERAL BUSINESS ZONE.

6.7.5 LAYOUT OF PARKING AREAS

THE LAYOUT OF CAR PARKING SPACES, ACCESS AISLES, CIRCULATION ROADWAYS AND RAMPS MUST BE DESIGNED AND CONSTRUCTED TO COMPLY WITH SECTION 2 "DESIGN OF PARKING MODULES, CIRCULATION ROADWAYS AND RAMPS" OF AS/NZS 2890.1:2004 PARKING FACILITIES PART 1: OFF-STREET CAR PARKING AND MUST HAVE SUFFICIENT HEADROOM TO COMPLY WITH CLAUSE 5.3 "HEADROOM" OF THE SAME STANDARD.

6.7.7 LIGHTING OF PARKING AREAS

PARKING AND VEHICLE CIRCULATION ROADWAYS AND PEDESTRIAN PATHS SERVING 5 OR MORE CAR PARKING SPACES, USED OUTSIDE DAYLIGHT HOURS, MUST BE PROVIDED WITH LIGHTING IN ACCORDANCE WITH CLAUSE 3.1 "BASIS OF DESIGN" AND CLAUSE 3.6 "CAR PARKS" IN AS/NZS 1158.3.1:2005 LIGHTING FOR ROADS AND PUBLIC SPACES PART 3.1: PEDESTRIAN AREA (CATEGORY P) LIGHTING.

BL — BOLLARD LIGHTING.

WML — WALL MOUNTED LIGHTING.

E6.7.8 LANDSCAPING OF PARKING AREAS

LANDSCAPING OF PARKING AND CIRCULATION AREAS MUST BE PROVIDED WHERE MORE THAN FIVE(5) CAR PARKING SPACES ARE PROPOSED. THIS LANDSCAPING MUST BE NO LESS THAN 5% OF THE AREA OF THE CAR PARK, EXCEPT IN THE CENTRAL BUSINESS ZONE WHERE NO LANDSCAPING IS REQUIRED.


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PROJECT:

**UNIT DEVELOPMENT**

**No. 11A GORDON STREET**
**SORELL**

**THE YOUNG GROUP**

DATE: **SEP 2021**
PROJECT No. **1690**

ISSUE/REV:

A. PRELIMINARY ISSUE. 28.03.21
B. PLAN REVISIONS. 10.04.21
C. PLAN REVISIONS. 16.04.21
D. PLAN REVISIONS. 22.04.21
E. PRELIMINARY ISSUE. 04.05.21
F. PRELIMINARY ISSUE. 01.06.21
G. DA ISSUE. 05.06.21
H. DRIVEWAY REV 09.07.21
J. UPDATE TO MATCH CIVIL. 02.09.21
K. STAGING PLAN ADDED. 16.09.21
L. LANDSCAPE KEY ADDED. 30.09.21

TITLE:

**GROUND FLOOR PLAN**

SCALE: **1:100 (A1)**

DRAWING No:

**A02**

SHEET: **2** OF 8

## SITE PLAN (GROUND FLOOR) 1:100




SITE PLAN (FIRST FLOOR) 1:100




STAGING PLAN (NOT TO SCALE)


MATT GILLEY
BUILDING DESIGNER

PO BOX 224 LINDISFARNE TASMANIA 7015
matt.gilley@bigpond.com
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LICENCE No. CC5666C


PROJECT:

**UNIT DEVELOPMENT**

**No. 11A GORDON STREET**
**SORELL**

**THE YOUNG GROUP**

DATE: **SEP 2021**
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F. PRELIMINARY ISSUE. 01.06.21
G. DA ISSUE. 05.06.21
H. UPDATE TO MATCH CIVIL. 02.09.21

TITLE:

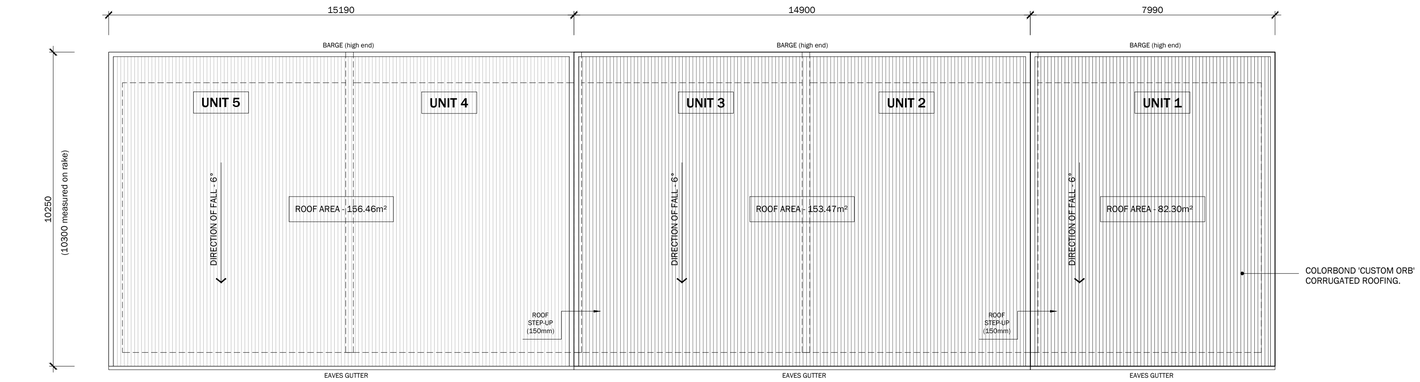
**FIRST FLOOR PLAN**

SCALE: **1:100 (A1)**

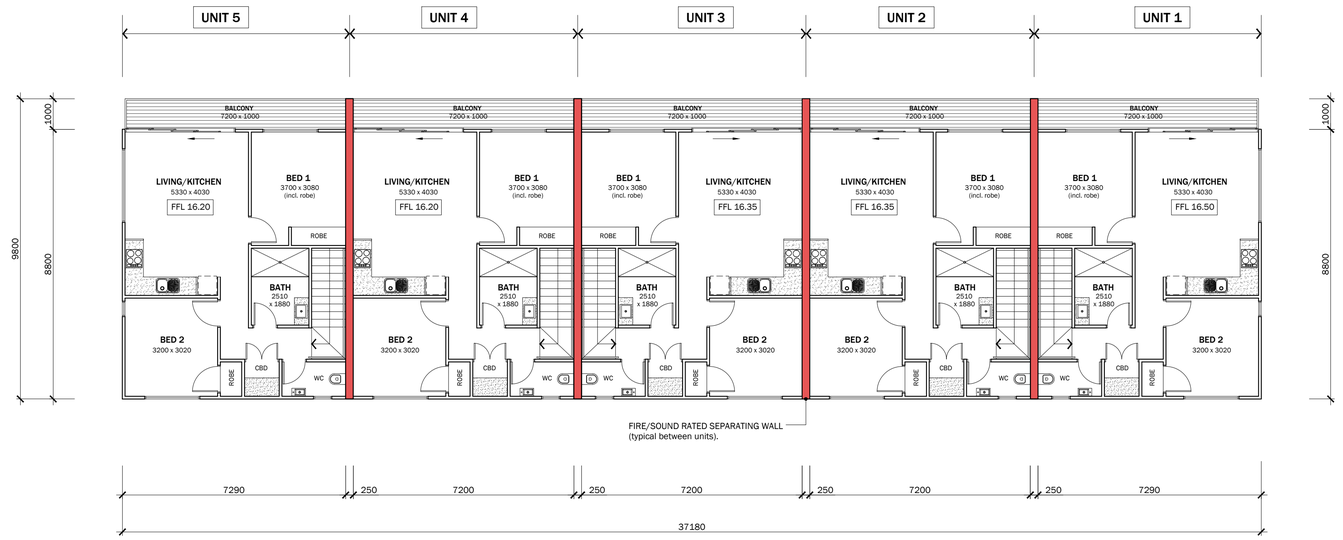
DRAWING No:

# A03

SHEET: **3** OF 8

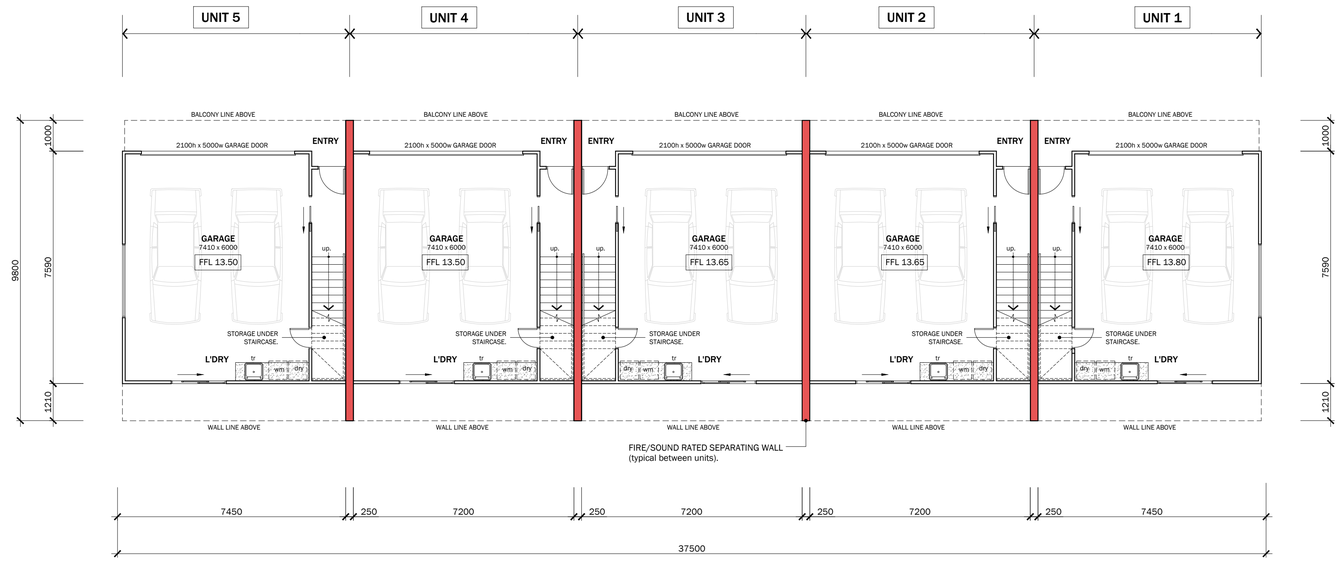



## ROOF PLAN 1:100




## FIRST FLOOR PLAN 1:100

UNITS 1 to 5 - 66.00m² EACH




## GROUND FLOOR PLAN 1:100

UNITS 1 to 5 - 54.77m² EACH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PO BOX 224 LINDISFARNE TASMANIA 7015
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PROJECT:

**UNIT DEVELOPMENT**

**No. 11A GORDON STREET SORELL**

**THE YOUNG GROUP**

DATE: **SEP 2021**

PROJECT No. **1690**

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B. PRELIMINARY ISSUE 04.05.21
C. PRELIMINARY ISSUE 01.06.21
D. DA ISSUE. 05.06.21
E. UPDATE TO MATCH CIVIL. 02.09.21

TITLE:

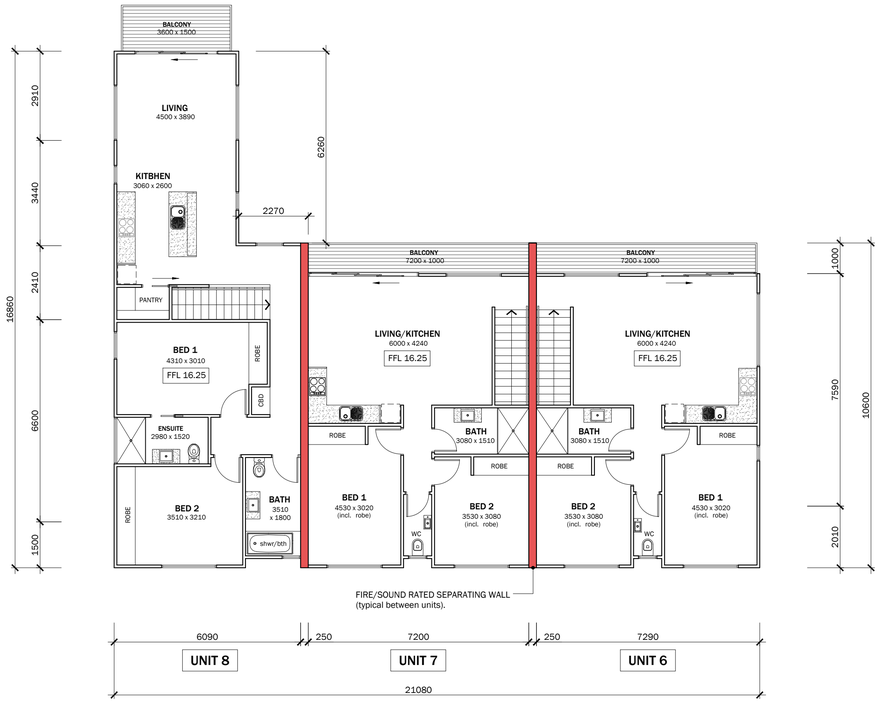
**FLOOR PLANS UNITS 1 - 5**

SCALE: **1:100 (A1)**

DRAWING No:

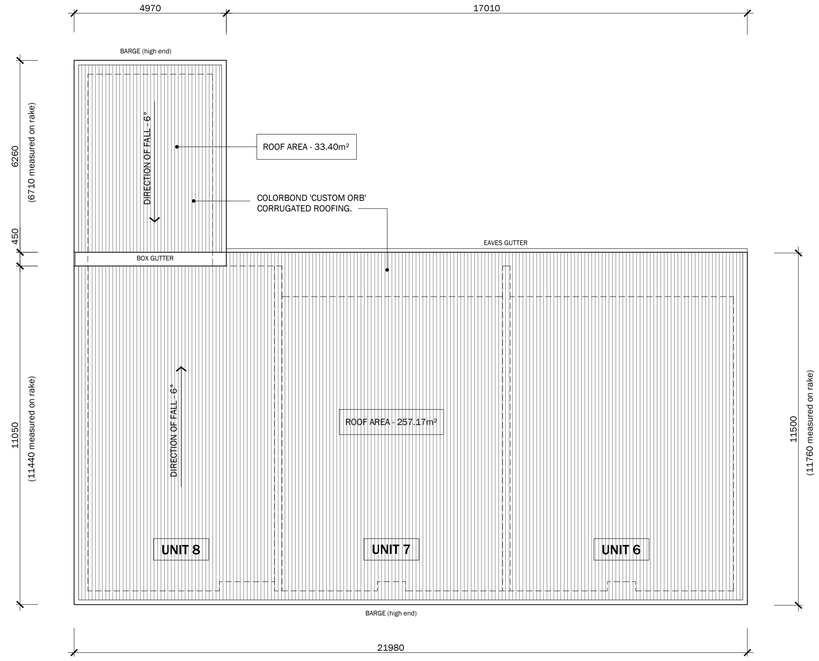
# A04

SHEET: **4** OF 8

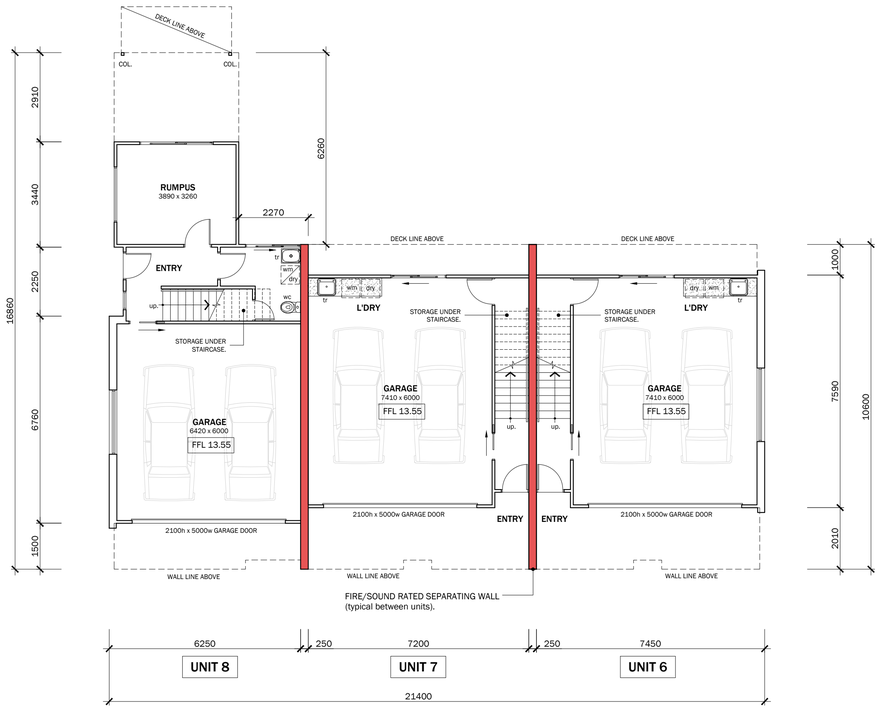



# FIRST FLOOR PLAN 1:100

UNIT 6 & 7 - 72.00m² EACH
UNIT 8 - 92.16m²




# ROOF PLAN 1:100




# GROUND FLOOR PLAN 1:100

UNIT 6 & 7 - 54.09m² EACH
UNIT 8 - 68.33m²


MATT GILLEY
BUILDING DESIGNER

PO BOX 224 LINDISFARNE TASMANIA 7015
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PROJECT:

**UNIT DEVELOPMENT**

**No. 11A GORDON STREET**
**SORELL**

**THE YOUNG GROUP**

DATE: **SEP 2021**
PROJECT No. **1690**

ISSUE/REV:

| | |
|---|---|
| A. PLAN REVISIONS. | 22.04.21 |
| B. PRELIMINARY ISSUE | 04.05.21 |
| C. PRELIMINARY ISSUE | 01.06.21 |
| D. DA ISSUE. | 05.06.21 |
| E. UPDATE TO MATCH CIVIL. | 02.09.21 |

TITLE:

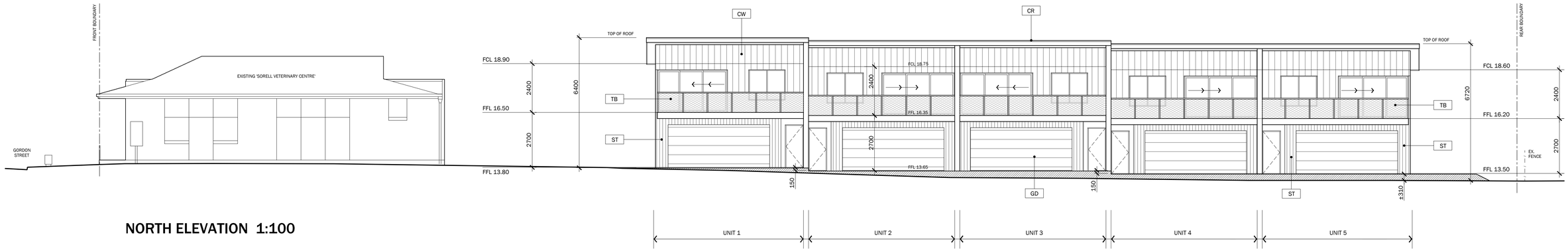
**FLOOR PLANS**
**UNITS 6 - 8**

SCALE: **1:100 (A1)**

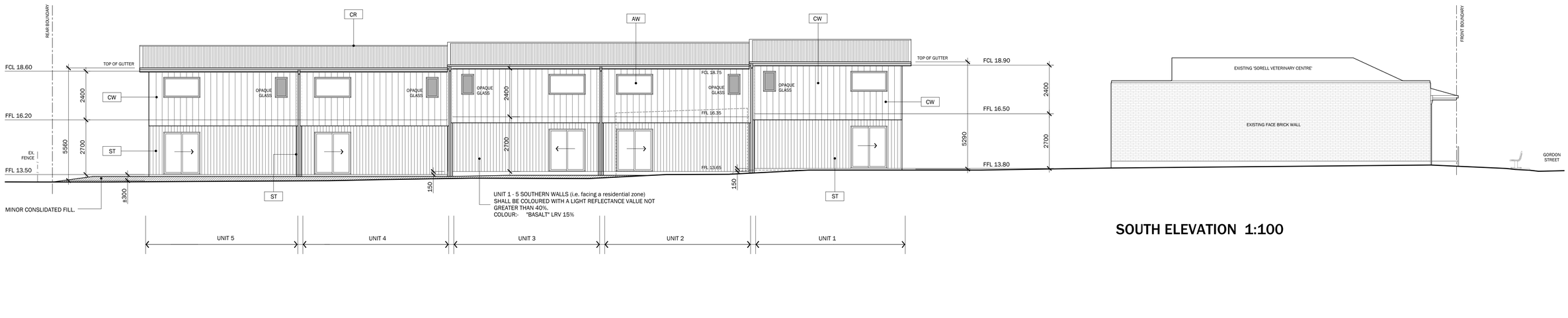
DRAWING No:

**A05**

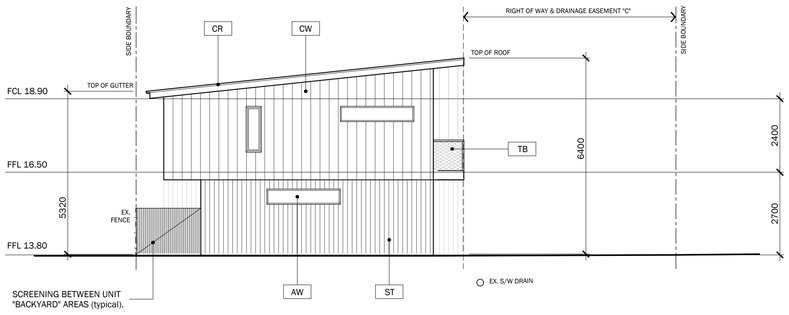
SHEET: **5** OF 8




## NORTH ELEVATION 1:100

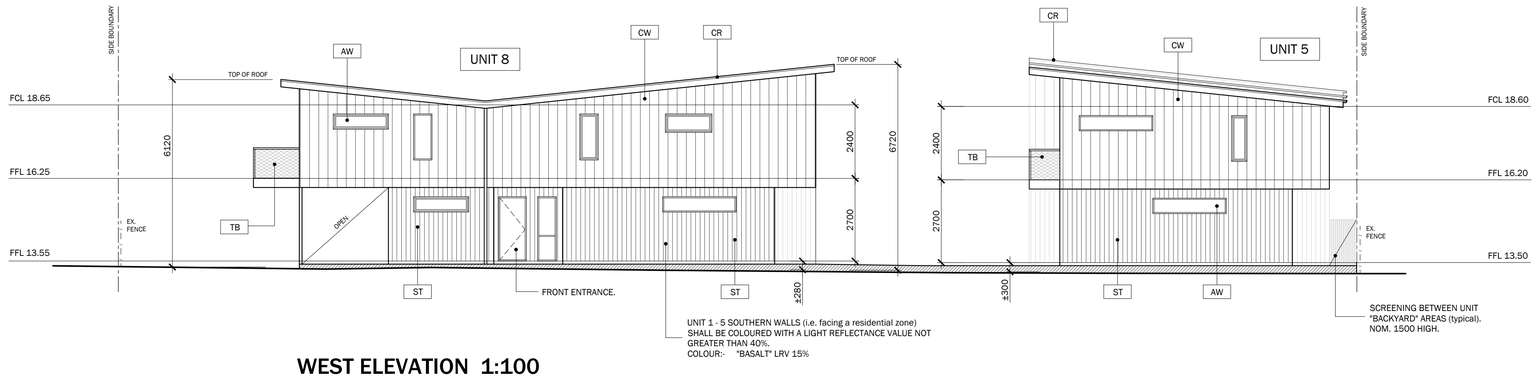



## SOUTH ELEVATION 1:100




## EAST ELEVATION 1:100

UNIT 1




## WEST ELEVATION 1:100

UNIT 5 & 8

### KEY - EXTERNAL MATERIALS

| | | | | | |
|---|---|---|---|---|---|
| CW | VERTICAL COLORBOND 'SHARPLINE' WALL CLADDING. | CR | COLORBOND 'CUSTOM ORB' CORRUGATED ROOFING. | GD | 5000 WIDE x 2100 HIGH 'PANEL-LIFT' GARAGE DOOR. |
| ST | 'HARDIES SCYON AXON ' VERTICAL GROOVE WALL CLADDING. PAINTED FINISH. | AW | ALUMINIUM WINDOW & SLIDING DOOR FRAMES. DOUBLE GLAZING TO ALL WINDOWS. POWDERCOAT FINISH. | TB | COMPOSITE DECKING BOARDS OVER TREATED PINE FLOOR JOISTS + 1.00m HIGH MESH BALUSTRADE. |


MATT GILLEY
BUILDING DESIGNER

PO BOX 224 LINDISFARNE TASMANIA 7015
matt.gilley@bigpond.com
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PROJECT:

**UNIT DEVELOPMENT**

**No. 11A GORDON STREET SORELL**

**THE YOUNG GROUP**

DATE: **SEP 2021**
PROJECT No. **1690**

ISSUE/REV:

| | |
|---|---|
| A. PRELIMINARY ISSUE. | 04.05.21 |
| B. PRELIMINARY ISSUE | 01.06.21 |
| C. DA ISSUE. | 05.06.21 |
| D. UPDATE TO MATCH CIVIL. | 02.09.21 |
| E. WALL COLOUR NOTED. | 30.09.21 |

TITLE:

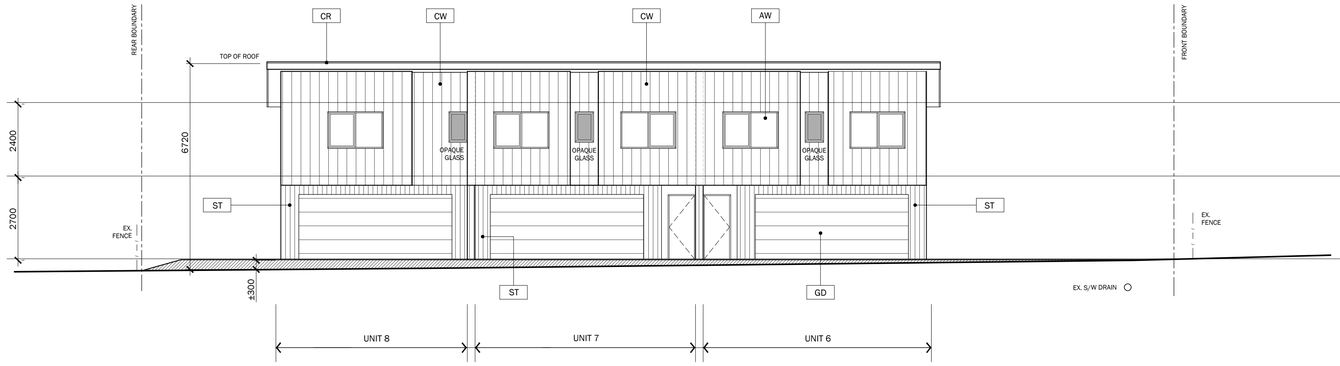
**ELEVATIONS**

SCALE: **1:100 (A1)**

DRAWING No:

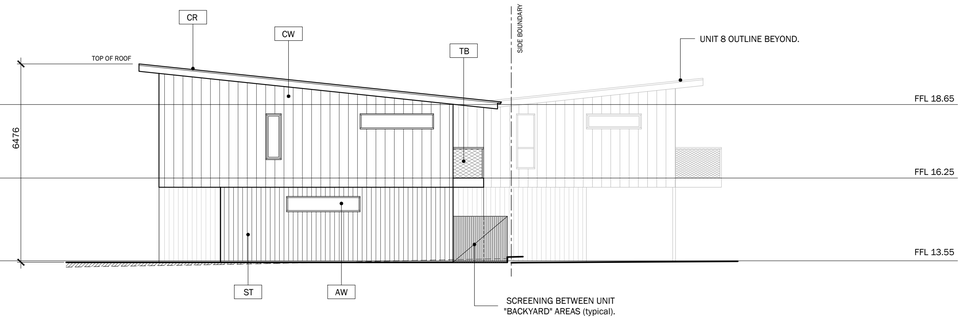
# A06

SHEET: **6** OF 8



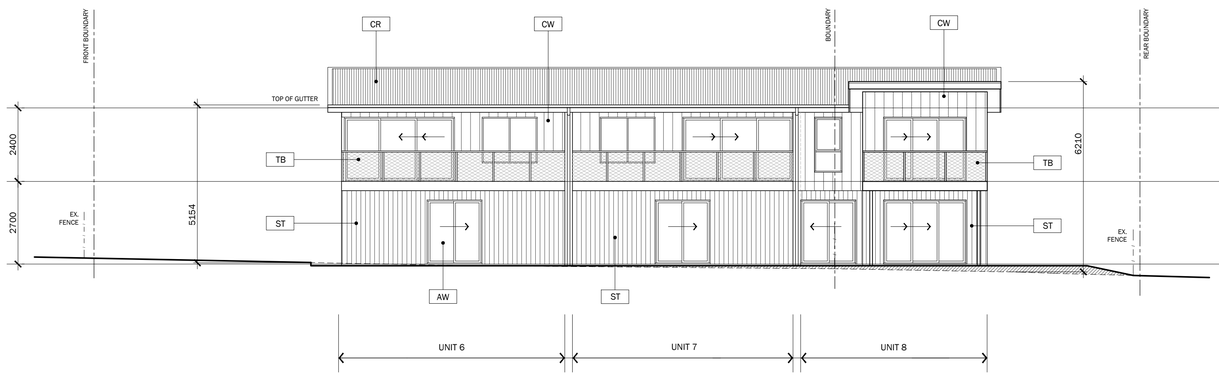

## SOUTH ELEVATION 1:100

UNIT 6 to 8



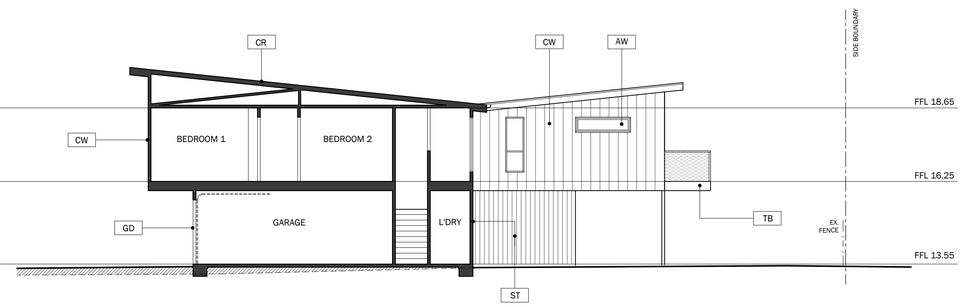

## EAST ELEVATION 1:100

UNIT 6




## NORTH ELEVATION 1:100

UNIT 6 to 8




## EAST ELEVATION 1:100

UNIT 8

### KEY - EXTERNAL MATERIALS

| | | | | | |
|---|---|---|---|---|---|
| CW | VERTICAL COLORBOND 'SHARPLINE' WALL CLADDING. | CR | COLORBOND 'CUSTOM ORB' CORRUGATED ROOFING. | GD | 5000 WIDE x 2100 HIGH 'PANEL-LIFT' GARAGE DOOR. |
| ST | 'HARDIES SCYON AXON ' VERTICAL GROOVE WALL CLADDING. PAINTED FINISH. | AW | ALUMINIUM WINDOW & SLIDING DOOR FRAMES. DOUBLE GLAZING TO ALL WINDOWS. POWDERCOAT FINISH. | TB | COMPOSITE DECKING BOARDS OVER TREATED PINE FLOOR JOISTS + 1.00m HIGH MESH BALUSTRADE. |


MATT GILLEY
BUILDING DESIGNER

PO BOX 224 LINDISFARNE TASMANIA 7015
matt.gilley@bigpond.com
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LICENCE No. CC5666C


PROJECT:

**UNIT DEVELOPMENT**

**No. 11A GORDON STREET SORELL**

**THE YOUNG GROUP**

DATE: **SEP 2021**
PROJECT No. **1690**

ISSUE/REV:

| | |
|---|---|
| A. PRELIMINARY ISSUE. | 04.05.21 |
| B. PRELIMINARY ISSUE | 01.06.21 |
| C. DA ISSUE. | 05.06.21 |
| D. UPDATE TO MATCH CIVIL. | 02.09.21 |

TITLE:

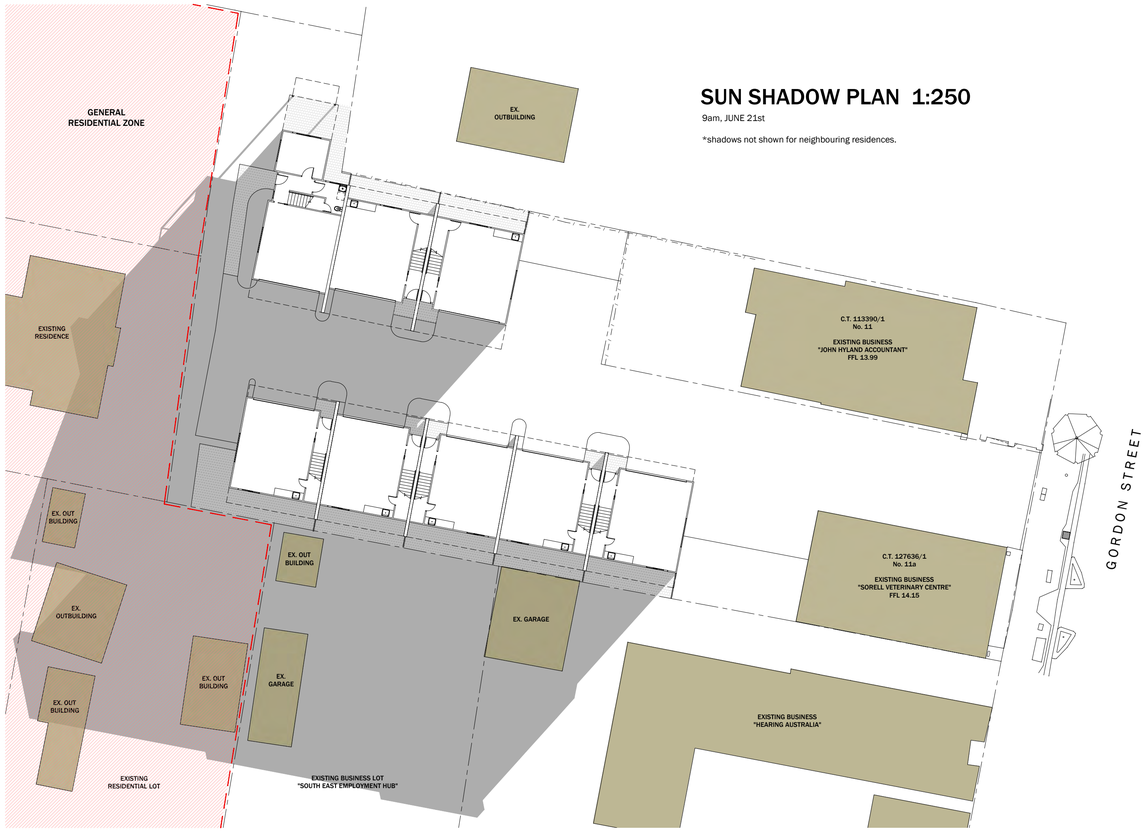
**ELEVATIONS**

SCALE: **1:100 (A1)**

DRAWING No:

# A07

SHEET: **7** OF 8




## SUN SHADOW PLAN 1:250

9am, JUNE 21st

*shadows not shown for neighbouring residences.




## SUN SHADOW PLAN 1:250

12pm, JUNE 21st

*shadows not shown for neighbouring residences.




## SUN SHADOW PLAN 1:250

3pm, JUNE 21st

*shadows not shown for neighbouring residences.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BUILDING DESIGNER

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PROJECT:

**UNIT DEVELOPMENT**

**No. 11A GORDON STREET**
**SORELL**

**THE YOUNG GROUP**

DATE: **SEP 2021**
PROJECT No. **1690**

ISSUE/REV:

A. DA ISSUE. 05.06.21
B. DRIVEWAY REV 09.07.21
C. UPDATE TO MATCH CIVIL. 02.09.21

TITLE:

**SUN SHADOWING**

SCALE: **1:200 (A1)**

DRAWING No:

# A08

SHEET: **8** OF 8

25 November 2021

Sorell Council
47 Cole Street
PO Box 126
Sorell TAS 7172
sorell.council@sorell.tas.gov.au

**Development Application Representation**

**Re: DA-2021/314, 11A Gordon Street, Sorell**

**Proposed Development:**
**Residential - Multiple Dwellings X8**

To Whom It May Concern:

Please accept this document as a written representation with regards to the proposed Development Application for works located at *11A Gordon Street, Sorell*, Application No: ***DA-2021/314*** with *The Young Group* identified as the principal applicant.

As both owners of the neighbouring property and concerned members of the Sorell community, we request that you please consider the following items which constitute the basis of this representation and their subsequent relevance with regards to the Sorell Council Interim Planning Scheme 2015 in the determination of this proposal.

*Item 21.1.1 of the Interim Planning Scheme identifies the following Zone Purpose Statements for the General Business Zone:*

*21.1.1.1 - To provide for business, community, food, professional and retail facilities serving a town of group of suburbs.*

*21.1.1.2 - To ensure the rural service centres provide for the daily and weekly needs of the community.*

*21.1.1.3 - To provide for a mix of retail and office based employment servicing the local area including a supermarket and a rang of specially shops.*

*21.1.1.4 - To provide a safe, comfortable and pleasant environment for workers, residents and visitors through the provision of high quality urban spaces and urban design.*

*21.1.1.5 - To provide a focus for employment primarily in retailing but complemented by a range of office based employment mainly in professional and personal services for the municipality and surrounding sub-region.*

*21.1.1.6 - To ensure that the Sorell township is the rural service centre providing for a range of convenience, goods and services as well as community services and facilities for the municipal area and surrounds including Tasman and lower East Coast sub-region*

*The Local Area Objective of the area seeks to develop and enhance the Sorell township role as the rural services centre for the municipal area through a mix of retail, commercial, administrative, residential and community services that complement this function and provide for the needs of the local and sub-regional community.*

*Furthermore the Desired Future Character Statement*

*(a) Provide active and attractive streetscapes*
*(b) Improve access / permeability to the town centre from the adjacent residential areas;*
*(c) Provide an open space hierarchy incorporating open spaces that are accessible and appropriately landscaped providing both passive and active recreation for social interaction with particular attention to enhancing the Sorell Rivulet;*
*(d) Provide for sustainable development to optimise water and energy conservation;*
*(e) Use scale, proportion, materials and colour to ensure building facades positively contribute to the streetscape*

The proposal, being located on one of the main arterial business thoroughfares within the Sorell municipality will undoubtedly have a detrimental impact to the above zone purpose, given the large amount of area designated, and zoned for purely residential endeavour already available within the municipality, this proposal brings to concern the potential for drastic overdevelopment within the municipality; something which is already evident in the vast amount of residential developments currently under construction.

The small strip or General Business within the immediate context of this proposal, is by no means a large area, but a narrow band fronting the main road into the Sorrel township, to allow residential development in this area would be deemed to contravene the integrity of the zoning, and it's ongoing viability as a productive business area.

Developments such as that being proposed are a discretionary item within the zone, and are not directly permitted. It is deemed that the invasive encroachment of this development is unwarranted and against the above statements outlined by council, particularly when there is already significant residential development in such close proximity to the subject site, indeed, the western boundary of the proposal being zoned general residential catering for such developments to take place.

We have great concerns that the approval of this proposal will undoubtedly be observed as a precedent for further development of this nature to occur, and the subsequent implications that this

would undoubtedly impose on small business in the community, and the continual use of this particular area as a General Business Zone.

The planning scheme for the area provides no governance or guide for developments of a residential nature and the potential impact which may be imposed on the General Business zone, as such there is no discourse under this zone for business entities which incur detrimental impact as a consequence of residential development.

The such close proximity of the development to neighbouring properties, and the overlooking of the first floor outdoor areas has huge detrimental impact to those neighbouring properties, and the ongoing use of those properties, particularly their inherent privacy, now being overlooked, if this were a residential area, these particulars would require addressing, and visual screening at the least.

Furthermore, under the General Business Zone, a residential development is subject to less adherence to the development standards than otherwise would be placed upon it within the General Residential Zone; particularly with regard to privacy of neighbouring properties, access to private open space, overshadowing and boundary setbacks, all of which amount to neighbouring properties/businesses being further encroached upon by a development proposal which is not a directly permitted use.

Our property at 9 Gordon Street would see the proposed dwellings being 900mm from our adjoining boundary, the upper levels of which having verandahs that overlook directly into our property consequently greatly impacting the privacy for our property and undoubtedly having implications on the use of our property for business venture, being constantly overlooked; If this were in the General Residential Zone, screening to these balconies would be a minimum requirement to these areas, such to lessen any impact on neighbouring properties as a result of the development.

The General Business Zone along this particular area is only a narrow strip, and our concern that the future consequences that this development if approved should fetter the ongoing use of this area is not unwarranted, and will undoubtedly be to the detriment of small rural business within the municipality, an amenity which the council promotes.

This appeal maintains that the nature of the proposal is in direct contrast with maintaining the neighbourhood character and natural landscape of the surrounding context, and additionally holds further concerns, that this type of development, if approved in its current state would undoubtably form a precedent for future developments of a similar nature to occur; having unreasonable impacts on the desired character of the area, and being detrimental to the daily lives of existing residents, as a direct consequence of such developments.

Without fully understanding the scope of the project nor the potential implications of any additional objections submitted by other concerned parties, potential alternatives to that proposed could include some form of screening to the verandahs of the residences overlooking our property, such that our property maintains some privacy to protect the ongoing use of our asset.

We are more than willing to discuss our concerns should you wish to contact us directly, please do not hesitate to do so; whilst we do not want to stipulate what property owners should and should not do with their property,  we do feel however, that some consultation to discuss this particular proposal would be small consideration given the potential implications it will consequently inflict.

Yours Faithfully

SORELL COUNCIL
29 NOV 2021
RECEIVED

The General Manager,
Sorell Council
Ref. DA 2021 00314-1
PID 1861734

Dear Manager,

Thank you for your letter re. the above. We as the owners and residents of we wish to lodge the following objections;

(1) The bedroom window on the Southern side of Unit 1. overlooks our backyard, Garage/workshop and lane. We believe this unnecessary, as it could be moved to the eastern side of the bedroom. This needs to be addressed.
The "Young Goup" manager told us this was not an unreasonable request.

(2) An Area of esctreme concern is that the main windows in our living areas. will be deprived of sunshine over the colder months at a time when most needed. If the developement goes ahead in its present form the unit residents would enjoy full sunshine whilst at the same time depriving us of that same enjoyment.

We desperately hope that this situation can be rectified.

| | |
|---|---|
| **From:** | Claire Tucker |
| **To:** | John Molnar |
| **Cc:** | Mark Slater; Trent Young |
| **Subject:** | Doc 594160 RE: 8 multiple dwellings - 5.2021.0314 - 11A Gordon Street - Representations and Request for Extension of Time |
| **Date:** | Monday, 6 December 2021 4:38:08 PM |
| **Attachments:** | image002.png<br>image004.png<br>image005.gif<br>image006.png |

Good Afternoon John,

Further to previous discussions in relation to the above, we have taken into consideration the concerns outlined in the representations received following the advertising of the Development Application for 11A Gordon Street.

We advise the following:

- We intend to make changes to the south facing window of Unit 1, which was posed a privacy concern to the owner of No. 13 Gordon Street. This window is to be a highlight window, approx. 1500mm from finished floor level. It is our understanding that the raised window will prevent the occupier from looking into the neighbouring yard of No. 13. Window to be amended in accordance with the minimum requirements for natural light and ventilation.
- It is also intended that a privacy screen is added to the eastern end of the balcony of Unit 6 to accommodate privacy concerns raised by the owners of No. 9 Gordon Street.

We understand that you will be finalising your report tomorrow.
Unfortunately, our Building Designer is unable to attend to these amendments within this deadline however our office will be able to provide marked up drawings tomorrow morning, which we anticipate will be acceptable.

Kind regards

Claire

Claire Tucker
Project Coordinator
Phone 03 61281002 | Mobile 0499 213 173 | Email claire@theyounggroup.com.au
1/6 Cessna Way | CAMBRIDGE | TAS 7170

# Attachments to item number 4.2

# RESULT OF SEARCH

RECORDER OF TITLES

*Issued Pursuant to the Land Titles Act 1980*

SEARCH OF TORRENS TITLE

| VOLUME | FOLIO |
|---|---|
| 40340 | 1000 |
| EDITION | DATE OF ISSUE |
| 2 | 26-Jun-2008 |

SEARCH DATE : 03-Apr-2021
SEARCH TIME : 02.46 PM

## DESCRIPTION OF LAND

Parish of FORCETT, Land District of PEMBROKE
Lot 1000 on Sealed Plan 40340
Derivation : Part of Lot 29251, 468A-1R-29Ps. Gtd. to E.J. Okines
Prior CT 4577/97

## SCHEDULE 1

C845321 TRANSFER to SORELL COUNCIL Registered 26-Jun-2008 at noon

## SCHEDULE 2

Reservations and conditions in the Crown Grant if any
SP 40340 COUNCIL NOTIFICATION under Section 468(12) of the Local Government Act 1962

## UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

Owner: A. E. Reardon

Title Reference: C.T. 4541/93 ~~3091/48~~

Grantee: Part of Lot 29251, 468ac 1rd 23p Ernest John Okines, Pur.

**PLAN OF SURVEY**

by Surveyor J. L. Cerutty of land situated in the CROMER & CERUTTY P/L. SURVEYORS OF 7 BAYFIELD ST. ROSNY PARK

LAND DISTRICT OF PEMBROKE
PARISH OF FORCETT

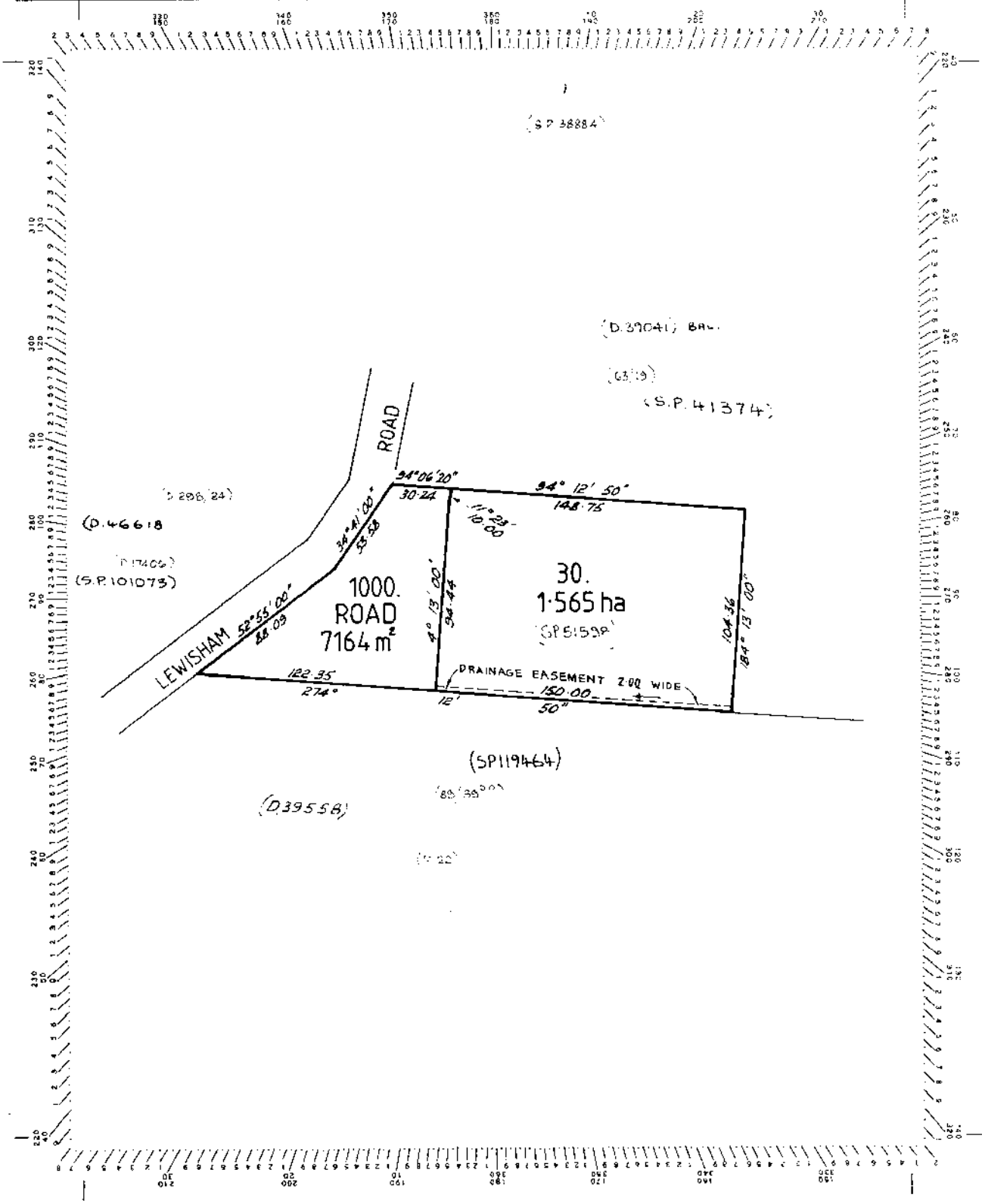
SCALE 1 2000. MEASUREMENTS IN METRES

Registered Number: **SP40340**

~~Approved~~

Effective from 30 JUN 1983

Recorder of Titles



## SCHEDULE OF EASEMENTS

**PLAN NO. SP40340**

NOTE:—The Town Clerk or Council Clerk must sign the certificate on the back page for the purpose of identification.

The Schedule must be signed by the owners and mortgagees of the land affected. Signatures should be attested.

### EASEMENTS AND PROFITS

Each lot on the plan is together with:—

(1) such rights of drainage over the drainage easements shewn on the plan (if any) as may be necessary to drain the stormwater and other surplus water from such lot; and

(2) any easements or profits à prendre described hereunder.

Each lot on the plan is subject to:—

(1) such rights of drainage over the drainage easements shewn on the plan (if any) as passing through such lot as may be necessary to drain the stormwater and other surplus water from any other lot on the plan; and

(2) any easements or profits à prendre described hereunder.

The direction of the flow of water through the drainage easements shewn on the plan is indicated by arrows.

Lot 30 is SUBJECT TO a Right of Drainage over the Drainage Easement 2.00 wide shown passing through the Lot for the benefit of the Balance.

FENCING CONDITION

The owner of each lot on the plan covenants with Albert Edgar Reardon (the owner) that the owner shall not be required to fence.

COVENANTS

The owner of each lot on the plan covenants with the said Albert Edgar Reardon and the owners for the time being of the balance land to the intent that the burden of this covenant may run with and bind the covenantor's lot and every part thereof and that the benefit thereof shall be annexed to and devolve with the balance land and each and every part thereof to observe the following stipulations:-

a) Not to erect or place upon the lot a relocatable house or building of any kind; and

b) not to instal a septic tank on the lot without first obtaining the consent of the Warden, Councillors and Electors of the Municipality of Sorell as to the location of such septic tank on the lot.

DEFINITION

"Balance" means the land remaining in Certificate of Title volume 3091 folio 48 after the transfer thereof of the lots shown on the plan.

SIGNED by ALBERT EDGAR REARDON )
the registered proprietor of )
the land comprised in Certifi- )
cate of Title volume ~~3091~~ folio)
48 in the presence of:- )

A.E. Reardon

Solicitor Hobart

This is the schedule of easements attached to the plan of ..... *(Insert Subdivider's Full Name)*

Albert Edgar REARDON affecting land in

C.T. 3091-48 *(Insert Title Reference)*

Sealed by Municipality of Sorell on 15 June 1989

Solicitor's Reference .....

M. Stewart *Council Clerk/~~Town Clerk~~*

OSK 3134

AllUrbanPlanning PTY LTD

# Dodges Ferry Swim School
# Planning Report



Date 3 April 2021

19 Mawhera Ave, Sandy Bay Tasmania 7005 Call 0400 109 582
Email frazer@allurbanplanning.com.au allurbanplanning.com.au

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# 1. Introduction

All Urban Planning Pty Ltd has been engaged by Luke Doerner to prepare an application for a planning permit for subdivision and use and development of a swim school at CT 40340/1000 Old Forcett Road, Dodges Ferry.

This report provides an assessment under the provisions of the *Sorell Interim Planning Scheme 2015* (Planning Scheme).

## 1.1 Title Information

The proposal relates to the following land as shown on Figure 1 below:

| Address | Title | Area | Owner |
|---|---|---|---|
| Lot 1000 Old Forcett Road | CT40340/1000 | Approx. 7000m$^2$ | Sorell Council |



***Figure 1 The Site (Source: annotated aerial photo and cadaster from theList)***

## 1.2 The proposal

It is proposed to construct a new indoor swimming pool with associated amenities and carparking on part of Lot 1000, Old Forcett Road, Dodges Ferry. A 1 lot subdivision is also proposed to create a new lot for the development.

The proposal includes:

- Removal of existing trees as shown on the site plan
- New 45m (L) x 20.7m(W) x 7m (H) indoor pool building to enclose a 25m pool
- Change rooms, amenities, physio and reception
- Ancillary café
- Plant room
- Grandstand seating
- Store
- 50 car parking spaces (including 2 DDA car parking spaces and 6 staff carparks)
- Landscaping as shown on the landscaping plan
- Outdoor play area
- Low level carpark lighting
- 5 x rainwater storage tanks
- On site waste water disposal system
- Subdivision to create a 4177m$^2$ lot 1 for the development leaving a balance lot 2 of 2985m$^2$.

Hours of operation – 5.30am to 10pm daily.

Signage will be minimal and will be subject of a further application to Council if required.

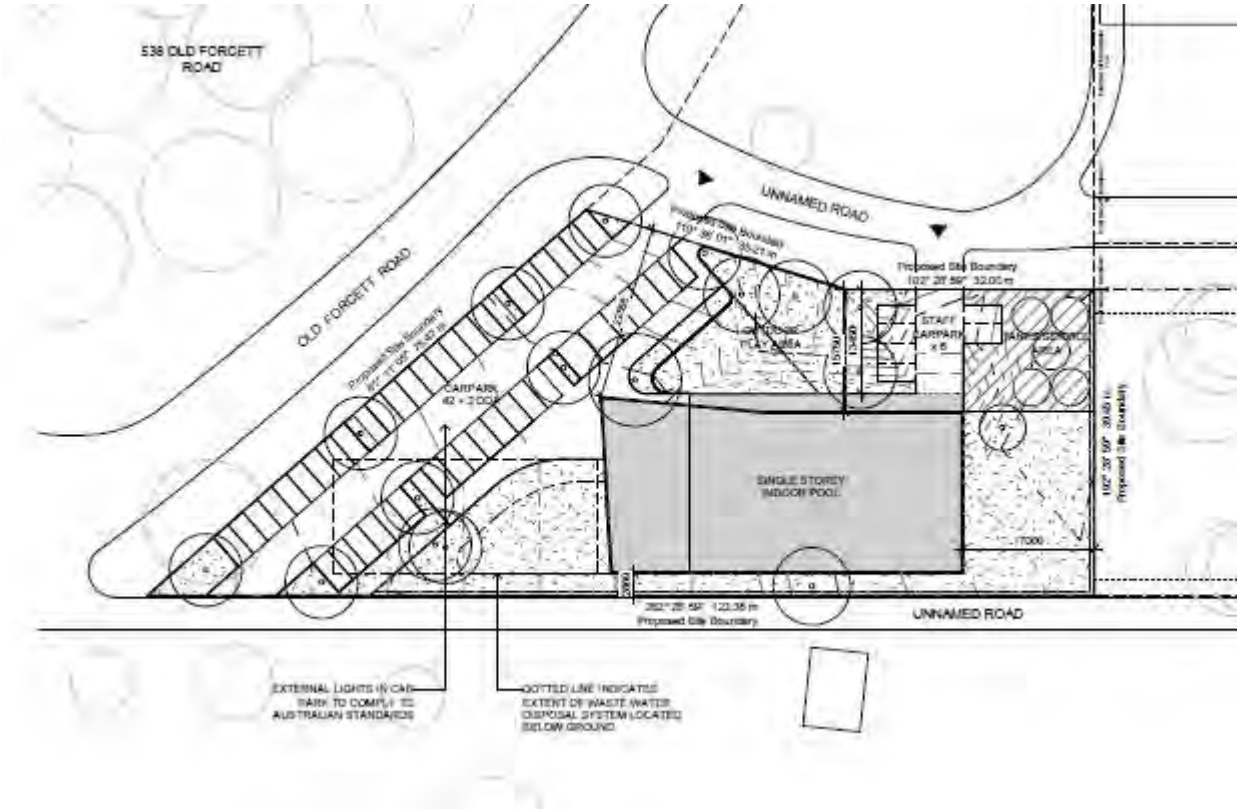


***Figure 2 - Site Layout***

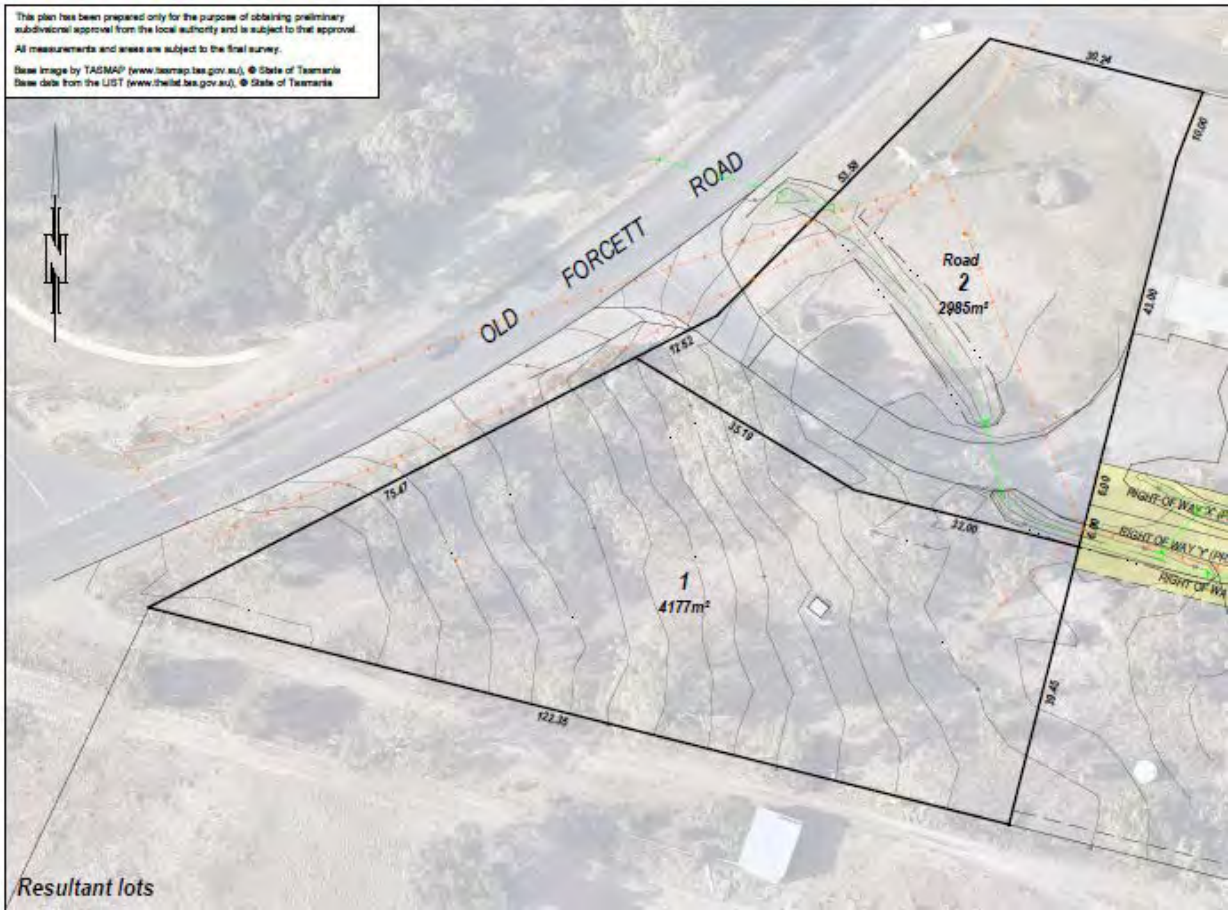


***Figure 3 Subdivision Plan prepared by Rogerson & Birch Dwg No. 12381-10, 15/3/2021***

# 2. The Planning Scheme

## 2.1 Zoning

This site is zoned Utilities under the Sorell Interim Planning Scheme 2015 (Planning Scheme).

The Purpose of the Zone under Clause 28.1.1 is:

*To provide land for major utilities installations and corridors.*

*To provide for other compatible uses where they do not adversely impact on the utility.*

*To provide for and protect the Copping landfill site as a major regional waste disposal facility.*

There are no applicable Local Area Objectives or Desired Future Character Statements.



***Figure 4 Site Plan and Planning Scheme zoning***

## 2.2 Use

The proposed swim centre is most similar to the Sports and recreation Use Class meaning:

> *use of land for organised or competitive recreation or sporting purposes including associated clubrooms. Examples include a bowling alley, fitness centre, firing range, golf course or driving range, gymnasium, outdoor recreation facility, public swimming pool, race course and sports ground.*

*Sports and recreation* is a Discretionary Use in the Zone.

The use is considered compatible with the Zone Purpose in that it involves a facility that will serve the local community that will not impact existing utilities in the vicinity.

## 2.3 Use Standards

***Hours of Operation (28.3.1)***

> *Objective:*
>
> *To ensure that hours of operation do not have unreasonable impact on residential amenity on land within a residential zone.*

| ***Use Standard*** | ***Assessment*** |
|---|---|
| *A1*<br><br>*Hours of operation of a use within 50 m of a residential zone must be within 7.00 am to 7.00 pm, except if:* | There is an area of Low Density Residential zoning approximately 50m to the west at 542 Old Forcett Road. The Low Density Residential zoning however extends to the road centreline such that it is within 50m of the site. The proposal for |

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| | |
|---|---|
| *(i) for office and administrative tasks;*<br>*or*<br>*(ii) a Utilities use.* | hours commencing prior to 7am and concluding after 7pm is therefore to be assessed under P1. |
| *P1*<br>*Hours of operation of a use within 50 m of a residential zone must not have an unreasonable impact upon the residential amenity of land in a residential zone through commercial vehicle movements, noise or other emissions that are unreasonable in their timing, duration or extent.* | The proposal is considered to satisfy P1 in that:<br>• The site is over 50m from the nearest residential property on the other side of Old Forcett Road (approximately 140m to the closest dwelling at 542 Old Forcett Road).<br>• It is considered that activities associated with the proposed use, being restricted to 5.30am to 10pm daily and conducted in the building without significant noise emissions, will not have an unreasonable impact on the residential amenity of land in the residential zone by way of noise or other emissions that are unreasonable in their timing duration or extent.<br>• Any commercial vehicle moments will be minor and conducted during normal business hours (see 28.3.4 below). |

***Noise (28.3.2)***

*Objective:*

*To ensure that noise emissions do not cause environmental harm and do not have unreasonable impact on residential amenity on land within a residential zone.*

| ***Use Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Noise emissions measured at the boundary of a residential zone must not exceed the following:*<br>*(a) 55 dB(A) (LAeq) between the hours of 7.00 am to 7.00 pm;*<br>*(b) 5dB(A) above the background (LA90) level or 40dB(A) (LAeq), whichever is the lower, between the hours of 7.00 pm to 7.00 am;*<br>*(c) 65dB(A) (LAmax) at any time.*<br>*Measurement of noise levels must be in accordance with the methods in the Tasmanian Noise Measurement Procedures Manual, issued* | Subject to appropriate installation of the mechanical equipment for the pool, the proposed use will not involve significant noise emissions and will not exceed these limits. |

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| *by the Director of Environmental Management, including adjustment of noise levels for tonality and impulsiveness.*<br>*Noise levels are to be averaged over a 15 minute time interval.* | |

***External Lighting (28.3.3)***

*Objective:*

*To ensure that external lighting (not including street lighting) does not have unreasonable impact on residential amenity on land within a residential zone.*

| ***Use Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*External lighting (not including street lighting) within 50 m of a residential zone must comply with all of the following:*<br>*(a) be turned off between 10:00 pm and 6:00 am, except for security lighting;*<br>*(b) security lighting must be baffled to ensure they do not cause emission of light outside the zone.* | The proposal will not involve exterior lighting other than for security and that lighting will be baffled to avoid light emissions outside the site and zone. |

***Commercial Vehicle Movements (28.3.4)***

*Objective:*

*To ensure that commercial vehicle movements not have unreasonable impact on residential amenity on land within a residential zone.*

| ***Use Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Commercial vehicle movements, (including loading and unloading and garbage removal) to or from a site within 50 m of a residential zone must be within the hours of:*<br>*(a) 7.00 am to 7.00 pm Mondays to Fridays inclusive;*<br>*(b) 9.00 am to 5.00 pm Saturdays;*<br>*(c) Nil Sundays and Public Holidays.* | The proposal will not involve commercial vehicle movements (meaning a small rigid vehicle, medium rigid vehicle, heavy rigid vehicle or articulated vehicle) outside the permitted hours in A1. |

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***Discretionary Use (28.3.5)***

*Objective:*

*To ensure that uses not directly associated with a utility do not compromise the use of that land for utility purposes.*

| ***Use Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*No Acceptable Solution.* | The proposed discretionary use is to be assessed under P1. |
| *P1*<br>*Discretionary use must not compromise or reduce the operational efficiency of an existing or intended utility having regard to all of the following:*<br>*(a) the compatibility of the utility and the proposed use;*<br>*(b) the location of the proposed use in relation to the utility;*<br>*(c) any required buffers or setbacks;*<br>*(d) access requirements.* | The use is considered compatible with the Zone Purpose in that:<br>• it involves a use that will serve the local community;<br>• Existing utilities in the vicinity including power lines and stormwater infrastructure are shown on the subdivision plan and will not be impacted by the proposal;<br>• The proposal will not impact any other utilities in the vicinity; and<br>• The impact of the proposal on the primary Utility in the area (the road network) is assessed as acceptable in the accompanying Traffic Impact Assessment. |

## 2.4 Development Standards for Buildings and Works (28.4)

***Building Height (28.4.1)***

*Objective:*

*To ensure that building height contributes positively to the streetscape and does not result in unreasonable impact on residential amenity of land in a residential zone.*

| ***Development Standards*** | ***Assessment*** |
|---|---|
| *A1*<br>*Building height must be no more than:*<br>*10 m.* | The proposed height of 7m comfortably complies. |
| *A2*<br>*Building height within 10 m of a residential zone must be no more than 8.5 m.* | Not applicable. The proposal adjoins the Rural and Local Business zones and does not involve a building within 10m of a residential zone. |

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***Setback (28.4.2)***

*Objective:*

*To ensure that building setback contributes positively to the streetscape and does not result in unreasonable impact on residential amenity of land in a residential zone.*

| ***Development Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Building setback from frontage must be no less than:*<br>*10 m from a primary frontage.*<br>*nil m from a secondary frontage.* | The proposal complies with A1 in that the building will be setback more than 10m from the Old Forcett Road frontage. |
| *A2*<br>*Building setback from a residential zone must be no less than:*<br>*(a) 5 m;*<br>*(b) half the height of the wall,*<br>*whichever is the greater.* | Not applicable. The proposal does not adjoin a residential zone and there is no applicable side or rear boundary setback requirement. |

***Landscaping (28.4.3)***

*Objective:*

*To ensure that a safe and attractive landscaping treatment enhances the appearance of the site and provides a visual break from land in a residential zone.*

| ***Development Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Landscaping is not required along the frontage of a site if the building has nil setback to frontage.* | The site landscaping concept is shown on the accompanying landscape plan. |
| *P1*<br>*Landscaping must be provided to satisfy all of the following:*<br>*(a) enhance the appearance of the development;*<br>*(b) provide a range of plant height and forms to create diversity, interest and amenity;*<br>*(c) not create concealed entrapment spaces;* | P1 is considered to me met in that:<br>• the proposed landscaping plan includes a range of trees and low level grasses to provide diversity and interest that will enhance the appearance of the development;<br>• The proposal does not create entrapment spaces; and<br>• There are no applicable Desired Future Character Statements. |

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|---|---|
| *(d) be consistent with any Desired Future Character Statements provided for the area.* | |
| *A2*<br>*Along a boundary with a residential zone landscaping must be provided for a depth no less than:*<br>*10 m.* | Not applicable. The site does not adjoin a residential zone. |

***Outdoor Storage Areas (28.4.4)***

The proposal does not involve an outdoor storage area and this Standard does not apply.

***Fencing (28.4.5)***

*Objective:*

*To ensure that fencing does not detract from the appearance of the site or the locality and provides for passive surveillance.*

| ***Development Standard*** | ***Assessment*** |
|---|---|
| *A1*<br>*Fencing must comply with all of the following:*<br>*(a) fences and gates of greater height than 2.1 m must not be erected within 10 m of the frontage;*<br>*(b) fences along a frontage must be 50% transparent above a height of 1.2 m;*<br>*(c) height of fences along a common boundary with land in a residential zone must be no more than 2.1 m and must not contain barbed wire.* | Not applicable. The proposal does not involve a fence within 10m of a frontage or along a common boundary with a residential zone. |

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## 2.5 Subdivision Standards

***Subdivision (28.5.1)***

*Objective:*

*To provide for lots appropriate to accommodate development consistent with the Zone Purpose and any relevant Local Area Objectives or Desired Future Character Statements.*

| ***Development Standards*** | ***Assessment*** |
|---|---|
| *A1*<br>*Subdivision is for the purpose of providing lots for public open space, a riparian or littoral reserve or utilities.* | To be assessed under P1 |
| *P1*<br>*Subdivision is for the purpose of providing a lot for an allowable use.* | P1 is satisfied in that the subdivision is for the purpose of the proposed swim centre (Sport and Recreation) which is an allowable use in the Zone. |
| *A2*<br>*The frontage for each lot must be no less than 15 m.* | The proposed lot and balance will maintain frontages of at least 15m - (75m Lot 1) and (65m Lot 2) respectively and complies with A2. |
| *A3*<br>*Services capable of adequately serving the intended purpose must be connected to each lot.* | There are no reticulated water or sewer services available and the proposal is to be assessed under P3. |
| *P3*<br>*Where reticulated services are unavailable but needed for the intended purpose, the lots must be capable of:*<br>*(a) being self sufficient for potable water adequate for the intended purpose;*<br>*(b) accommodating an wastewater management system adequate for the intended purpose;*<br>*(c) accommodating an on-site stormwater management system adequate for the intended purpose,*<br>*as the case may be.* | The proposal is considered to satisfy P3 in that the lot has been sized to accommodate the proposed use including building, associated carparking, waste water disposal and water storage areas as shown on the site plan. |

# 3. Planning Scheme Codes

The site is not covered by any Planning Scheme Code Overlays.

## 3.1 Potentially Contaminated land Code

The proposal relates to a potentially contaminated site. Although the proposal does not involve a sensitive use, the proposed subdivision and excavation triggers consideration under this Code. These matters will be addressed in a separate Environmental Site Assessment prepared by GES.

## 3.2 Road and Railway Assets Code

The requirements of this Code are addressed in the accompanying Traffic Impact Assessment by Hubble Traffic.

## 3.3 Parking and Access Code

The requirements of this Code are addressed in the accompanying Traffic Impact Assessment by Hubble Traffic.

## 3.4 On Site Wastewater Management Code

A wastewater disposal area has been provided on the site plan and further detail will be provided prior to commencement.

# 4. Conclusion

The proposed use is considered compatible with the Purpose of the Utilities Zone in that it involves a facility that will serve the local community without impacting on existing utilities in the vicinity.

The proposal satisfies the relevant use and development standards and is accompanied by Traffic and Environmental assessments to address the requirements of the Planning Scheme Codes.

The proposal is recommended for approval such that a planning permit should be issued following consideration of any relevant matters that arise following public notification of the application.

GES

GEO-ENVIRONMENTAL

SOLUTIONS



**ENVIRONMENTAL SITE ASSESSMENT – Version 2**

**Proposed Southern Beaches Learn to Swim Centre, Dodges Ferry**

**April 2021**

## DOCUMENT CONTROL

| Title | Version | Date | Author | Reviewed By |
|---|---|---|---|---|
| *Environmental Site Assessment: Southern Beaches Learn to Swim Centre, Dodges Ferry, Tasmania* | 1 | 30th April 2021 | Sarah Joyce | JP Cumming |
| *Environmental Site Assessment: Southern Beaches Learn to Swim Centre, Dodges Ferry, Tasmania* | 2 | 5th May 2021 | Sarah Joyce | JP Cumming |
| | | | | |

## EXECUTIVE SUMMARY

This report presents the findings of an Environmental Site Assessment (ESA) undertaken by Geo-Environmental Solutions Pty. Ltd. (GES) for the Proposed Southern Beaches Learn to Swim Centre at Dodges Ferry, *'Dodges Ferry Pool'*, situated on council land north of Lot 1 Old Forcett Road, Dodges Ferry - hereby referred to as 'The Site' or 'The Swim Centre'. GES was commissioned by All Urban Planning to conduct the ESA.

This ESA has been prepared by a suitably qualified and experienced practitioner in accordance with procedures and practices detailed in National Environmental Protection Measure [Assessment of Site Contamination] (NEPM ASC; 2013).

The objective of this ESA was to demonstrate the absence of contamination at the site, by addressing E2.6.2 performance criteria under the *Sorell Council Interim Planning scheme 2015* for excavation. If contamination were confirmed to be present, then a plan to manage contamination and associated risk to human health and the environment should be developed.

The following information was gathered during the desktop investigation:

- The site is zoned *Utilities* under the *Sorell Councils Interim Planning Scheme 2015* and is owned by the Sorell Council.
- The geology of the site is underlaid with Quaternary deposits of siltstone, sandstone and mudstone. Groundwater is inferred to be travelling in a westerly direction. The closest ecological receptor is Okines Beach at the mouth of the bay of Pit Water; approximately 400m from the site.
- There are a total of 4 registered bores located within 200m of the investigation area according to the MRT. These bores have been either capped or abandoned. Therefore, the possibility of residents accessing contaminated groundwater has been ruled out.
- The site walkover confirmed that the site proposed for the Swim Centre is a vacant block, predominantly grassed, with some scattered eucalyptus trees. There is a small shed containing an abandoned remediation bore and several groundwater monitoring wells associated with previous groundwater investigations relating to the former United Service Station.
- The site is situated 100m south west of a former Service Station at 521 Old Forcett Road, which is known to have contamination sourced from compromised refueling infrastructure. It is currently abandoned and owned by NORVAC Pty Ltd. Three underground fuel tanks were removed in 2011 according to WST and there have been multiple environmental site assessments conducted in relation to a groundwater contaminated plume. A Remediation Notice (RN) 8680/1 was removed from the site in 2015 by the EPA Tasmania after receiving the '*Final Site Remediation and Validation Report'* by Tonkin and Taylor P/L in December 2014.
- The entire site is an Area of Potential Concern as it is directly down gradient of a former Contaminated Site. Contaminants Of Potential Concern (COPC) include the following: TPH/TRH; Mono Aromatic hydrocarbons: (BTEXN); PAH; and lead. However, current analytical results confirmed that elevated lead does not appear to be an issue at the site.
- There may be other unknown contamination sources that may be impacting the site; including but not limited to the Redline depot at 523 Old Forcett Road and the self-storage site has a wash down area at 525 Old Forcett Road.

The Investigation Conclusion Summary stated that:

The current Environmental Site Assessment has focused on potential hydrocarbon contamination of shallow soil and groundwater at the site. Hydrocarbon contamination was identified in the groundwater which may pose a risk to human health or the environment with the current building design.

Even though contamination in the groundwater is present it is not thought to have been caused by activities at the site but by former fuel storage at the adjacent property, the former United Service Station at 521 Old Forcett Road, Dodges Ferry.

GES recommends the following:

The presence of hydrocarbons in the groundwater is confirmed. To minimise the risk to future site commercial workers during the development, occupants of the Swim Centre including staff and visitors plus future trench works and ecological receptors, the following mitigation measures should be put in place as a minimum:

- To mitigate the indoor vapour risk, the proposed building should be designed with an above ground floor level and minimal excavation into the current ground surface should be undertaken.
- There should be a minimum vertical separation distance of 8m between the base of the building including services and the water-table. Seasonal fluctuations in the water-table must be considered in the depth of any separation calculation.
- Engineering solutions for increasing the impermeability of the building from the ground should be considered, such as impermeable membranes, a clay layer below the concrete and / or an increased thickness in the floor / pool base concrete slab.
- Current groundwater and remediation bores should be decommissioned in accordance with appropriate decommissioning guidelines. Including and not limited to the removal of PVC piping and backfilling with bentonite or a comparable impermeable medium to ensure vapours from the contaminated groundwater do not travel up preferential pathways and enter the Swim Centre building.

It can be noted that no impact in shallow soil has been identified and from the current soil testing no risk to human health from the soil on site was identified.

Although there were no ecological or human health guideline exceedances for soil tested; the deepest soil bore drilled during the current investigation was 2.5m below ground surface. It is likely that there is secondary soil contamination associated with the contaminated groundwater at depths from 5-10m below ground surface. To minimise the risk to ecological receptors it is recommended that minimal material from depth be disturbed during the site redevelopment.

Given the site history of 521 Old Forcett Road the former Service Station and the impact if has had on the current site, it is recommended that for any future disturbance at the site of soil over 1 cubic metre;

- A Soil and Water Management Plan (SWMP) will be required to control the movement and erosion of soil from the site that could impact ecological receptors.
- Soil should be tested and managed in accordance with EPA Tasmania's IB105.

<u>Suitability Statement</u>

The current Environmental Site Assessment has identified contaminated groundwater is underlying the site. Providing the recommendations and protection measures are implemented from this report, including but not limited to a building design, then GES is satisfied that a Swim Centre will not adversely impact on human health or the environment.

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## ABREVIATIONS

| | |
|---|---|
| AEC | Areas of Environmental Concern |
| AHD | Australian Height Datum |
| ALS | Analytical Laboratory Services |
| ANZECC | Australia and New Zealand Environment and Conservation Council |
| BGS | Below Ground Surface |
| BH | Borehole |
| BTEXN | Benzene Toluene Ethylbenzene Xylene Naphthalene |
| COA | Certificate of Analysis |
| COC | Chain of Custody |
| COPC | Contaminant of Potential Concern |
| CRC CARE | Corporative Research Centre for Contamination Assessment and Remediation of the Environment |
| CSM | Conceptual Site Model |
| DQO | Data Quality Objectives |
| EOH | End Of Hole |
| EIL | Ecological Investigation Levels |
| ESL | Ecological Screening Levels |
| EPA | Environmental Protection Authority |
| ESA | Environmental Site Assessment |
| GDA94 | Geocentric Datum of Australia 1994 |
| GES | Geo-Environmental Solutions Pty. Ltd. |
| HIL | Health Investigation Levels |
| HSL | Health Screening Levels |
| IL | Investigation Levels |
| LOR | Limits of Reporting |
| MDL | Mean Detection Limit |
| NATA | National Association of Testing Authorities |
| NEPM ASC | National Environmental Protection (Assessment of Site Contamination) Measure |
| NHMRC | National Health and Medical Research Council |
| NL | Non Limiting |
| NRMMC | Natural Resource Management Ministerial Council |
| PAH | Polynuclear Aromatic Hydrocarbons |
| PCP | Physico-Chemical Parameters |
| PHC | Petroleum Hydrocarbons |
| PID | Photo-Ionisation Detector |
| PPA | Preferential (PVI) Pathways Assessment |
| PVI | Petroleum Vapour Intrusion |
| TPH | Total Petroleum Hydrocarbons |
| TRH | Total Recoverable Hydrocarbons |
| USCS | Unified Soil Classification System |

# 1 INTRODUCTION

## 1.1 General

This report presents the findings of an Environmental Site Assessment (ESA) undertaken by Geo-Environmental Solutions Pty. Ltd. (GES) for the Proposed Southern Beaches Learn to Swim Centre at Dodges Ferry, *'Dodges Ferry Pool'*, situated on council land north of Lot 1 Old Forcett Road, Dodges Ferry - hereby referred to as 'The Site' or 'The Swim Centre'. The site location is presented in Figure 1. GES was commissioned by All Urban Planning to conduct the ESA.

This ESA has been prepared by a suitably qualified and experience practitioner in accordance with procedures and practices detailed in NEPM (2013) guidelines and key regulations and policies identified in the References section of this document. Personnel engaged in preparing this ESA are listed in Appendix 1 along with their relevant qualifications and years of experience.




**Figure 1 Site Location, site outlined in blue, image sourced from the LIST**

## 1.2 Site Details

Site details are presented in Table 1 and Figure 2.

**Table 1 Site Details**

| |
|---|
| **Site Address**<br>The site does not currently have an address. The proposed Southern Beaches Learn to Swim Centre at Dodges Ferry, *'Dodges Ferry Pool'*, is situated on council land adjacent to Lot 1 Old Forcett Road, Dodges Ferry, Tasmania. |
| **Current Title identification details**<br>Title reference is 40340/1000 |
| **Current land use**<br>Vacant land |
| **Site total area**<br>Approximately 4544 $m^2$ |
| **Current Ownership (as per current certificates of title)**<br>Sorell Council |
| **Zoning**<br>Utilities – Sorell Interim Planning Scheme 2015 |
| **Local Council**<br>Sorell Council |
| **Proposed Site Use**<br>Southern Beaches Learn to Swim Centre, Dodges Ferry |



**Figure 2 View of the site from Old Forcett Road (Source Google Maps)**

## 1.3 Investigation Objectives

The objective of this ESA was to demonstrate the absence of contamination at the site, by addressing E2.6.2 performance criteria under the *Sorell Council Interim Planning scheme 2015* for excavation. If contamination confirmed to be present, then a plan to manage contamination and associated risk to human health and the environment should be developed.

## 1.4 Site Layout

An aerial image of the existing site layout is presented in Figure 3.




**Figure 3 Existing Site Layout and approximate boundary (Image C/O Google Earth)**

## 1.5 Scope of Works

The scope of works of this ESA was to:

- Conduct a desktop assessment,
- Drill six (6) soil test holes and collect twenty-one (21) primary soil samples, 13 of which were selected for analysis.
- Collect six (6) primary groundwater samples from 6 groundwater monitoring wells.
- The primary soil and groundwater samples were sent for analysis of total recoverable hydrocarbons (TRH), Benzene Toluene Ethylbenzene Xylene Naphthalene (BTEXN), Polynuclear Aromatic Hydrocarbons (PAH), and lead, at a National Association of Testing Authorities (NATA) accredited laboratory in Melbourne.
- Samples were sent with quality assurance/ quality control (QA/QC) samples including one duplicate soil sample, one duplicate groundwater sample, one interlaboratory split groundwater sample, two rinsate blanks and two field blacks plus three trip blanks.
- Review results to determine the absence or presence and if present the level of site contamination and compare results against the relevant guidelines.
- Develop a conceptual site model (CSM) for the site to assess specific potential ecosystem and human health receptors and assess all risks with respect to proposed future land use.
- Provide recommendations for managing potential contamination on site.

# 2 PLANNING

## 2.1 Overview

The client has requested an Environmental Site Assessment (ESA) of the site prior to a potential site redevelopment into the Southern Beaches Learn to Swim Centre.

## 2.2 Interim Planning Scheme

### *2.2.1 Acceptable Solutions*

Although the development site does not have a history of contaminating activites the historical use of the adjacent site suggests that potentially contaminating activities have taken place on that site. There for any future potential ***excavation*** at the Site, must address E2.6.2 P1 performance criteria of the potentially contaminated land code.

### *2.2.2 Excavation Works E2.6.2 P1*

As there is proposed excavation works at the Site, there are no acceptable solutions to proposed works, E2.6.2 P1 performance criteria are to be addressed. The performance criteria identify that the excavation works must not adversely impact on health and the environment, having regard to:

(a) an environmental site assessment that demonstrates there is no evidence the land is contaminated; or

(b) a plan to manage contamination and associated risk to human health and the environment that includes:

  i. an environmental site assessment;

  ii. any specific remediation and protection measures required to be implemented before excavation commences; and

  iii. a statement that the excavation does not adversely impact on human health or the environment.

### *2.2.3 Statement of Suitability*

*A statement based on the results of the Environmental Site Assessment that the excavation as part of the planned works will not adversely impact on human health or the environment is to be provided (subject to implementation of any identified remediation and/or protection measures as required).*

# 3 DESKTOP STUDY

## 3.1 Site Zoning

The site is zoned *Utilities* under the Sorell Council Interim Planning Scheme of 2015, see Figure 4. The land use surrounding the site is consistent with land use and including the following zoning; *Community Purpose, Recreation, Open Space, Local Business, Rural Living, Rural Resource, Utilities and Low Density Residential.*

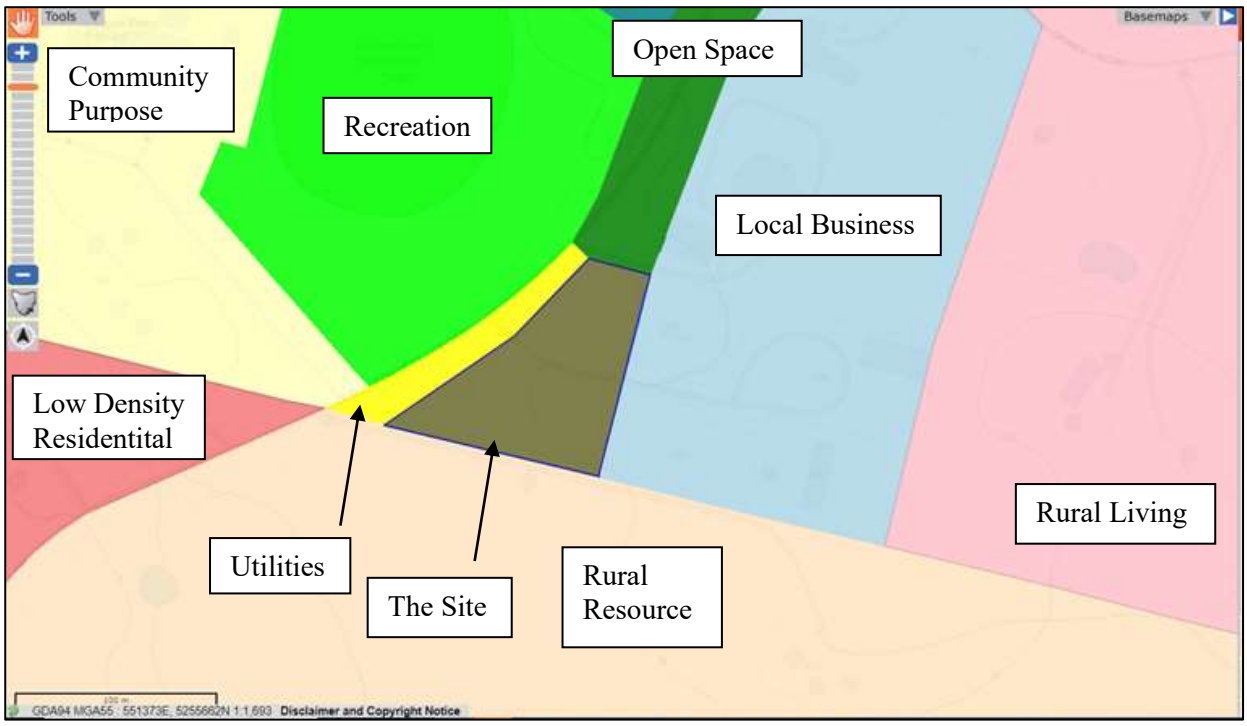



**Figure 4 Council planning zones (2015), site outlined in blue, image sourced the LIST**

## 3.2 Site Walkover

A site walkover was completed by GES staff on the following dates 5th March 2021 along with site visits on the 18th and 22nd March 2021. Photographs of the site are presented in Plate 1 to Plate 4 and Appendix 2.

### *3.2.1 Surface Coverings*

The site is vacant land, the surface condition across the site predominantly grassed, with some scattered eucalyptus trees. There is a small shed containing an abandoned remediation bore and several groundwater monitoring wells associated with previous groundwater investigations of the former United Service Station 100m to the northeast.

### *3.2.2 Signs of Contamination*

There were no obvious signs of contamination such as odour, staining or denuded vegetation that were observed during the site walkover. However, it was noted during the groundwater monitoring event that water from most monitoring wells had a slight to discernable hydrocarbon odour.



**Plate 1 Typical surface at the site**



**Plate 2 Small shed at the site which houses an abandoned remediation bore**



**Plate 3 Example of Groundwater Monitoring Well covers located across the site**



**Plate 4 Former Service Station building north of the site**

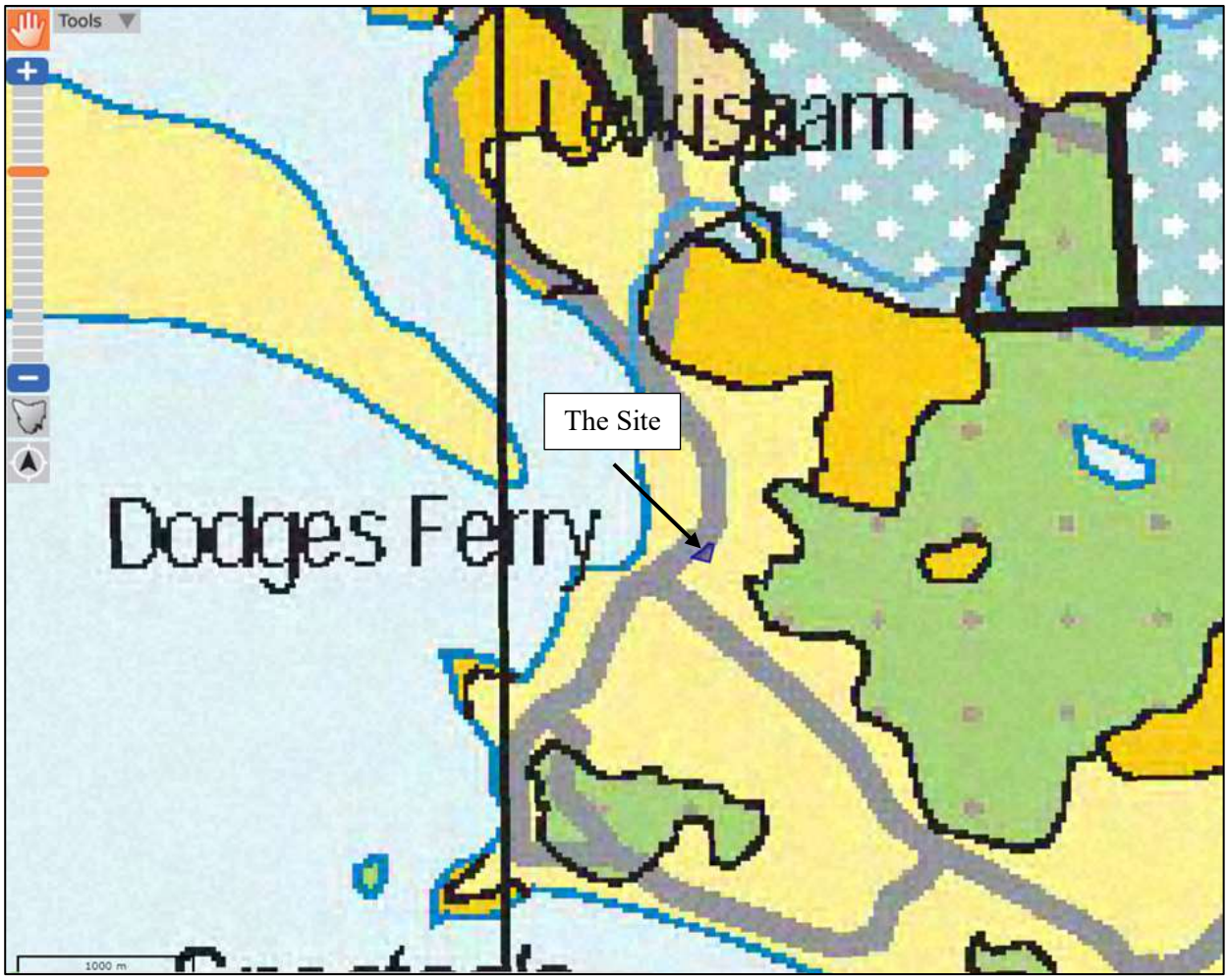
## 3.3 Sorell Council

Sorell Council was contacted on the 15 April 2021 and Greg Robertson confirmed the following;

- The vacant block is owned by Sorell Council.
- 521 Old Forcett Road had hosted a Mobil Service Station in the 1990s and a United Service Station more recently. The site owned by NORVAC PTY LTD. There was a contamination issue at that site which was regulated by the Environmental Protection Authority (EPA) Tasmania.
- A Remediation Notice (RN) 8680/1 was removed from the site in 2015 by the EPA Tasmania See Appendix 3 for the letter.

## 3.4 MRT Geology Mapping

The geology of the site is mapped as Quaternary sediments, see Figure 5. Nearby geological units include; Permian - Triassic quartz sandstone (Rq), Jurassic dolerite (Jd), Tertiary sediments (Ts) and Permian upper glaciomarine sequences (Pu). The site is likely to feature deep soil profiles.




***Qh –*** *Quaternary sediments, Sand gravel and mud of alluvial, lacustrine and littoral origin*

**Figure 5 Mineral Resources Tasmania 1:25000 Scale Mapping (The LIST).**

## 3.5 Site Topography, Drainage & Hydrogeology

The topography of the area, and inferred groundwater flow is illustrated in Figure 6. The site is largely flat, with slight fall to the west at around 2% slope angle. The site is located approximately 10m ASL. There is an unnamed minor drainage line south of the site. Groundwater is likely to travel in a westerly direction towards Okines Beach at the mouth of the bay of Pit Water.

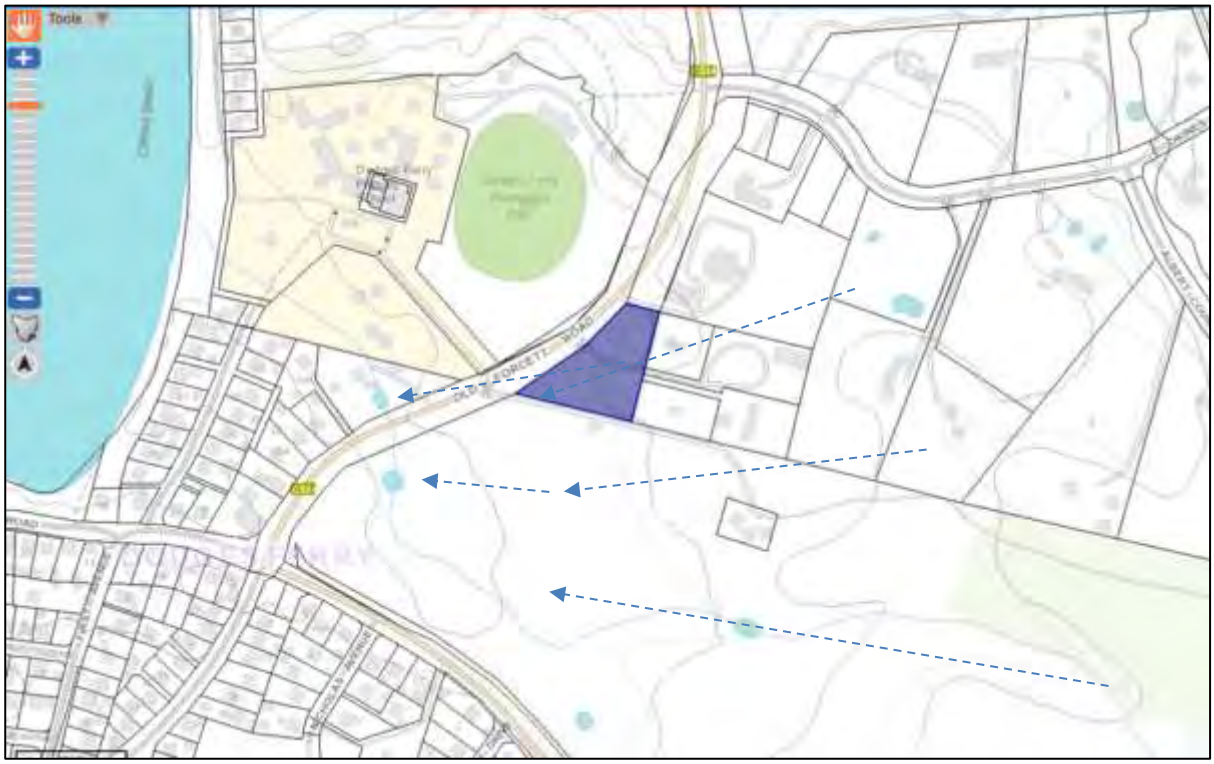


**Figure 6 Inferred Groundwater Flow**



**Figure 7 Google Earth Image, 2011 showing surface drainage south of the site**

## 3.6 Historical Aerial Photography Interpretation

A historical aerial photograph from 1948 was sourced from Department of Primary Industries Parks Water and Environment (DPIPWE) see Plate 5, and the 2005 to 2020 period was reviewed through Google Earth. Some extracted images are presented chronologically in Plate 6 to Plate 8.

In 1948 the site and surrounding properties were vacant land. Recent images confirmed a service station situated on the adjacent property at 521 Old Forcett Road, plus the presence of the Redline Depot at 523 Old Forcett Road which may house underground fuel storage and storage buildings at 525 Old Forcett Road; a self-storage facility owned by GALA (TAS) PTY LTD.



**Plate 5 Aerial photograph of the site January 1948 (source DPIPWE)**




**Plate 6 Aerial photograph of the site 4 January 2019 (source Google Earth)**




**Plate 7 Aerial photograph of the site 1 February 2014 (source Google Earth)**




**Plate 8 Aerial photograph of the site 28 June 2011 (source Google Earth)**

## 3.7 Previous Site Investigations

Although the Site is a vacant block; the former service station at 521 Old Forcett Road, Dodges Ferry immediately northeast of the site is a known previously contaminated site. Known previous work relating to that contamination is as following:

- GES, 2016. *Contamination Assessment Lot 1 Carlton River Road, Dodges Ferry. Version 3.* Geo Environmental Solutions. 27 January 2016.
- EPA Tasmania, 2015. *521 Old Forcett Road, Dodges Ferry, Tasmania. Completion of Remediation Notice (RN) 8680/1.* For full letter, see Appendix 3.
- GES, 2015. *Limited Scope Contamination Assessment – Lot 1 Old Forcett Road.*
- Cromer, 2011. *Dixon: Proposed Subdivision - Site Contamination Issues in Relation to 521 Old Forcett Road*. Letter Report.
- SMEC, 2010. *Groundwater Monitoring Event (GME) – 521 Old Forectt Road, Dodges Ferry*.
- GHD also did investigation work in 2009 but GES does not have a copy of these reports at the time of reporting.

Note. The tanks at service station were decommissioned in 2011 according to the WorkSafe Tasmania documentation, see Section 3.8 Dangerous Goods Records (WorkSafe Tasmania).

**GES, 2016. *Contamination Assessment Lot 1 Carlton River Road, Dodges Ferry. Version 3.* Geo Environmental Solutions. 27 January 2016.**

The area south of the current investigation area was assessed for potential contamination in relation to a potential rural living residential subdivision. There were no risks to human health or environment identified as part of the soil investigation. There were detections of benzene, ortho-xylene and naphthalene in groundwater in well DB1 which is situated on the fence between the two properties. This location was not recommended for residential construction and presented a potential human health risk.

**EPA Tasmania, 2015. 521 Old Forcett Road, Dodges Ferry, Tasmania. Completion of Remediation Notice (RN) 8680/1.**

The letter from the EPA Tasmania concluded that the full requirements of the Remediation Notice (RN) # 8680/1 on the site of 521 Old Forcett Road had been met and the RN was withdrawn from the title.

**GES, 2015. *Limited Scope Contamination Assessment – Lot 1 Old Forcett Road.***

Assessment related to potential hydrocarbon contamination from the former Mobil Service Station that operated mid 1990s. Three wells on the property of Lot 1 Old Forcett Road were sampled. Low levels of hydrocarbons were detected and an exceedance of Australian Drinking Water Guidelines in MW15 (outside the current investigation area).

**Cromer, 2011. Dixon: Proposed Subdivision - Site Contamination Issues in Relation to 521 Old Forcett Road. Letter Report.**

Cromer agreed with the findings from the SMEC 2010 report.

**SMEC 2010**

Groundwater Monitoring Event – 521 Old Forcett Road, Dodges Ferry, Tasmania, 19 January 2010 SMEC. GME completed for United Petroleum. Phase Separated hydrocarbons detected in 4 bores on site. A general decrease in contamination levels may indicate that there has been a migration of the contaminant plume. The variation in depth to water struck across the wells indicates that different aquifers have been intersected. Some bores may be screened over multiple aquifers. At the time there were 3 UPSS remaining on site.

SMEC referenced an Environmental Protection Notice (EPN) # 575/1. The also recommended ongoing monitoring and a Remediation Action Plan. There was also reference to a report by GHD 2009, United Petroleum – Report for Dodges Ferry Groundwater Monitoring. March 2009 GME.

Wells sampled in the current program that previously recorded PSH included PW1 & MW11A.

## 3.8 Dangerous Goods Records (WorkSafe Tasmania)

WorkSafe Tasmanian provided a Statutory Declaration, see Appendix 4 that the following tanks were removed from the United Dodges Ferry Service Station at 521 Old Forcett Road, Dodges Ferry on the 15 August 2011:

- 1x50 000lt fuel tank
- 1x20 000lt fuel tank
- 1x2 000lt fuel tank

GES confirmed with WorkSafe Tasmania (Case, Pers. Comm, 15 April 2021) that they do not hold any fuel storage records for the current Redline bus depot at 523 Old Forcett Road.

## 3.9 EPA Tasmania

An Environmental Protection Authority (EPA) Tasmania Archive and Document Search form was submitted to the EPA Tasmania on the 15th April 2021. The response is attached in Appendix 5. EPA Tasmania do not hold any records for the site however it holds many records relating to the former Service Station at 521 Old Forcett Road. The most recent report was received in December 2014 and was titled the 'Remediation and Validation Report: 521Old Forcett Road, Dodges Ferry, Tasmania.'

The data available on the EPA Tasmania Regulated Premises layer on The LIST has been consulted. The EPA Tasmania layers on The LIST (2020) for underground petroleum storage system (UPSS) (illustrated with a green pin) are presented in Figure 8. The data base confirms that the property adjacent to the site (521 Old Forcett Road) is not a regulated premise and does not contain any UPSS infrastructure. Although a workshop remains, this is consistent with what was observed during the site visits.

The closest regulated premises with active UPSS include the following:

- Dodges Ferry Post Office, 1.2 km south of the site located at 60 Carlton Beach Road, Dodges Ferry.
- Lewisham Service Centre Store, 3 km northwest of the site, located at 96 Lewisham Scenic Drive, Lewisham.

## 3.10 Groundwater

### *3.10.1 Potential Up-Gradient Contamination Sources*

The following up-gradient contamination sources have been identified:

- The former United Service Station at 521 Old Forcett Road, Dodges Ferry.

### *3.10.2 Downgradient Ecosystem Receptors*

Groundwater is likely to tend westerly towards Okines Beach at the mouth of the bay of Pit Water; approximately 400m from the site.

### *3.10.3 Registered Water Bores*

Mineral Resources Tasmania registered water bore reports are presented in Appendix 6 and illustrated in Figure 9. A total of 4 boreholes were identified within 200m of the site are either capped or abandoned including Bore ID 16521, 16552, 3344 and 3353. These bores ranged from 18 to 80 m deep and geology consisted of either mudstone and or sandstone. Therefore, there are no bores proximal to the site that could be impacted by any potential contamination.




**Figure 8 EPA regulated premises and UPSS**

## 3.11 Potential Contamination Issues

### *3.11.1 Areas of Potential Concern*

The entire site is considered an area of potential concern due to the proximity to the former United Service Station located at 521 Old Forcett Road. The potential contamination sources are the fuel storage systems operating on the site until 2010 and a total of 3 tanks were removed from site on the 15 August 2011 (WorkSafe Tasmania, 2021) including 1x50 000 lt fuel tank; 1x20 000lt fuel tank and 1x2 000lt fuel tank.

Other potential offsite sources include the following:

- 523 Old Forcett Road – Redline depot has the potential for fuel storage.
- 525 Old Forcett Road – Self storage site has a wash down area.

### *3.11.2 Contaminants of Potential Concern*

Contamination from the site source from above ground and underground fuel storage systems, and dispensing infrastructure. COPC include the following:

- Total Petroleum/Recoverable Hydrocarbons (TPH/TRH);
- Mono Aromatic hydrocarbons: Benzene, Toluene, Ethylbenzene, Xylene (BTEX);
- Polynuclear Aromatic Hydrocarbons (PAH); and
- Lead.

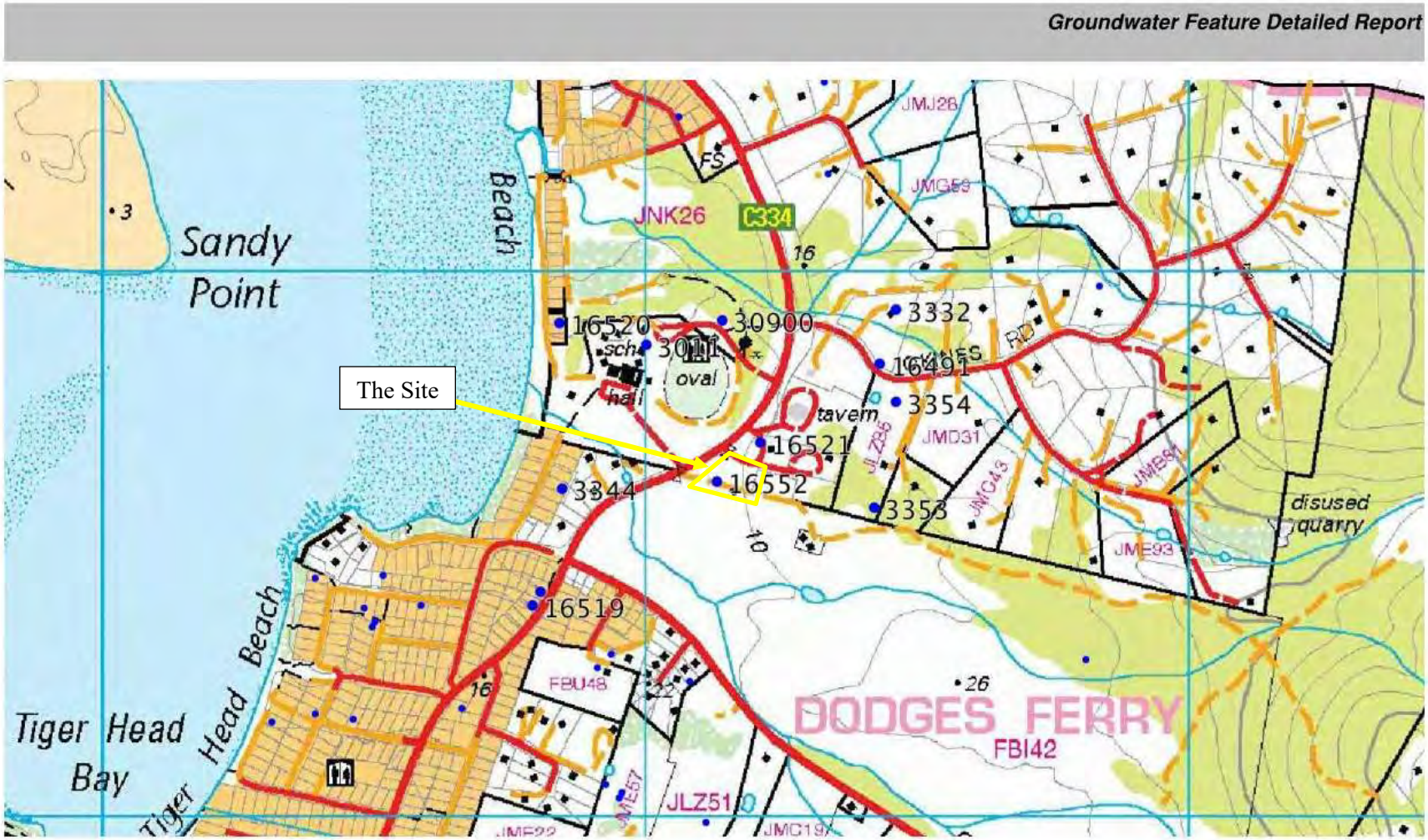



**Figure 9 Groundwater Bores (source DPIPWE Water Resources Tasmania Access Portal)**

# 4 FIELD INVESTIGATION PROCEDURES

## 4.1 Works Summary

There were three site visits conducted during this investigation, see Table 2 for the details. In summary, soil bores were drilled, soil samples collected plus groundwater was sampled. See Figure 10 for the soil bore location and groundwater monitoring well used in the current investigation. See Appendix 7 for Field Notes.

**Table 2 Site Visit Details**

| Date | Details / Comments |
|---|---|
| 5th March 2021 | Site walkover to confirm current site conditions. |
| 18th March 2021 | Soil boring and sampling, SB01 to SB06. |
| 22nd March 2021 | Limited Groundwater Monitoring Event of wells in the footprint of the proposed pool excavations. Wells sampled included PW1, MW12, IT1, MW11, MW11A. |

## 4.2 Soil Investigation

### *4.2.1 Borehole Drilling*

A total of six holes were drilled for sampling for contamination impact. The test holes BH1, BH2 and BH7 were drilled by GES using the industry recognized Geoprobe direct push drilling system. The selected drilling method involved using a Geoprobe dual tube to retain wall integrity and eliminates risk of profile collapse whilst allowing extraction of 1.0 m length sample cores.

### *4.2.2 Soil Sampling*

Soil sampling was conducted per the National Environmental Protection Measure (NEPM ASC 2013) and AS4482 sampling guidelines. Table 3 presents a summary of the soil assessment methodology adopted at the Site.

**Table 3 Summary of Soil Sampling Methods**

| Activity | Details / Comments |
|---|---|
| Drilling Method | Geoprobe direct push drilling and 65mm hand auger to clear services. |
| Soil Logging | Logging the soil was conducted in accordance with the unified soil classification system (USCS) as detailed in AS1726 (1993). |
| Decontamination of Sampling Equipment | Quantum Clean Laboratory Detergent (R213) was used to decontaminate reusable sampling equipment (hand auger) between each borehole sampling event. |
| Soil Screening | In accordance with AS4482.2. Individual soil samples were collected at 0.5 intervals below ground surface (BGS) and/or change in geology. Screening for volatile fractions using a photoionisation Detector (PID) was not undertaken. |
| Laboratory Soil Sample Collection | In accordance with AS4482.2. All samples were collected using disposable nitrile gloves. Samples were selected for laboratory analysis at; 0.1-0.2m BGS, 0.5-0.6m BGS, 1.0-1.1m BGS, 2.0-2.1m BGS and 2.4-2.5m BGS where the depths could be achieved.<br>A minimum number of samples were carefully selected which would provide enough information to delineate potential soil contamination. The remaining samples were placed on hold. |
| Sample preservation | Samples were placed into a jar for laboratory analysis. Soil jars were placed in a pre-chilled cool box with ice bricks. |
| Sample holding times | Sample holding times were within acceptable range (based on NEPM ASC B3-2013), time from collection to extraction. |

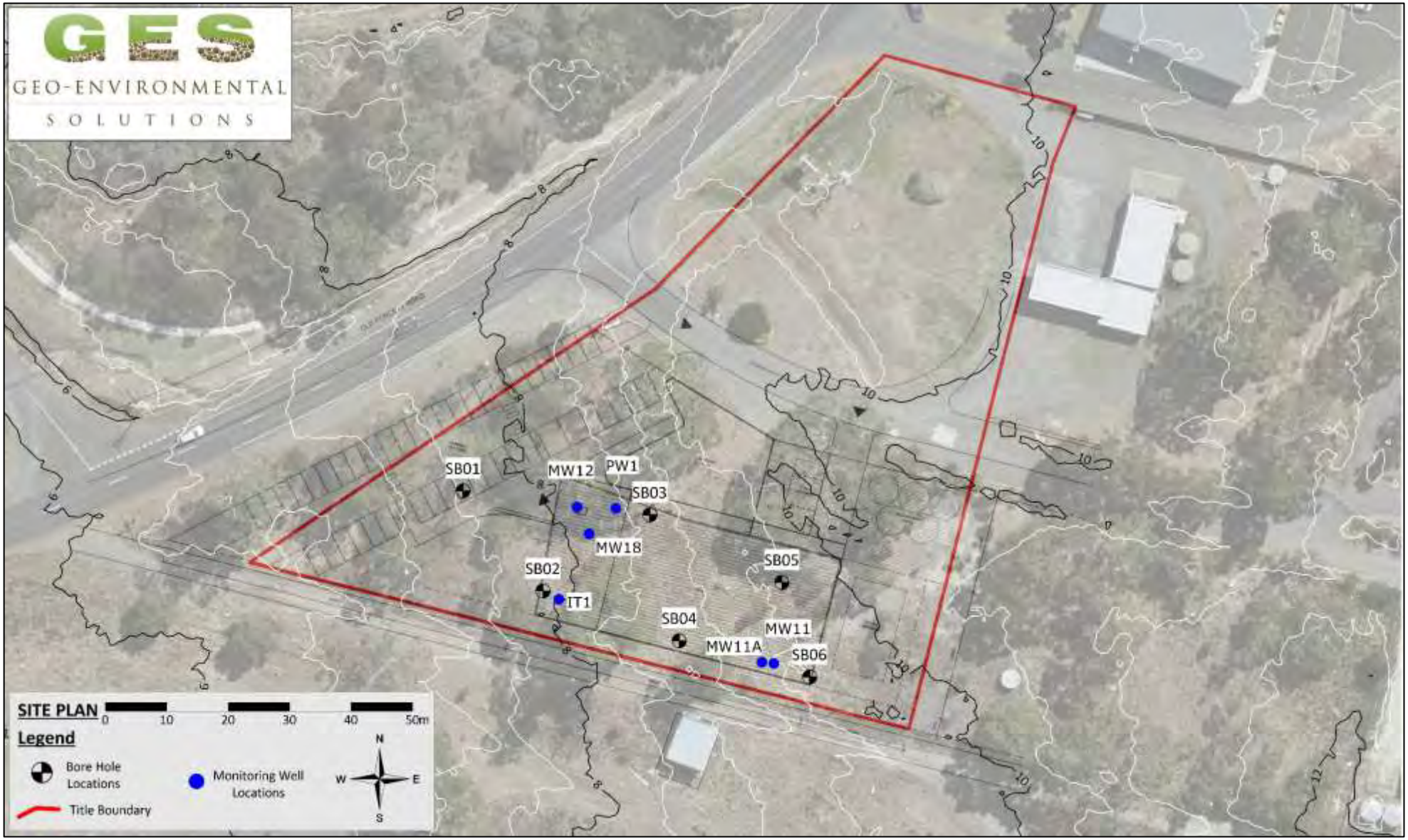



**Figure 10 Borehole & Groundwater Monitoring Well Location in the Investigation Areas**

### *4.2.3 Soil Analysis*

Primary and QC samples were submitted to Analytical Laboratory Services (ALS), Springvale, Melbourne for analysis. A total of 21 primary samples were collected and 13 were selected for analysis.

Chain of Custody (COC) documentation was completed and is provided in Appendix 8 along with the Sample Receipt Notification (SRN) for each batch. Table 4 presents a summary of the laboratory analyses undertaken.

**Table 4 Overview of Soil Analysis and Quality Control**

| Analytes | Primary Samples | Duplicate[a] | ILS[b] | Trip Blank[c] | Rinsate Blank[d] | Field Blank[e] |
|---|---|---|---|---|---|---|
| TPH | 13 | 1 | - | 1 | 1 | 1 |
| BTEX | 13 | 1 | - | 1 | 1 | 1 |
| PAH | 13 | 1 | - | 1 | 1 | 1 |
| Lead | 13 | 1 | - | 1 | 1 | 1 |

Sampling Quality Control Standards (AS4482):
a – Duplicate one (1) in twenty (20) primary samples
b – Inter-lab duplicate split sample one (1) in twenty (20) primary samples
c – Trip blank one per eski where hydrocarbon odour is discernible
d – Single rinse sample per sampling day
e – Field blank sample per sampling day

Given lead was analysed, there was a requirement to assess the following soil physical properties to determine soil threshold investigation levels: Soil grain class (sand/silt or clay); % Clay content; Cation exchange capacity (CEC); and Soil pH. The soil physical properties were based on knowledge of similar soil types encountered around the greater Hobart area.

## 4.3 Groundwater Assessment

### *4.3.1 Monitoring Well Establishment*

A total of 6 existing wells were utalised for the current investigation. The locations of the wells are illustrated in Figure 10.

### *4.3.2 Well Sampling*

Table 5 summarises the procedures for monitoring well gauging and sampling.

**Table 5 Summary of Monitoring Well Gauging and Sampling Procedures**

| Activity | Procedure Details |
|---|---|
| Groundwater Gauging | All groundwater wells were gauged for standing water levels (SWL) from top of casing (TOC) and the presence of Phase Separated Hydrocarbons (PSH) using a Solinst water/oil/air Interface Probe (IP). |
| Groundwater Extraction Method | Groundwater was extracted from the well using Geoprobe peristaltic pump. |
| Groundwater Purging | To ensure a representative groundwater sample could be collected, groundwater was purged three (3) times the volume of the well (6 x water column) or purged dry using the chosen groundwater extraction method for well development.<br>The following physiochemical parameters (PCP's) were monitored whilst purging to ensure that the aquifer and groundwater parameters had stabilised to within 10% variation of the previous reading:<br>• Reduction / Oxidation potential (REDOX);<br>• Temperature;<br>• pH; and<br>• Electrical conductivity (EC). |
| Decontamination Procedure | Dedicated equipment was used for each monitoring well. |
| Sample preservation | Following groundwater purging, all groundwater samples were collected in laboratory supplied receptacles, labelled, chilled, and delivered with a COC to National Association of Testing Authorities (NATA) certified laboratories for analysis within the prescribed holding time. |
| Sample holding times | Sample holding times were within acceptable range (based on NEPM B3-2013) from collection to extraction. |

### *4.3.3 Groundwater Analysis*

Primary and QC groundwater samples were submitted to Analytical Laboratory Services (ALS), Springvale, Melbourne for analysis. A total of 6 primary samples were selected for analysis. Secondary Laboratory samples (Water ILS) were sent to ALS Smithfield NSW.

Table 6 presents a summary of the sample analysis including the QC sampling based on AS5667.1 and AS5667.11. Chain of Custody (COC) documentation was completed and is provided in Appendix 8 along with the Sample Receipt Notification (SRN).

**Table 6 Overview of Groundwater Analysis and Quality Control**

| Analytes | Primary Samples | Duplicate[a] | ILS[b] | Trip Blank[c] | Rinsate Blank[d] | Field Blank[e] |
|---|---|---|---|---|---|---|
| TPH | 6 | 1 | 1 | 1 | 1 | 1 |
| BTEX | 6 | 1 | 1 | 1 | 1 | 1 |
| PAH | 6 | 1 | 1 | 1 | 1 | 1 |
| Lead | 6 | 1 | 1 | 1 | 1 | 1 |

Sampling Quality Control Standards (AS4482):
a – Duplicate one (1) in twenty (20) primary samples
b – Inter-lab duplicate split sample one (1) in twenty (20) primary samples
c – Trip blank one per eski where hydrocarbon odour is discernible
d – Single rinse sample per sampling day
e – Field blank sample per sampling day

# 5 QUALITY CONTROL

All Field and laboratory Quality Assurance and Quality Control (QA/QC) details and outputs are presented in Appendix 9.

## 5.1 Field

It is standard to expect up to 10% error in field duplication and up to 10% laboratory error. Therefore, in theory up to 20% error can be assumed on duplicate analysis. Some variation may exist in soil and groundwater because even though all efforts are made to split samples homogeneously, fragments of materials may bias samples in certain elements.

Relative Percentage Differences (RPDs) for the duplicate and triplicate samples where applicable are calculated using the method outlined below.

The acceptance criteria used for the RPDs depend on the levels of contaminants detected and the laboratory's Method Detection Limits. The closer the levels detected are to the MDL the greater the acceptable RPD. RPDs are calculated as follows:

- RPD <50% for low level results (<20 * MDL)
- RPD <30% for medium level results (20-100 * MDL)
- RPD <15% for high level results (>100 * MDL)
- No limit applies at <2 * MDL (Method Detection Limit)

Field QA/QC procedures and compliance are summarised in Table 7

**Table 7 Soil Sampling Field QA/QC procedures and Compliance**

| QA/QC Requirement | Compliance | Comments |
|---|---|---|
| Appropriate sampling strategy used and representative samples collected | Yes | Sampling program was undertaken in accordance with AS4482.1-2005 |
| Appropriate and well documented sample collection, handling, logging and transportation procedures. | Yes | Appropriate and well documented |
| Decontamination | Yes | Appropriate decontamination such as cleaning tools before sampling and between sample locations was undertaken |
| Chain-of-custody documentation completed | Yes | COC were completed in accordance with NEPM ASC Schedule B2, Section 5.4.5 and transported under strict COC procedures. The signed COC documents are included in this report, which includes the condition report on arrival of samples to the Laboratory, cross checking of sample identification and paperwork and preservation method. |
| Required number of splits: Duplicate & inter-lab splits: 1 per 20 primary samples | Yes/No | One duplicate sample was collected and tested, for 13 primary samples, as per AS4482.1-2005. An inter-laboratory split sample was not collected. |
| QA/QC samples reported RPD's within indicated MDL guidelines. | Yes | For 'Duplicate Soil' and 'SB02 0.1-0.2' pairs, there were no non-compliances. |
| Required numbers of rinse blank samples collected with no laboratory detections? | Yes | One rinse blank sample was collected as per AS4482.1-2005 and no detections were identified. |
| Trip blanks collected with no laboratory detections? | Yes | According to AS4482.2-1999, soil trip blanks are required where volatile hydrocarbons are discernible. Although there was no odour noted in soils; the soil samples were sent with the water samples where odour had been noted. |
| Field blanks collected with no laboratory detections? | Yes | One field blank sample was collected as per AS4482.1-2005 and no detections were identified. |
| Samples delivered to the laboratory within sample holding times and with correct preservative | Yes | All samples were sent to the laboratory with correct preservative, and within required holding time. |

**Table 8 Groundwater Sampling Field QA/QC procedures and Compliance**

| QA/QC Requirement | Completed | Comments |
|---|---|---|
| Appropriate sampling strategy used and representative samples collected | Yes | Sampling program was undertaken in accordance with AS4482.1-2005 |
| Appropriate and well documented sample collection, handling, logging and transportation procedures. | Yes | Appropriate and well documented |
| Chain-of-custody documentation completed | Yes | All samples were transported under strict COC procedures and signed COC documents are included in this report. |
| Required number of duplicate and ILS samples collected (1:20) | Yes | 6 Primary samples plus 1 duplicate sample and 1 inter-laboratory split (ILS) sample were collected and selected for analysis. |
| QA/QC samples reported method detection limits within indicated guidelines. | Yes | Duplicate and sample PW1 reported no difference in results. ILS and PW1 reported no difference in results. |
| Required numbers of field and rinse blank samples collected | Yes | A field blank and a rinsate blank was collected. |
| Samples delivered to the laboratory within sample holding times and with correct preservative | Yes | All samples were sent to the laboratory within holding times and correct preservative. |

## 5.2 Laboratory

Soil and groundwater laboratory QA/QC procedures and compliance are summarised in Table 9.

**Table 9 Sample Laboratory QA/QC Procedures and Compliance**

| QA/QC Requirement | Compliance | Comments |
|---|---|---|
| All analyses NATA accredited | Yes | ALS Laboratories is NATA Accredited. Appropriate analytical methods used, in accordance with Schedule B(3) of the NEPM ASC 2013. Acceptable laboratory limits of reporting (LORs) adopted. |
| Method Blanks: zero to <Practical Quantitation Limit (PQL) | Yes | There were no method blank value outliers in the QCI reports. |
| Laboratory Control Samples: 70% to 130% recovery for soil. | Yes | There were no Laboratory Control Samples outliers in the QCI reports. |
| Matrix spikes: 70% to 130% recovery for organics or 80%-120% recovery for inorganics | Yes | There were no Matrix spike outliers in the QCI reports. |
| Duplicate Samples: 0% to <20% RPD. | Yes | There were no duplicate sample RPD outliers in the QCI reports. |
| Surrogates: 70% to 130% recovery | No | There were surrogate recovery outliers in QCI report EM2104986 for groundwater sample MW11A recovery was greater that upper data quality objectives. |
| Analysis holding time outliers | Yes | There were no laboratory control outliers in the QCI report. |
| Quality Control Sample Frequency Outliers | No | For EM2104986: For PAH/Phenols and TRH of laboratory duplicates the NEPM 2013 B3 & ALS QC Standard.<br>For ES2110567: For PAH/Phenols and TRH of laboratory duplicates and Matrix spikes the NEPM 2013 B3 & ALS QC Standard. |

# 6 FIELD INVESTIGATION FINDINGS

## 6.1 Soil Bores

### *6.1.1 Geological Interpretation*

See Appendix 2 for photographs of material samples and Appendix 11 for the Soil Bore logs. The material encountered across the site was consistent with the MRT geology mapping of Quaternary sediments. Across the site the material was similar in nature and consisted of a mix of sand, siltstone and mudstone and minor clay. The following can be summarised for the soil across the site:

- 0.0-0.2 – SAND dark grey, fine grained, loose and dry
- 0.2-1.4 – SILTY SAND (clayey SILT) fine grained, pale grey to dark red-brown, dry and med-dense to dense
- 1.4-2.4 – SANDY SILTSTONE; CLAYEY SILT to SILTY CLAY low plasticity grey – pale brown-yellow, dry very stiff
- 2.4-2.5 – SILTY SANDSTONE with refusal at 2.5 on weathered dark orange-brown silt stone in SB01

### *6.1.2 Grain Class Interpretation*

Grain size classifications are applied to all soils at the site to determine threshold screening level concentrations for hydrocarbons (and chromium) to assess soil ecological and human health risks.

Grain class threshold values are determined based on either the:

- sample grain size (in the case of ecological screening levels or chromium limits); or
- average grain class overlying the sample point (when assessing petroleum vapour screening levels) relative to the proposed finished floor level.

Table 10 provides a summary of the grain class averages for material overlying the sample.

**Table 10 Summary of Grain Class Based on USCS Classification**

| Sample | Footing Excavation Depth^ - Red Fill Thickness^ - Green | Sample PVI Depth (m) Relative to Slab/Cut Depth | Soil Grain Size Class Averaging Above Soil Sample | | | | | | | | | | | | | | | | | Crawl Space Thickness (m) | Attenuation | | | Petroleum Vapour Intrusion HSL Grain Class* | SAMPLE USCS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GW | GP | GM | GC | SW | SP | SM | SC | ML | CL | OL | MH | CH | OH | CI | Rock (R) | Existing Pavement (P) | | Proposed CONCRETE (CH) | Crawl Space | Biodegradation | | |
| SB01 0.1-0.2 | 0.4 | 0.1 | | | | | 0.1 | | | | | | | | | | | | | NA | | 1.0 | 1.0 | SAND | SW |
| SB01 1.0-1.1 | 0.4 | 1.0 | | | | | 0.2 | | 0.3 | | | 0.5 | | | | | | | | NA | | 1.0 | 1.0 | CLAY | CL |
| SB01 2.4-2.5 | 0.4 | 2.4 | | | | | 0.2 | | 0.3 | | 1.0 | 0.9 | | | | | | | | NA | | 1.0 | 1.0 | SILT | ML |
| SB02 0.1-0.2 | 0.7 | 0.2 | | | | | | | 0.1 | | | | | | | | | | | NA | 0.1 | 1.0 | 1.0 | SAND | SM |
| SB02 2.0-2.1 | 0.7 | 1.7 | | | | | | | 0.1 | | 0.5 | 1.0 | | | | | | | | NA | 0.1 | 1.0 | 1.0 | CLAY | ML |
| SB03 0.1-0.2 | 1.7 | < | | | | | | | | | | | | | | | | | | NA | 0.1 | 1.0 | 1.0 | CLAY | SM |
| SB03 1.0-1.1 | 1.7 | < | | | | | | | | | | | | | | | | | | NA | 0.1 | 1.0 | 1.0 | CLAY | CL |
| SB04 0.1-0.2 | 1.5 | < | | | | | | | | | | | | | | | | | | NA | 0.2 | 1.0 | 1.0 | CLAY | SM |
| SB04 1.0-1.1 | 1.5 | < | | | | | | | | | | | | | | | | | | NA | 0.2 | 1.0 | 1.0 | CLAY | CL |
| SB05 0.1-0.2 | 2.2 | < | | | | | | | | | | | | | | | | | | NA | 0.2 | 1.0 | 1.0 | CLAY | SM |
| SB05 1.0-1.1 | 2.2 | < | | | | | | | | | | | | | | | | | | NA | 0.2 | 1.0 | 1.0 | CLAY | CL |
| SB06 0.5-0.6 | 2.2 | < | | | | | | | | | | | | | | | | | | NA | 0.2 | 1.0 | 1.0 | CLAY | SM |
| SB06 2.0-2.1 | 2.2 | 0.3 | | | | | | | | | | 0.1 | | | | | | | | NA | 0.2 | 1.0 | 1.0 | CLAY | CL |

### *6.1.3 Soil Contamination Observations*

No staining or odour of hydrocarbon contamination was observed during the soil investigation.

## 6.2 Site Groundwater

### *6.2.1 Borehole Hydrogeology & Well Construction*

All wells sampled were pre-existing monitoring wells. Table 13 presents a summary of the groundwater monitoring well construction details for relevant wells sampled during the current event, sourced from SMEC, 2010.

**Table 11 Summary of Well Construction and Aquifer Details (SMEC, 2010)**

| Well | DWS* (m) | Top of Screen (m) | Bottom of Screen (m) | Well Depth (m) | Previous PSH Presence |
|---|---|---|---|---|---|
| PW1 | 5.9 | 5.5 | 20.5 | 20.0 | Yes |
| IT1 | - | - | - | - | ? |
| MW11 | 13.9 | 12 | 18 | 18.4 | No |
| MW11A | 8.4 | 7 | 10 | 10.3 | Yes |
| MW12 | 6.7 | 8 | 14 | 18.6 | No |
| MW18 | 7.3 | 9 | 14 | 18.6 | No |

DWS - Depth Water Struck

### *6.2.2 Hydraulic Gradient and Groundwater Flow Direction*

Field results from the groundwater gauging are presented in Appendix 7. Groundwater depths for the gauging event are presented in Table 12. PSH was not detected (gauged) in any of the monitoring wells. Groundwater levels have not been contoured.

**Table 12 Summary of Groundwater Gauging Results**

| Monitoring Well | PW1 | IT1 | MW11 | MW11A | MW12 | MW18 |
|---|---|---|---|---|---|---|
| Well Depth (m) | 20.0 | 18.6 | 18.4 | 10.35 | 18.6 | 18.6 |
| Top of Casing (TOC) Height (mAHD)[1] | 8.4 | 7.9 | 9.4 | 9.3 | 8.2 | 8.4 |
| Groundwater Depth from TOC (m) | 6.2 | 5.2 | 9.6 | 6.7 | 5.0 | 5.5 |
| PSH Thickness (mm) | 0 | 0 | 0 | 0 | 0 | 0 |
| Corrected Groundwater Elevation (mAHD) | 5.7 | 5.0 | 9.1 | 6.2 | 4.5 | 5.0 |

[1]No survey completed. Casing height above ground estimated at 0.5m.Elevation AHD taken from LiDAR.

Inferences about groundwater flow directions have been obtained gauging data during the groundwater investigation.

The groundwater flow direction is inferred to be to the west and the hydraulic gradient is determined to be approximately 2.46 º based on surface elevations between MW11 and IT1, see Table 13.

**Table 13 Summary of Inferred Site Groundwater Flow Directions and Rates**

| Details | Result |
|---|---|
| Groundwater flow direction from the site | West |
| *Hydraulic Gradient Calculations*<br>Upgradient Groundwater Elevation<br>Downgradient Groundwater Elevation<br>Distance Between Upgradient and Downgradient Points<br><br>Hydraulic Gradient | <br><br>9.57m AHD (MW11) to<br>7.99m AHD IT1<br>36.49 m<br><br>2.46º or 0.68% |

### *6.2.3 Hydraulic Conductivity*

Slug testing has not been conducted in aquifers at the site and inferences are made about the aquifer material hydraulic properties. The aquifer is inferred to comprise of a *fractured rock* which would have a hydraulic conductivity in the order of *0.1 to 0.01 m per day* (Freeze & Cherry 1979).

### *6.2.4 Groundwater Flow Rates*

Groundwater flow rates are in the order of 9.92 to 99.28 m per year based on hydraulic calculations presented in Table 16.

**Table 14 Summary of Inferred Groundwater Flow Rates at the Site**

| Applicable Wells | Hydraulic Conductivity (m/year) | Hydraulic Gradient | Effective Porosity | Flow rate (m/year) |
|---|---|---|---|---|
| | **K** | **$i_h$** | **δ** | **(K x $i_h$) / δ** |
| MW11 | 3.65 to 36.5 | 2.46 (0.68%) | 0.25 | 9.9 to 99.2 |

### *6.2.5 Groundwater Physiochemistry*

All purge volumes were attained or the wells were pumped dry before collecting a representative sample for physiochemical analysis and laboratory analysis. Physiochemical parameters were collected whilst purging and a representative value for the aquifer is presented in Table 17.

The following observations can be made during groundwater sampling activities:

- MW18 was almost purged dry.
- There was no discoloration to the groundwater in PW1, MW18. Groundwater was pale brown in MW12 and IT1 and dark grey in MW11A. No colour was recorded for MW11.

**Table 15 Summary of Stabilised Groundwater Properties**

| Parameter | Range | Average | Comment |
|---|---|---|---|
| Temp (°C) | 13.3 (PW1, MW11 & MW11A) to 14.6 (MW18) | 13.38 | Typical groundwater temperature for groundwater within southern Tasmania for autumn. |
| pH | 6.33 (IT1) to 7.77 (MW18) | 6.48 | Indicates slightly alkaline pH conditions for groundwater |
| Redox (mV) | -45.1 (MW12) to 84.9 (MW18) | 32.7 | Indicates that reducing conditions exist beneath parts of the site |
| EC (µs/cm) | 6.78 (MW12) to 12.78 (MW11A) | 9.15 | Indicates highly saline, low quality groundwater |

### *6.2.6 PSH & Groundwater Contamination Observations*

The following field observations were noted when collecting the groundwater samples:

- A slight odour was detected when opening some of the groundwater monitoring wells including PW1, MW11A & MW18.
- A Sheen was noted in MW11A.
- PSH was not observed in any wells samples.

# 7 SOIL ECOLOGICAL IMPACT ASSESSMENT

## 7.1 Protected Environmental Values

The requirement for protecting soil from contaminated activities in Tasmania is managed under the Environmental Management and Pollution Control Act 1994 (EMPCA) which states in Part 5A:

(2) An area of land is a contaminated site if –

(a) there is in, on or under that area of land a pollutant in a concentration that –

(i) is above the background concentration; and

(ii) is causing or is likely to be causing serious or material environmental harm or environmental nuisance, or is likely to cause serious or material environmental harm or environmental nuisance in the future if not appropriately managed;

Potential soil impact at the site is assessed through application of the following environmental investigation guidelines.

## 7.2 NEPM ASC (2013) Guidelines

The following ecological investigation guidelines are to be addressed in order to assess acceptable levels of risk to terrestrial ecosystems:

- NEPM ASC (2013) Ecological Investigation Levels (EIL's) – have been developed for selected metal and organic substances. EIL's depend on specific soil and physicochemical properties and land use scenarios and generally apply to the top two (2) metres of the soil profile (NEPM ASC 2013);
- NEPM ASC (2013) Ecological Screening Levels (ESL's) – have been developed for selected petroleum hydrocarbon compounds and total petroleum hydrocarbon fractions. ESL's broadly apply to coarse- and fine-grained soils and various land use scenarios within the top two (2) metres of the soil profile (NEPM ASC 2013).

Soil analytical results are compared against Ecological Screening Levels (ESL's) and Ecological Investigation Levels (EIL's) limits presented in Table 16.

**Table 16 Summary of Soil Investigation Limits Considered at the Site based in NEPM (2013) ASC**

| **Investigation Levels (IL)** | **Analytes Investigated** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Hydrocarbons** | | | | **Metals** | | **DDT** |
| | **BTEX** | **TRH (F1 to F4)** | **Benzo(a) pyrene (PAH)** | **Naphthalene (PAH)** | **Zn, Cu, Cr(III), Ni & As** | **Lead** | |
| ESL's | Analysed | Analysed | Analysed | | | | |
| EIL's | | | | Analysed | Not Analysed | Analysed | Not Analysed |

## 7.3 Guidelines

### *7.3.1 Ecological Screening Levels*

The following compounds were compared against NEPM (2013) Ecological Screening Levels (ESL's):

- BTEX;
- F1 to F4 TRH; and
- Benzo(a)pyrene

Selection of ESL threshold investigation limits are set out in the NEPM (2013) guidelines and require classification of the soil according to:

- Land use sensitivity:
    - Areas of ecological significance
    - Urban residential and public open space; and
    - Commercial and industrial.

- Dominant particle size passing through a 2 mm sieve into:
    - Coarse – sand sizes and greater; and
    - Fine – clay and silt sizes.

Adopted NEPM (2013) soil and land use classifications are presented below.

### *7.3.2 Ecological Investigation Levels*

There was a requirement to classify the soil according to physicochemical properties given that the above listed compounds. Adopted physicochemical parameters are presented in the results tables.

Selection of EIL threshold investigation limits are set out in the NEPM (2013) guidelines and require classification of the soil per specific soil and physicochemical properties which are presented in the results tables. The adopted land use scenarios presented in Table 17.

**Table 17 Adopted Land Use Scenario For the Various Soil Bores**

| **Land Use Scenario** | **Applicable Soil Bores** |
|---|---|
| Areas of Ecological Significance | |
| Urban Residential & Public Open Space | |
| Commercial & Industrial | All soil bores |

Based on a preliminary assessment of site soil conditions, the following physicochemical properties are applied to assess guideline EIL's:

- Clay content consistent with field observations;
- A soil pH and cation exchange capacity (CEC) consistent with Table 18.

**Table 18 Cation Exchange and Clay content, Adopted For the Site**

| USCS | Clay % | CEC | pH |
|---|---|---|---|
| R | 100.00 | 10.00 | 4.5 |
| GW | 0.00 | 10.00 | 4.5 |
| GP | 0.00 | 10.00 | 4.5 |
| GM | 10.00 | 15.00 | 4.5 |
| GC | 30.00 | 20.00 | 4.5 |
| SW | 0.00 | 10.00 | 4.5 |
| SP | 0.00 | 10.00 | 4.5 |
| SM | 10.00 | 15.00 | 4.5 |
| SC | 20.00 | 20.00 | 4.5 |
| ML | 30.00 | 20.00 | 4.5 |
| CL | 100.00 | 35.00 | 4.5 |
| OL | 50.00 | 35.00 | 4.5 |
| MH | 30.00 | 35.00 | 4.5 |
| CH | 100.00 | 45.00 | 4.5 |
| OH | 100.00 | 60.00 | 4.5 |
| PT | 100.00 | 80.00 | 4.5 |
| P | 0.00 | 0.00 | 4.5 |
| CM | 100.00 | 35.00 | 4.5 |
| CM | 100.00 | 35.00 | 4.5 |
| Rock | 0.00 | 10.00 | 4.5 |

## 7.4 Findings

### *7.4.1 Ecological Screening Levels*

Laboratory analytical results for soil samples are presented in Appendix 12. Table 19 compares soil analytical results against relevant NEPM ESL's. Concentrations which exceeded laboratory levels of reporting (LOR) would be highlighted in bold, and ESL exceedances would be highlighted with a colored cell.

There were no guideline exceedances and no risk to ecological receptors identified.

**Table 19 Summary of Soil Analytical Results Compared with Ecological Screening Level's**

| **NEPM Ecological Screening Levels for Soil** | | | | BTEX | | | | PAH | TRH | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bold - Indicates LOR Exceedances**<br>X - Indicates Sample has been Excavated | | | | Benzene | Toluene | Ethylbenzene | Xylenes | Benzo(a)pyrene | F1 (C6 - C10) | F2 (>C10 - C16) | F3 (>C16 - C34) | F4 (>C34 - C40) |
| Colour Shading - Indicates ESL Exceedances:<br>>1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x | | | | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg |
| Sample ID | Sample Date | Soil Texture Class (fine /coarse) | Land Use | LOR 0.2 | LOR 0.5 | LOR 0.5 | LOR 0.5 | LOR 0.5 | LOR 10 | LOR 50 | LOR 100 | LOR 100 |
| SB01 0.1-0.2 X | 18/3/21 | C | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB01 1.0-1.1 | 18/3/21 | F | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB01 2.4-2.5 | 18/3/21 | F | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB02 0.1-0.2 X | 18/3/21 | C | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB02 2.0-2.1 | 18/3/21 | F | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB03 0.1-0.2 X | 18/3/21 | C | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB03 1.0-1.1 X | 18/3/21 | F | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB04 0.1-0.2 X | 18/3/21 | C | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB04 1.0-1.1 X | 18/3/21 | F | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB05 0.1-0.2 X | 18/3/21 | C | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | **120** | <100 |
| SB05 1.0-1.1 X | 18/3/21 | F | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB06 0.5-0.6 X | 18/3/21 | C | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |
| SB06 2.0-2.1 X | 18/3/21 | F | COM/IND | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <10 | <50 | <100 | <100 |

### *7.4.2 Ecological Investigation Levels*

Laboratory analytical results for soil samples are presented in Appendix 12. Table 20 compares soil analytical results against relevant ecological investigation limits (EIL's). Concentrations which exceeded laboratory LOR would be highlighted indicated in bold, and EIL exceedances would be highlighted with a colored cell.

There were no EIL exceedances.

**Table 20 Soil Analytical Results Compared Against Ecological Investigation Levels**

| **NEPM Ecological Investigation Levels for Soil** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Bold - Indicates LOR Exceedances**<br>X - Indicates Sample Within Inferred Excavation | | | | | | | |
| Colour Shading - Indicates EIL Exceedances:<br>>1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x | | | | | | | |
| Sample ID | Sample Date | EIL Land Use Sensitivity Class | Soil CEC (cmolc/kg) | Soil pH | Soil Texture Class (fine / coarse) | Lead | Naphthalene |
| | | | | | | mg/kg | mg/kg |
| SB01 0.1-0.2 X | 18/3/21 | COM/IND | 10 | 4.5 (3) | C | <5 | <1 |
| SB01 1.0-1.1 | 18/3/21 | COM/IND | 35 | 4.5 (3) | F | 9 | <1 |
| SB01 2.4-2.5 | 18/3/21 | COM/IND | 20 | 4.5 (3) | F | 22 | <1 |
| SB02 0.1-0.2 X | 18/3/21 | COM/IND | 15 | 4.5 (3) | C | <5 | <1 |
| SB02 2.0-2.1 | 18/3/21 | COM/IND | 20 | 4.5 (3) | F | 16 | <1 |
| SB03 0.1-0.2 X | 18/3/21 | COM/IND | 15 | 4.5 (3) | C | <5 | <1 |
| SB03 1.0-1.1 X | 18/3/21 | COM/IND | 35 | 4.5 (3) | F | 7 | <1 |
| SB04 0.1-0.2 X | 18/3/21 | COM/IND | 15 | 4.5 (3) | C | <5 | <1 |
| SB04 1.0-1.1 X | 18/3/21 | COM/IND | 35 | 4.5 (3) | F | 25 | <1 |
| SB05 0.1-0.2 X | 18/3/21 | COM/IND | 15 | 4.5 (3) | C | <5 | <1 |
| SB05 1.0-1.1 X | 18/3/21 | COM/IND | 35 | 4.5 (3) | F | 20 | <1 |
| SB06 0.5-0.6 X | 18/3/21 | COM/IND | 15 | 4.5 (3) | C | <5 | <1 |
| SB06 2.0-2.1 X | 18/3/21 | COM/IND | 35 | 4.5 (3) | F | 24 | <1 |

# 8 SOIL HUMAN HEALTH DIRECT CONTACT ASSESSMENT

## 8.1 Guidelines

Guidelines presented herein are based on potential exposure of human receptors to soil impact which may include:

- Trench workers repairing or building services (typically to 1 m bgs). This classification is not dependent on the land use class.
- Onsite inhabitants which may be exposed to potential shallow soil impact in non-paved areas of the site; and
- Onsite excavation works which may include potential swimming pools (up to 3 m bgs); basement carparks; and deep foundations.

### *8.1.1 Land Use Classification*

The NEPM (2013) guidelines have been referenced to ensure that the correct land use and density category has been adopted for the site and the surrounding properties (where applicable). As per NEPM (2013) guidelines, the adopted land use class is dependent on the building density and the opportunity for soil access by site occupants (exposure to potentially impacted soil). Aspects needing to be considered include:

- Whether the site is of sensitive land use such as a childcare center, preschool, primary school or aged care facility in which case land use Class A is applicable;
- The percentage of paved area to determine direct contact exposure risk and therefore classification as low or high density; and
- Classification based on residential, recreational or commercial/industrial setting.

### *8.1.2 Adopted Land Use Classification*

The adopted land use class is presented in Table 21. Land use class is based on the opportunity for soil access as per NEPM ASC 2013 guidelines. Soil access is anticipated to include future construction workers during site redevelopment, future commercials workers at the swim center and future trench workers conducting routine maintenance.

**Table 21 Summary of Land Use Setting and Density for Determining Exposure Risk**

| Soil Bores | Construction Phase | Location | Land Use | Pathway | Land Use Class |
|---|---|---|---|---|---|
| All soil | During | Site | Construction worker and trench workers | ALL | D and trench worker specific |
| | | Offsite | Nearby commercial land users | DI | D |
| | Post | Site | Future trench workers | ALL | D and trench worker specific |
| | | | Future commercial workers | ALL | D |
| | | | Future potential recreational land users | ALL | C |

DC – Dermal Contact - Trench Worker Guidelines (CRC CARE 2013)
DI – Dust Inhalation - HIL Guidelines (NEPM ASC 2013)
SI – Soil Ingestion - HIL Guidelines (NEPM ASC 2013)
ALL – All of above

### *8.1.3 Health Investigation & Screening Levels*

The main exposure pathways and methods for assessing heath risk from contaminated soils are presented in Table 22.

**Table 22 Summary of Exposure Pathways and Preliminary (Tier 1) Methods for Assessing Human Exposure Risk**

| Exposure Scenario | Contaminant Type | Tier 1 Assessment Method | Reference |
|---|---|---|---|
| Vapour Inhalation – Indoor (PVI) | Petroleum Hydrocarbons | HSL's (addressed in PVI sections) | NEPM ASC (2013) |
| Vapour Inhalation – Trench (PVI) | | | CRC CARE (Friebel & Nadebaum, 2011) |
| Dermal Contact | | HSL's | |
| Dust Inhalation | Lead, PAH's | Health Investigation Levels (HIL's) | NEPM ASC (2013) |
| Soil Ingestion | | | |

PVI – Petroleum Vapour Intrusion

## 8.2 Findings

### *8.2.1 Dermal Contact - Petroleum Hydrocarbons*

Laboratory analytical results for soil samples are presented in Appendix 12. Table 23 presents soil hydrocarbon analytical results compared against CRC CARE (Friebel & Nadebaum, 2011) Health Screening Levels (HSL) guidelines for assessing dermal contact risk. Concentrations which exceeded laboratory LOR are highlighted in bold, and any HSL exceedances would be highlighted with a colored cell indicating the highest HSL land used class which is exceeded.

There was one detection of hydrocarbons is SB05 at 0.1-0.2m bgs. There were no guideline exceedances and therefore no risk identified.

**Table 23 Soil Analytical Results Compared Against CRC CARE Guidelines for Dermal Contact**

| CRC CARE Health Screening Level<br>Dermal Contact Hazard from Soil Hydrocarbons' | | EP080: BTEXN | | | | | EP080/071: TRH | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Benzene | Toluene | Ethylbenzene | Total Xylenes | Naphthalene | C6 - C10 Fraction | >C10 - C16 Fraction | >C16 - C34 Fraction | >C34 - C40 Fraction |
| Units | | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg |
| LOR | | 0.2 | 0.5 | 0.5 | 0.5 | 1 | 10 | 50 | 100 | 100 |
| HSL C Recreational | | 120 | 18000 | 5300 | 15000 | 1900 | 5100 | 3800 | 5300 | 7400 |
| HSL D Commercial/Industrial | | 430 | 99000 | 27000 | 81000 | 11000 | 26000 | 20000 | 27000 | 38000 |
| Intrusive Maintenance Worker | | 1100 | 120000 | 85000 | 130000 | 29000 | 82000 | 62000 | 85000 | 120000 |
| Date | Sample | | | | | | | | | |
| 18/03/2021 | SB01 0.1-0.2 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB01 1.0-1.1 | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB01 2.4-2.5 | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB02 0.1-0.2 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB02 2.0-2.1 | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB03 0.1-0.2 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB03 1.0-1.1 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB04 0.1-0.2 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB04 1.0-1.1 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB05 0.1-0.2 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | **120** | <100 |
| 18/03/2021 | SB05 1.0-1.1 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB06 0.5-0.6 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |
| 18/03/2021 | SB06 2.0-2.1 X | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 | <100 | <100 |

### *8.2.2 Dust Inhalation & Soil Ingestion*

Combined dust inhalation and soil ingestion risk is assessed through the application of NEPM (2013) Health Investigation Levels (HILs) for exposure to soil contaminants.

Laboratory analytical results for soil samples are presented in Appendix 12. Soil analytical results are compared against the HILs presented in Table 24. Concentrations which exceeded laboratory LOR would be highlighted in bold except for metals, and HIL exceedances would be highlighted with a colored cell indicating the highest HIL land used class which is exceeded.

There were no exceedances of the HIL guidelines for dust inhalation and soil ingestion and therefore no risk identified.

**Table 24 Soil Analytical Results Compared Against NEPM (2013) Health Investigation Limit Guidelines**

| **Bold - Indicates LOR Exceedance in Non Metalic Compounds** | | | EA055: Moisture Content | | EP075(SIM)B: Polynuclear Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NEPM Health Investigation Levels (HIL's)**<br>**Dust Inhalation and Soil Ingestion Assessment**<br>X - Indicates Sample Within Proposed Excavation Zone | | | Moisture Content | Lead | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benz(a)anthracene | Chrysene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Indeno(1.2.3.cd)pyrene | Dibenz(a.h)anthracene | Benzo(g.h.i)perylene | PAHs | Benzo(a)pyrene TEQ (WHO) |
| Units | | | % | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg |
| LOR | | | 1 | 5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| HIL C Recreational | ☑ HIL C | | | 600 | | | | | | | | | | | | | | | | | 300 | 3 |
| HIL D Commerial/Industrial | ☑ HIL D | | | 1500 | | | | | | | | | | | | | | | | | 4000 | 40 |
| Sample date: | Sample ID | | | | | | | | | | | | | | | | | | | | | |
| 18/03/2021 | SB01 0.1-0.2 X | | 2.7 | <5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB01 1.0-1.1 | | 17.3 | 9 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB01 2.4-2.5 | | 12.2 | 22 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB02 0.1-0.2 X | | 4.2 | <5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB02 2.0-2.1 | | 15.7 | 16 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB03 0.1-0.2 X | | 3.4 | <5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB03 1.0-1.1 X | | 14.1 | 7 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB04 0.1-0.2 X | | 3.1 | <5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB04 1.0-1.1 X | | 13.1 | 25 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB05 0.1-0.2 X | | 5.1 | <5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB05 1.0-1.1 X | | 19.7 | 20 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB06 0.5-0.6 X | | 10.7 | <5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB06 2.0-2.1 X | | 15.4 | 24 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |

# 9 INDOOR INHABITANT PVI ASSESSMENT – HSL's

This PVI assessment has been conducted in accordance with relevant CRC CARE Technical Documentation and NEPM 2013 guidelines presented in references section of this report. The HSL assessment approach is generally the first (Tier 1) investigation phase adopted for assessing PVI risk at petroleum hydrocarbon (PHC) impacted sites. HSL guidelines have been applied for samples collected from the site to account for risks that may be associated with volatile hydrocarbon vapour intrusion into confined spaces where there may be an inhalation risk through longer term exposure. This does not constitute a full vapour risk assessment but provides additional information from which to further quantify any risk.

A detailed investigation (Tier 2 to 3) is recommended over an HSL assessment where an acute risk has been identified at the site (CRC CARE 2013) because of:

- Migrating product on surface soils beneath buildings;
- Strong PHC odours;
- Flammable risk in confined spaces; and/or
- Health complaints from occupants.

Based on the site visits, none of the above conditions have been identified at the site. If the outcome of this Tier 1 assessment reveals HSL exceedances for hydrocarbon vapour intrusion, a more detailed (Tier 2) assessment will be required to further evaluate the human health risk.

PVI risk is initially interpreted through the development of HSL threshold limits from the following classifications:

- The geology and or hydrogeology of the investigation point; and
- Land use sensitivity:

The resulting HSL threshold limits are compared with laboratory analytical results.

## 9.1 Selected Media for Assessing PVI Risk

Table 25 presents a summary of the preferred HSL approach to assessing PVI risk. In this case, all soil and groundwater investigated was within the excavation zone.

**Table 25 Preferred Methods for Determining Site PVI Risk**

| Media Analysed | Method | Limitations | Order of Preference |
|---|---|---|---|
| Soil Gas | Concentrations of a soil gas through a soil vapor probe | This approach provides the most reliable data in interpreting PVI risk, although direct modelling should be applied if concentrations exceed HSL threshold limits. | Primary |
| Groundwater | Concentrations of PHC in groundwater through deployment of monitoring wells | More robust and reliable that soil in determining onsite and in particular, offsite risks. Determining PVI risk based on groundwater is inherently conservative when interpreting vapour risk to account for not readily discernible preferential pathways. Reference may be drawn to alternative assessment approaches:<br>1) Application of site-specific conditions to the CRC CARE model for assessing PVI risk<br>2) Soil gas interpretation for areas where a PVI risk is identified from groundwater analysis. | Secondary |
| Soil | Concentrations of PHC in soil | Concentrations in soil may be subject variability due to soil moisture, organic content and oxygen ingress all which create significant bias in threshold values. Reliance is place on utilizing groundwater analysis over soil. Soil results provide localised information. | Tertiary |

## 9.2 Land Use Class

For surrounding properties, the potential PVI risk is characterized through application of CRC CARE HSL's for each individual property based on their existing land use (NEPM 2013; Friebel & Nadebaum 2010). The CRC CARE guidelines have been referenced to ensure that the correct land use and density category has been adopted for surrounding land use to ensure health risks are consistent with the HSL models. Aspects considered include the:

- Sensitivity of the existing or potential land use;
- Percentage of paved area for defining potential vapour migration risk;
- Type of basement garage which may influence the confinement of PHC vapors;
- Presence of a slab or cavity for discerning vapour intrusion risk.

If hydrocarbon impacted soil is discerned at the site, consideration is given to downgradient receptors. Where applicable, land use class therefore considers:

- Downgradient receptors where onsite HSL exceedances have been identified in soil; and
- Variations in land use for different parts of the proposed development.

The following land use classes are applied:

- *HSL D for Commercial Land use*

## 9.3 Findings

Laboratory analytical results for soil samples are presented in Appendix 12. Table 26 presents the soil results against a potential indoor vapour risk. Concentrations which exceeded laboratory LOR would be highlighted in bold. HSL exceedances would be highlighted with a coloured cell. There was no indoor vapour risk identified in the shallow soil profile.

Table 27 presents the groundwater results against a potential indoor vapour risk at a commercial premise. In one sample, MW11A there were guideline exceedances for Benzene and total recoverable hydrocarbons, this indicates an indoor vapour risk.

**Table 26 Soil Analytical Results Compared Against HSL D**

| **Soil Hydrocarbon HSL's for Assessing Indoor Vapour Intrusion (NEPM 2013) Soil Sample Analysis** | | | | | EP080: BTEXN | | | | | EP080/071: TRH | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bold - Indicates LOR Exceedances** | | | | | Benzene | Toluene | Ethylbenzene | Total Xylenes | Naphthalene | F1 | F2 |
| Colour Shading - Indicates HSL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x | | | | | | | | | | | |
| Sample ID | Sample Date | Depth Class | Grain Class | HSL | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg |
| | | | | | LOR 0.2 | LOR 0.5 | LOR 0.5 | LOR 0.5 | LOR 1 | LOR 10 | LOR 50 |
| SB01 0.1-0.2 | 18/03/2021 | 0 - 1 | SAND | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB01 1.0-1.1 | 18/03/2021 | 0 - 1 | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB01 2.4-2.5 | 18/03/2021 | 2 - 4 | SILT | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB02 0.1-0.2 | 18/03/2021 | 0 - 1 | SAND | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB02 2.0-2.1 | 18/03/2021 | 1 - 2 | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB03 0.1-0.2 | 18/03/2021 | >SLAB/CUT RL | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB03 1.0-1.1 | 18/03/2021 | >SLAB/CUT RL | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB04 0.1-0.2 | 18/03/2021 | >SLAB/CUT RL | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB04 1.0-1.1 | 18/03/2021 | >SLAB/CUT RL | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB05 0.1-0.2 | 18/03/2021 | >SLAB/CUT RL | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB05 1.0-1.1 | 18/03/2021 | >SLAB/CUT RL | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB06 0.5-0.6 | 18/03/2021 | >SLAB/CUT RL | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB06 2.0-2.1 | 18/03/2021 | 0 - 1 | CLAY | D | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |

**Table 27 Groundwater Analytical Results Compared Against HSL D**

| **NEPM (ASC) 2013 Schedule B1**<br>**Groundwater HSL's for Assessing Vapour Intrusion Risk** | | | | | | Benzene | Toluene | Ethylbenzene | Xylene | Naphthalene | F1 | F2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | | | | | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| LOR | | | | | | 1 | 2 | 2 | 2 | 5 | 20 | 100 |
| Water Sample ID | Date | Groundwater Depth Class (m) | Grain Class | HSL | | | | | | | | |
| PW1 | 22/3/21 | 4 - 8 | SAND | D | Limit | 5000 | NL | NL | NL | NL | 6000 | NL |
| | | | | | Result | 20 | <2 | <2 | <2 | <5 | 240 | 100 |
| IT1 | 22/3/21 | 4 - 8 | SAND | D | Limit | 5000 | NL | NL | NL | NL | 6000 | NL |
| | | | | | Result | <1 | <2 | <2 | <2 | <5 | 30 | <100 |
| MW11 | 22/3/21 | 4 - 8 | SAND | D | Limit | 5000 | NL | NL | NL | NL | 6000 | NL |
| | | | | | Result | 2420 | 188 | 258 | 202 | 94 | 1610 | 1326 |
| MW11A | 22/3/21 | 4 - 8 | SAND | D | Limit | 5000 | NL | NL | NL | NL | 6000 | NL |
| | | | | | Result | 15600 | 64500 | 13500 | 94900 | 2300 | 344000 | 50500 |
| MW12 | 22/3/21 | 4 - 8 | SAND | D | Limit | 5000 | NL | NL | NL | NL | 6000 | NL |
| | | | | | Result | 12 | <2 | <2 | <2 | <5 | 210 | <100 |
| MW18 | 22/3/21 | 4 - 8 | SAND | D | Limit | 5000 | NL | NL | NL | NL | 6000 | NL |
| | | | | | Result | 4 | <2 | <2 | <2 | <5 | 40 | <100 |

# 10 TRENCH WORKER PVI ASSESSMENT – HSL's

## 10.1 Classification

The following Health Screening Assessment is based on hydrocarbon vapour intrusion risk to subsurface excavation workers within excavations. This is assessed through analysis of vapors from soil and soil vapours. Groundwater is generally not used to assess risk as threshold limits for all depth and grain classes are non-limiting. Land use classes are not applicable when assessing vapour intrusion into trenches.

Soil and soil vapour HSL's for assessing hydrocarbon risk to maintenance workers are based on CRC CARE Technical Report 10 guidelines (Friebel & Nadebaum 2011) and the following variables:

- Dominant grain size class of material at the soil sample depth or based on the dominant grain class of the backfill material based on US Agriculture Soil Classification System (SCS) and partitioning into either sand, silt or clay; and
- Classifying soil according to depth ranges: 0 to 2 m; 2 to 4 m; 4 to 8 m; and greater than 8 m;

## 10.2 Findings

Laboratory analytical results for soil samples are presented in Appendix 12 and summarised in Table 28. Concentrations which exceeded laboratory LOR would be highlighted in bold, and HSL exceedances would highlighted with a colored cell indicating the highest HSL land used class which is exceeded.

None of the results exceeded of the CRC CARE HSL guidelines for Assessing PVI Risk to Trench Workers and no vapour risk was identified through soil vapour.

**Table 28 Summary of Soil Analytical Results Compared against HSL's for Assessing PVI Risk to Trench Workers**

| **CRC CARE Health Screening Level Assessment for PHC Inhalation Risk To Trench Workers From Soil Sample Analysis** | | | | EP080: BTEXN | | | | | EP080/071: TRH | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Bold - Indicates LOR Exceedances** | | | | | | | | | | |
| **Dark Grey Shading - Indicates HSL Exceedances: >1 x, * 2-5 x, ** 5-20 x, *** 20-50 x, **** >50 x** | | | | Benzene | Toluene | Ethylbenzene | Total Xylenes | Naphthalene | C6 - C10 Fraction | >C10 - C16 Fraction |
| Sample ID | Sample Date | Depth Class | Grain Class | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg |
| | | | | LOR 0.2 | LOR 0.5 | LOR 0.5 | LOR 0.5 | LOR 1 | LOR 10 | LOR 50 |
| SB01 0.1-0.2 | 18/03/2021 | 0 to 2m | SAND | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB01 1.0-1.1 | 18/03/2021 | 0 to 2m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB01 2.4-2.5 | 18/03/2021 | 2 to 4m | SILT | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB02 0.1-0.2 | 18/03/2021 | 0 to 2m | SAND | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB02 2.0-2.1 | 18/03/2021 | 0 to 2m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB03 0.1-0.2 | 18/03/2021 | 4 to 8m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB03 1.0-1.1 | 18/03/2021 | 4 to 8m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB04 0.1-0.2 | 18/03/2021 | 4 to 8m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB04 1.0-1.1 | 18/03/2021 | 4 to 8m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB05 0.1-0.2 | 18/03/2021 | 4 to 8m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB05 1.0-1.1 | 18/03/2021 | 4 to 8m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB06 0.5-0.6 | 18/03/2021 | 4 to 8m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |
| SB06 2.0-2.1 | 18/03/2021 | 0 to 2m | CLAY | <0.2 | <0.5 | <0.5 | <0.5 | <1 | <10 | <50 |

# 11 GROUNDWATER ASSESSMENT

## 11.1 HSL's for Assessing Petroleum Vapour Intrusion

Health Screening Levels (HSLs) for vapour intrusion are provided in Table 1A(4) of Schedule B1 of the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended April 2013 (NEPC, 2013) (the NEPM).

The NEPM groundwater HSLs provide an initial screening assessment for potential health risks via vapour intrusion to users of land overlying petroleum hydrocarbon impacted groundwater. This investigation concerns the following:

- As the proposed future use of the site is a swimming pool development, HSL D NEPM HSL screening criteria for commercial use have been adopted;

Screening level guidelines for assessing petroleum vapour intrusion from groundwater into shallow trenches (less than 1 m BGS) are non-limiting given that the derived groundwater HSL exceeds the water solubility limit (Friebel, E & Nadebaum, P., 2011).

The following classes have been applied to the site to derive an appropriate screening level for assessing petroleum vapour intrusion risk from groundwater:

- SAND grain size - confirmed by a particle size distribution analysis of the main geological strata encountered at the site; and
- A groundwater depth class of 4 to 8 m bgs.
- For the potential development, Commercial D land use class.

## 11.2 Groundwater Results

Groundwater was sampled from 6 monitoring wells. Groundwater analytical results are compared against selected water quality screening levels and are presented in Table 29 to Table 33; and the laboratory certificates are presented in Appendix 12.

The following can be summarised from the findings of the current groundwater analytical data:

- Although no free phase hydrocarbons were observed during the groundwater sampling event there were traces of hydrocarbons in MW11A which would indicate PSH may be present.
- There were detections of hydrocarbons in all 6 groundwater samples collected.
- There were Fresh Water and Marine Water guideline exceedances for hydrocarbons in MW11 and MW11A.
- Trace amounts of lead were detected in MW11A, but it did not exceed the guideline limits.
- There is risk of hydrocarbon vapour intrusion from groundwater, and a potential risk to ecological or human health receptors exists.

**Table 29 Groundwater analytical results summary of hydrocarbons and likely LNAPL**

| Investigation Levels | | Benzene | Toluene | Ethyl-benzene | Xylene | | | BTEX | Napthalene | TPH Carbon Chain Fractions | | TRH Carbon Chain Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indicates >Laboratory LOR | | | | | M, P Xylene | O Xylene | Total Xylene | | | C6 - C14 | C10 - C14 | C6 - C10 | C6 - C16 | F1 | >C10 - C16 | >C16 - C34 | >C34 - C40 | >C10 - C40 | F2 |
| Indicates Likely LNAPL (CRC CARE Tech. Report 23; p8) | | | | | | | | | | | | | | | | | | | |
| **UNITS** | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| **LOR** | | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 5 | 20 | 50 | 20 | 20 | 20 | 100 | 100 | 100 | 100 | 100 |
| **Date Collected** | **Water Sample** | | | | | | | | | | | | | | | | | | |
| 22/03/2021 | PW1 | 20 | <2 | <2 | <2 | <2 | <2 | 20 | <5 | 350 | 100 | 260 | 360 | 240 | 100 | <100 | <100 | 100 | 100 |
| 22/03/2021 | IT1 | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <5 | 40 | <50 | 30 | 30 | 30 | <100 | <100 | <100 | <100 | <100 |
| 22/03/2021 | MW11 | 2420 | 188 | 258 | 153 | 49 | 202 | 3070 | 94 | 5760 | 1830 | 4680 | 6100 | 1610 | 1420 | 110 | <100 | 1530 | 1330 |
| 22/03/2021 | MW11A | 15600 | 64500 | 13500 | 74400 | 20500 | 94900 | 188000 | 2300 | 583000 | 101000 | 533000 | 585800 | 344000 | 52800 | 1530 | <140 | 54300 | 50500 |
| 22/03/2021 | MW12 | 12 | <2 | <2 | <2 | <2 | <2 | 12 | <5 | 260 | <50 | 220 | 220 | 210 | <100 | <100 | <100 | <100 | <100 |
| 22/03/2021 | MW18 | 4 | <2 | <2 | <2 | <2 | <2 | 4 | <5 | 50 | <50 | 40 | 40 | 40 | <100 | <100 | <100 | <100 | <100 |

**Table 30 Groundwater analytical results compared against selected fresh water (95% trigger) water quality guidelines (TRH & BTEXN)**

| Fresh Water (95% Trigger) ANZG (2018) | | Benzene | Toluene | Ethyl-benzene | Xylene | | | BTEX | Napthalene | TRH Carbon Chain Fractions | | | | | | | Dilsolved Lead |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | M, P | O | Total | Total | | 6 - 10 | F1 | >10 - 16 | >16 - 34 | >34 - 40 | >10 - 40 | F2 | |
| **UNITS** | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | mg/L |
| **LOR** | | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 5 | 20 | 20 | 100 | 100 | 100 | 100 | 100 | 0.001 |
| Investigation Limit | | 950 | 180 | 80 | 275 | 350 | | | 16 | | | | | | | | 0.0034 |
| **Date Collected** | **Water Sample ID** | | | | | | | | | | | | | | | | |
| 22/03/2021 | PW1 | 20 | <2 | <2 | <2 | <2 | <2 | 20 | <5 | 260 | 240 | 100 | <100 | <100 | 100 | 100 | <0.001 |
| 22/03/2021 | IT1 | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <5 | 30 | 30 | <100 | <100 | <100 | <100 | <100 | <0.001 |
| 22/03/2021 | MW11 | 2420 | 188 | 258 | 153 | 49 | 202 | 3070 | 94 | 4680 | 1610 | 1420 | 110 | <100 | 1530 | 1330 | <0.001 |
| 22/03/2021 | MW11A | 15600 | 64500 | 13500 | 74400 | 20500 | 94900 | 188000 | 2300 | 533000 | 344000 | 52800 | 1530 | <140 | 54300 | 50500 | 0.002 |
| 22/03/2021 | MW12 | 12 | <2 | <2 | <2 | <2 | <2 | 12 | <5 | 220 | 210 | <100 | <100 | <100 | <100 | <100 | <0.001 |
| 22/03/2021 | MW18 | 4 | <2 | <2 | <2 | <2 | <2 | 4 | <5 | 40 | 40 | <100 | <100 | <100 | <100 | <100 | <0.001 |

**Table 31 Groundwater analytical results compared against selected fresh water (95% trigger) water quality guidelines (PAH)**

| **Fresh Water (95% Trigger) ANZG (2018)** | | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benz(a)anthracene | Chrysene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Indeno(1.2.3.cd)pyrene | Dibenz(a.h)anthracene | Benzo(g.h.i)perylene | PAH Sum | Benzo(a)pyrene TEQ (WHO) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **UNITS** | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| **LOR** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 | 1 | 1 | 0.5 | 0.5 |
| Investigation Limit | | 16 | | | | 2 | 0.4 | 1.4 | | | | | | 0.2 | | | | | |
| **Date Collected** | **Water Sample ID** | | | | | | | | | | | | | | | | | | |
| 22/03/2021 | PW1 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |
| 22/03/2021 | IT1 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |
| 22/03/2021 | MW11 | 75.1 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | 75.1 | <0.5 |
| 22/03/2021 | MW11A | 1780 | <2.4 | <6.0 | 13 | 12.3 | 2.9 | <2.4 | 3.2 | <2.4 | <2.4 | <2.4 | <2.4 | <0.5 | <2.4 | <2.4 | <2.4 | 1810 | <2.4 |
| 22/03/2021 | MW12 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |
| 22/03/2021 | MW18 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |

**Table 32 Groundwater analytical results compared against selected Marine water (95% trigger) water quality guidelines (TRH & BTEXN)**

| ANZG (2018) Marine Water (95% trigger) | | Benzene | Toluene | Ethyl-benzene | Xylene | | | BTEX | Napthalene | TRH Carbon Chain Fractions | | | | | | | Dilsolved Lead |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | M, P | O | Total | Total | | 6 - 10 | F1 | >10 - 16 | >16 - 34 | >34 - 40 | >10 - 40 | F2 | |
| **UNITS** | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | mg/L |
| **LOR** | | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 5 | 20 | 20 | 100 | 100 | 100 | 100 | 100 | 0.001 |
| Investigation Limit | | 700 | 180 | 80 | 80 | | | | 70 | | | | | | | | 0.004 |
| **Date Collected** | **Water Sample ID** | | | | | | | | | | | | | | | | |
| 22/03/2021 | PW1 | 20 | <2 | <2 | <2 | <2 | <2 | 20 | <5 | 260 | 240 | 100 | <100 | <100 | 100 | 100 | <0.001 |
| 22/03/2021 | IT1 | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <5 | 30 | 30 | <100 | <100 | <100 | <100 | <100 | <0.001 |
| 22/03/2021 | MW11 | 2420 | 188 | 258 | 153 | 49 | 202 | 3070 | 94 | 4680 | 1610 | 1420 | 110 | <100 | 1530 | 1330 | <0.001 |
| 22/03/2021 | MW11A | 15600 | 64500 | 13500 | 74400 | 20500 | 94900 | 188000 | 2300 | 533000 | 344000 | 52800 | 1530 | <140 | 54300 | 50500 | 0.002 |
| 22/03/2021 | MW12 | 12 | <2 | <2 | <2 | <2 | <2 | 12 | <5 | 220 | 210 | <100 | <100 | <100 | <100 | <100 | <0.001 |
| 22/03/2021 | MW18 | 4 | <2 | <2 | <2 | <2 | <2 | 4 | <5 | 40 | 40 | <100 | <100 | <100 | <100 | <100 | <0.001 |

**Table 33 Groundwater analytical results compared against selected fresh water (95% trigger) water quality guidelines (PAH)**

| **ANZG (2018) Marine Water (95% trigger)** | | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benz(a)anthracene | Chrysene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Indeno(1.2.3.cd)pyrene | Dibenz(a.h)anthracene | Benzo(g.h.i)perylene | Sum of polycyclic aromatic hydrocarbons | Benzo(a)pyrene TEQ (WHO) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **UNITS** | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| **LOR** | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 | 1 | 1 | 0.5 | 0.5 |
| Investigation Limit | | 70 | | | | 2 | 0.4 | 1.4 | | | | | | 0.2 | | | | | |
| **Date Collected** | **Water Sample ID** | | | | | | | | | | | | | | | | | | |
| 22/03/2021 | PW1 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |
| 22/03/2021 | IT1 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |
| 22/03/2021 | MW11 | 75.1 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | 75.1 | <0.5 |
| 22/03/2021 | MW11A | 1780 | <2.4 | <6.0 | 13 | 12.3 | 2.9 | <2.4 | 3.2 | <2.4 | <2.4 | <2.4 | <2.4 | <0.5 | <2.4 | <2.4 | <2.4 | 1810 | <2.4 |
| 22/03/2021 | MW12 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |
| 22/03/2021 | MW18 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |

# 12 SOIL DISPOSAL ASSESSSMENT

## 12.1 Guidelines

Soil which is excavated from the site for landfill disposal is to be assessed against Information Bulletin 105 (IB105) for Classification and Management of Contaminated Soil for Disposal. The EPA uses 4 categories to classify contaminated soil as per Table 34:

- (Level 1) Fill Material;
- (Level 2) Low Level Contaminated Soil;
- (Level 3) Contaminated Soil; and
- (Level 4) Contaminated Soil.

Fixed numerical values are presented for soil concentrations and leachable fraction concentrations.

**Table 34 Summary of IB105 Classification Guidelines**

| | Classification (with reference to Table 2) | Controlled Waste[1] | Comments |
|---|---|---|---|
| **Fill Material[2] (Level 1)** | Soil that exhibits levels of contaminants below the limits defined under *Fill Material* in Table 2. | Unlikely | Soil classified as *Fill Material* can still be a 'pollutant' under the *Environmental Management and Pollution Control Act 1994* and needs to be responsibly managed. |
| **Low Level Contaminated Soil (Level 2)** | Soil that exhibits levels of contaminants above the limits defined under *Fill Material* but below the limits defined under *Low Level Contaminated Soil* in Table 2. | Likely | Where leachable concentrations have not been prescribed, maximum total concentrations will be used to classify the soil. |
| **Contaminated Soil (Level 3)** | Soil that exhibits levels of contaminants above the limits defined under *Low Level Contaminated Soil* but below the limits defined under *Contaminated Soil* in Table 2. | Yes | Where leachable concentrations have not been prescribed, maximum total concentrations will be used to classify the soil. |
| **Contaminated Soil for Remediation (Level 4)** | Soil that exhibits levels of contaminants above the limits defined under *Contaminated Soil* in Table 2 (regardless of the maximum total concentrations) is generally ***not*** considered acceptable for off-site disposal without prior treatment. | Yes | Soil that contains contaminants that do not have criteria for leachable concentrations (*e.g.* petroleum hydrocarbons), and the levels of contaminants exceed the maximum total concentrations listed in *Contaminated Soil*, are generally classified as *Contaminated Soil for Remediation*. |

[1] Controlled Waste is defined in the *Environmental Management and Pollution Control Act 1994*.
[2] Criteria for *Fill Material* are the limits set by the Director for the purposes of R.9(2)(a)(ii) in the *Regulations*.

## 12.2 Findings

The soil samples have been compared against IB105 guidelines for soil disposal. Of the limited analytes tested for IB105 soil classification there were no guideline exceedances. Therefore the samples tested are classified as Level 1 Material (Clean Fill).

**Table 35 Soil Analytical Results Compared Against IB105 Investigation Limits for soil Disposal**

| **Information Bulletin 105**<br><br>**Classification and Management of Contaminated Soil For Disposal** | | Lead | Benzo(a)pyrene | C6 - C9 Fraction | C10 - C36 Fraction (sum) | Sum of polycyclic aromatic hydrocarbons | Benzene | Toluene | Ethylbenzene | Total Xylenes |
|---|---|---|---|---|---|---|---|---|---|---|
| Unit | | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg |
| LOR | | 5 | 0.5 | 10 | 50 | 0.5 | 0.2 | 0.5 | 0.5 | 0.5 |
| **Investigation Level Selected** | | | | | | | | | | |
| IB105 Level 1 | | <300 | <0.08 | <65 | <1000 | <20 | <1 | <1 | <3 | <14 |
| **IB105 Level 2** | | 300 | 0.08 | 65 | 1000 | 20 | 1 | 1 | 3 | 14 |
| **IB105 Level 3** | | 1200 | 2 | 650 | 5000 | 40 | 5 | 100 | 100 | 180 |
| **IB105 Level 4** | | 3000 | 20 | 1000 | 10000 | 200 | 50 | 1000 | 1080 | 1800 |
| | | | | | | | | | | |
| 18/03/2021 | SB01 0.1-0.2 X | <5 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB01 1.0-1.1 | 9 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB01 2.4-2.5 | 22 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB02 0.1-0.2 X | <5 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB02 2.0-2.1 | 16 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB03 0.1-0.2 X | <5 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB03 1.0-1.1 X | 7 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB04 0.1-0.2 X | <5 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB04 1.0-1.1 X | 25 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB05 0.1-0.2 X | <5 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB05 1.0-1.1 X | 20 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB06 0.5-0.6 X | <5 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |
| 18/03/2021 | SB06 2.0-2.1 X | 24 | <0.5 | <10 | <50 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 |

# 13 CONCEPTUAL SITE MODEL

## 13.1 Potential & Identified Contamination Sources

The identified source of contamination impacting the investigation area is the former infrastructure at 521 Old Forcett road, the former United Service Station.

There may be other unknown potential sources of onsite or offsite impact (outside of the sampling areas) which GES are unaware of and therefore have not been investigated within this assessment.

Contaminates of potential concern associated with these potential sources have already been identified in a previous section.

### *13.1.1 Identified Primary Sources*

Identified primary sources of contamination was historical fuel spill / s now sitting in the groundwater below the site. It is likely that the soil contamination is attributed to former fuel storage on the adjacent property.

### *13.1.2 Identified Secondary Sources*

Secondary source is contamination which may sources from a primary source (soil, groundwater, surface water and vapour). Secondary sources are typically spatially separated from the primary source, and may have a direct pathway linkage impacting or affecting receptors of interest.

The groundwater contaminated and associated soil vapour is the secondary source of contamination.

## 13.2 Potential Receptors

The following presents a summary of all potential receptors considered in the assessment.

### *13.2.1 Potential Future Onsite Receptors*

Potential future onsite receptors are presented in Table 36.

**Table 36 Summary of Potential Future Onsite Receptors**

| Medium | Specific Onsite Receptor | Impact Identified |
|---|---|---|
| Soil Impact | Future Construction and Trench workers – construction phase | No |
| | Future onsite site users – Commercial Workers and recreational users of the Swim Center | No |
| | Future trench workers – ongoing maintenance | No |
| Groundwater Impact | Future Construction and Trench workers – construction phase | Yes |
| | Future onsite site users – Commercial Workers and recreational users of the Swim Center | Potential |
| | Future trench workers – ongoing maintenance | Potential |

### *13.2.2 Identified Human Receptors*

Groundwater results exceeded human heath guidelines for indoor vapour for commercial use with the current building design.

There were no human health exceedances from the soil results.

### *13.2.3 Identified Ecological Receptors*

Groundwater results exceeded ecological guidelines for both freshwater and Marine water guideline. Note the contaminated was not derived and there are no ecological receptors have been identified on site.

There were no ecological exceedances from the soil results.

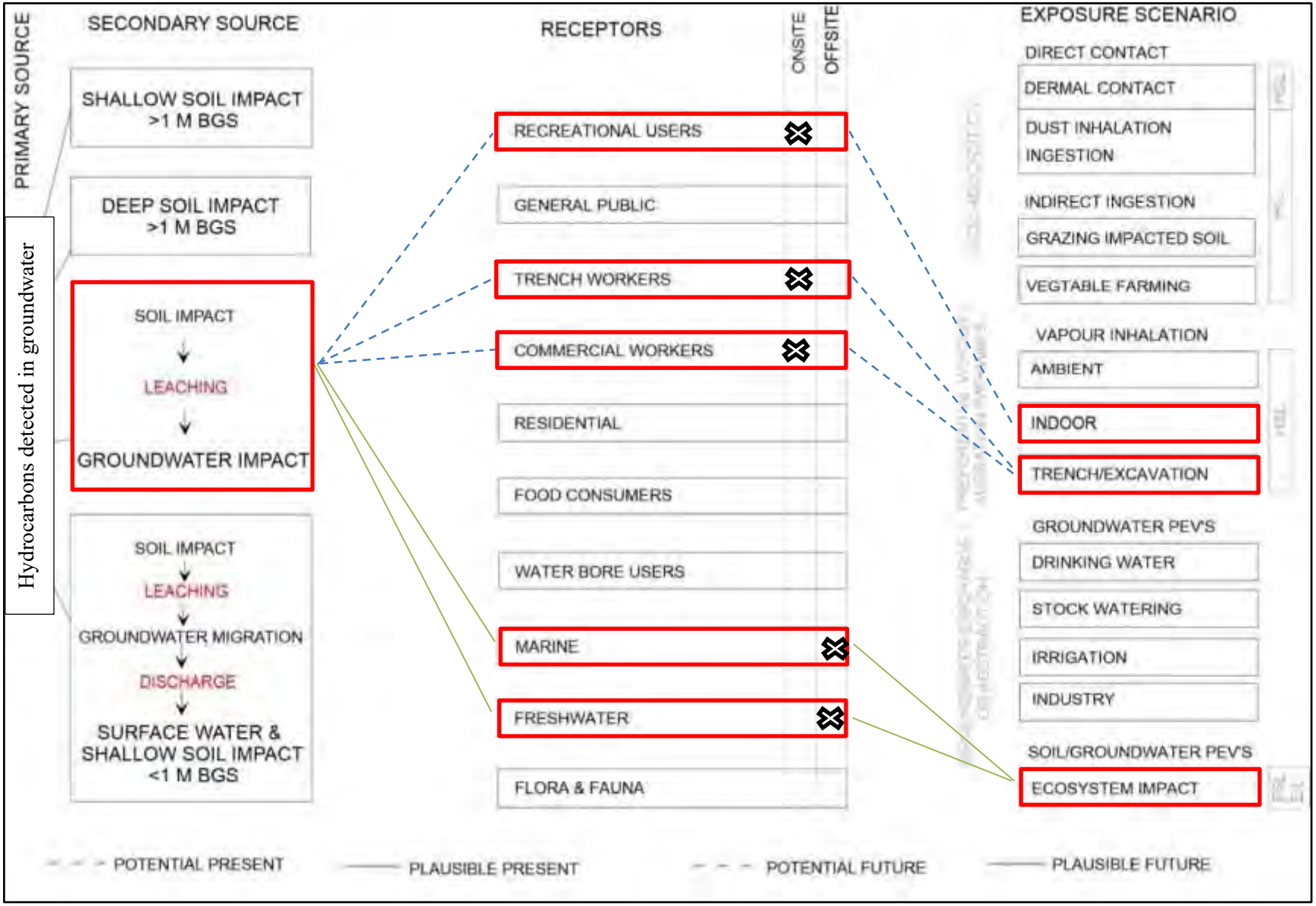



**Figure 11 Conceptual Site Model Identifying Contamination Source, Receptors and Transport Mechanisms/Exposure Routes**

# 14 CONCLUSIONS

## 14.1 Desktop Assessment

The following information was gathered during the desktop assessment:

- The site is zoned *Utilities* under the *Sorell Councils Interim Planning Scheme 2015* and is owned by the Sorell Council.
- The geology of the site is underlaid with Quaternary deposits of siltstone, sandstone and mudstone. Groundwater is inferred to be travelling in a westerly direction. The closest ecological receptor is Okines Beach at the mouth of the bay of Pit Water; approximately 400m from the site.
- There were a total of 4 registered bores located within 200m of the investigation area according to the MRT. These bores have been either capped or abandoned. Therefore, the possibility of residents accessing contaminated groundwater has been ruled out.
- The site walkover confirmed that the site proposed for the Swim Centre is a vacant block, predominantly grassed, with some scattered eucalyptus trees. There is a small shed containing an abandoned remediation bore and several groundwater monitoring wells associated with previous groundwater investigations relating to the former United Service Station.
- The site is situated 100m south west of a former Service Station at 521 Old Forcett Road, which is known to have contamination sourced from compromised refueling infrastructure. It is currently abandoned and owned by NORVAC Pty Ltd. Three underground fuel tanks were removed in 2011 according to WST and there have been multiple environmental site assessments conducted in relation to a groundwater contaminated plume. A Remediation Notice (RN) 8680/1 was removed from the site in 2015 by the EPA Tasmania after receiving the '*Final Site Remediation and Validation Report'* by Tonkin and Taylor P/L in December 2014.
- The entire site is an Area of Potential Concern as it is directly down gradient of a former Contaminated Site. Contaminants Of Potential Concern (COPC) include the following: TPH/TRH; Mono Aromatic hydrocarbons: (BTEXN); PAH; and lead. However, current analytical results confirmed that elevated lead does not appear to be an issue at the site.
- There may be other unknown contamination sources that may be impacting the site; including but not limited to the Redline depot at 523 Old Forcett Road and the self storage site has a wash down area at 525 Old Forcett Road.

## 14.2 Soil Assessment

From the shallow soil assessment including depths from 0.1 to 2.5 m below ground surface, the following is concluded:

- Environment: there were hydrocarbons detected in SB05 and small amounts of lead in most soil bores. There were no guideline exceedances and no risk to ecological receptors identified in the shallow soil assessment.
- Human Health: There were no human health guideline exceedances for dermal contact compared with CRC CARE 2011 HSL guideline limits, no human health guideline exceedances compared with NEPM 2013 HIL guideline limits for dust inhalation or ingestion.
- Excavated Soil Management: In terms of *IB105*, the thirteen primary soil samples, are Level 1 Material, and classified as Clean Fill.

## 14.3 Groundwater Assessment

From the groundwater assessment, it is concluded that:

- There were detections of hydrocarbons in all 6 groundwater samples collected. Although no free phase separated hydrocarbons (PSH) were observed during the groundwater sampling event, there were levels of hydrocarbons in MW11A which would indicate PSH may be present.
- Environment: There were Fresh Water and Marine Water guideline exceedances for hydrocarbons in MW11 and MW11A. A potential risk to the environment has been identified.
- Human Health – Indoor Vapour Risk – a vapour intrusion risk from groundwater has been identified and there is a potential future indoor vapour risk.
- Human Health – Trench worker Risk - there is a potential future vapour risk to trench works if construction of The Swim Centre building proceeds in the current design.

## 14.4 Conclusion Summary

The Investigation Conclusion Summary stated that:

The current Environmental Site Assessment has focused on potential hydrocarbon contamination of shallow soil and groundwater at the site. Hydrocarbon contamination was identified in the groundwater which may pose a risk to human health or the environment with the current building design.

Even though contamination in the groundwater is present it is not thought to have been caused by activities at the site but by former fuel storage at the adjacent property, the former Service Station at 521 Old Forcett Road, Dodges Ferry.

# 15 RECOMMENDATIONS

GES recommends the following:

## 15.1 Groundwater Contamination

The presence of hydrocarbons in the groundwater is confirmed. To minimise the risk to future site commercial workers during the development, occupants of the Swim Centre including staff and visitors plus future trench works and ecological receptors, the following mitigation measures should be put in place as a minimum:

- To mitigate the indoor vapour risk, the proposed building should be designed to be above ground and minimal excavation into the current site should be undertaken.
- There should be a minimum vertical separation distance of 8m buffer between the base of the building including services and the water-table. Seasonal fluctuations in the water-table must be considered in the depth separation calculation.
- Engineering solutions for increasing the impermeability of the building from the ground up should be considered, such as impermeable membranes, a clay layer below the concrete and / or an increased thickness in the floor / pool base concrete slab.
- Current groundwater and remediation bores should be decommissioned in accordance with appropriate decommissioning guidelines. Including and not limited to the removal of PVC piping and backfilling with bentonite or a comparable impermeable medium to ensure vapours from the contaminated groundwater do not travel up preferential pathways and enter the Swim Centre building.

## 15.2 Secondary Soil Contamination

It can be noted that no impact in shallow soil has been identified and from the current soil testing no risk to human health from the shallow soil was identified.

Although there were no ecological or human health guideline exceedances for soil tested; the deepest soil bore drilled during the current investigation was 2.5m below ground surface. It is likely that there is secondary soil contaminated associated with the contaminated groundwater at depths from 5-10m below ground surface. To minimise the risk to ecological receptors it is recommended that minimal material will be disturbed during the site redevelopment.

Given the site history of 521 Old Forcett Road the former United Service Station and the impact if has had on the current site, it is recommended that for any future disturbance at the site of soil over 1 cubic metre;

- A Soil and Water Management Plan (SWMP) will be required to control the movement and erosion of soil from the site that could impact ecological receptors.
- Soil should be tested and managed in accordance with EPA Tasmania's IB105.

## 15.3 Alternative Options

Given the current site conditions, alternative options that may be considered but understandably not necessarily viable or preferred. Options include:

- The use of a different parcel of land for the development.
- An intense groundwater remediation action plan.
- The postponement of construction of the Swim Centre until groundwater conditions become more favourable.

## 15.4 Suitability of the site for Site Redevelopment

The current Environmental Site Assessment has identified contaminated groundwater is underlying the site. Provided the recommendations and protection measures are implemented from this report including but not limited to a building design then GES is satisfied that a Swim Centre will not adversely impact on human health or the environment.

It should be noted that:

- As there are still elevated levels of hydrocarbons in the groundwater, the site owners, may consider conducting an additional study to assess the land use on the upgradient surrounding properties to ensure that there is not an additional source of contamination that may be contributing to the impact of the groundwater at the site.
- Under the current conditions, the site is not suitable for a more sensitive land use such as a school or residential use.

Yours faithfully,



Sarah Joyce BSc (Hons)

*Senior Environmental Scientist*

## REFERENCES

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## LIMITATIONS STATEMENT

This monitoring Report has been prepared in accordance with the scope of services between Geo-Environmental Solutions Pty. Ltd. (GES) and All Urban Planning ('the Client'). To the best of GES's knowledge, the information presented herein represents the Client's requirements at the time of printing of the Report. However, the passage of time, manifestation of latent conditions or impacts of future events may result in findings differing from that described in this Report. In preparing this Report, GES has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations referenced herein. Except as otherwise stated in this Report, GES has not verified the accuracy or completeness of such data, surveys, analyses, designs, plans and other information.

The scope of this study does not allow for the review of every possible soil and groundwater contaminant over the whole area of the site. Samples collected from the investigation area are assumed to be representative of the areas from where they were collected and indicative of the contamination status of the site at that point in time. The conclusions described within this report are based on these samples, the results of their analysis and an assessment of their contamination status.

This report does not purport to provide legal advice. Readers of the report should engage professional legal practitioners for this purpose as required.

No responsibility is accepted for use of any part of this report in any other context or for any other purpose by third party.

## Appendix 1 GES Staff

Geo-Environmental Solutions (GES) is a specialist geotechnical and environmental consultancy providing advice on all aspects of soils, geology, hydrology, and soil and groundwater contamination across a diverse range of industries.

Geo Environmental Solutions Pty Ltd:

- ACN – 115 004 834
- ABN – 24 115 004 834

**GES STAFF - ENGAGED IN SITE INVESTIGATION WORKS**

*Dr John Paul Cumming B.Agr.Sc (Hons) Phd CPSS GAICD*

- Principle Author and Principle Environmental Consultant
- PhD in Environmental Soil Chemistry from the University of Tasmania in 2007
- 18 years' experience in environmental contamination assessment and site remediation.

*Ms Sarah Joyce BSc (Hons)*

- Senior Environmental Scientist
- 18 years professional work experience and 9 years contaminated site assessment
- Honours in Geography and Environmental Science at the University of Tasmania in 2003
- Undergraduate Degree Double Major in Geology and Geography & Environmental Science

*Mr Aaron Plummer (Cert. IV)*

- Soil Technician
- 6 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater

**GES STAFF – CONTAMINATED SITES EXPERIENCE**

*Mr Mark Downie B.Agr.Sc*

- Soil Scientist with 15 years' professional experience.
- 8 years' experience in contamination assessment and reporting of soils and groundwater.

*Mr David Lee B.Sc*

- Geologist with 3 years' experience in site assessments for land-use, landslide, coastal hazards and foundation construction, including contaminated site assessments.
- 2 years' experience undertaking geotechnical assessment and design in underground hard rock mining.

*Dr Sam Rees B.Agr.Sc (Phd)*

- Soil & Environmental Scientist
- 6 years' experience in hydrocarbon and heavy metal contamination assessment and reporting of soils

*Mr Grant McDonald (Adv. cert. hort.)*

- Soil Technician
- 10 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater.

## Appendix 2 Site Photographs







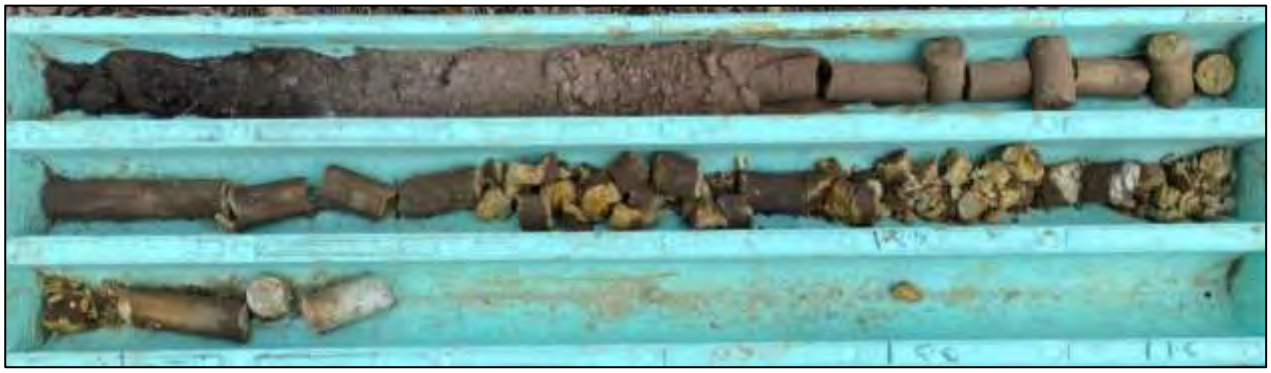
SB01



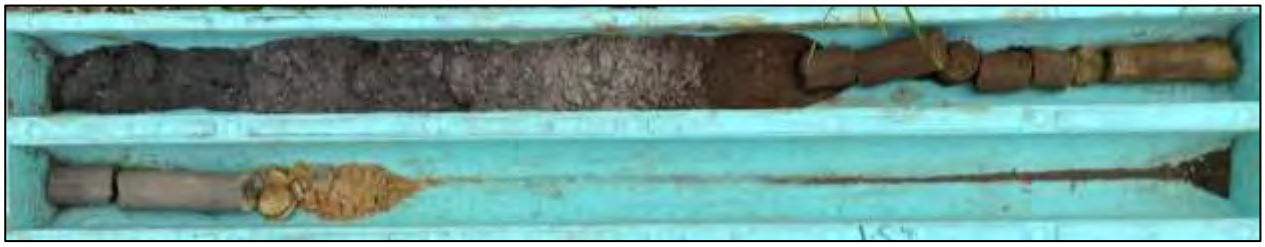








SB02



SB03







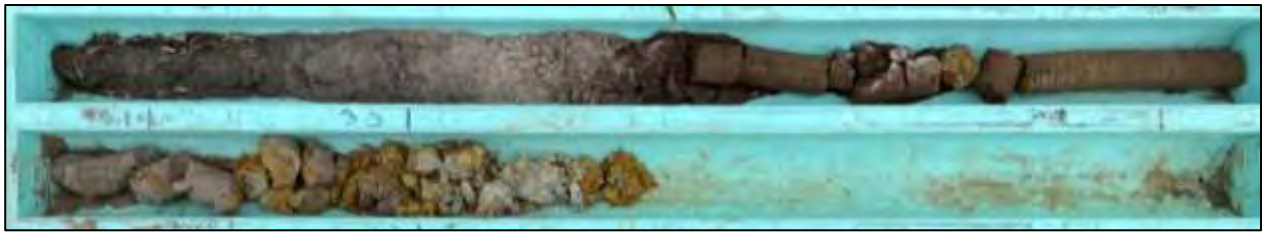












SB04



SB05

## Appendix 3 EPA Tasmania cancellation of RN 8680/1

Level 7, 134 Macquarie Street, Hobart TAS
GPO Box 1550, Hobart, TAS 7001 Australia

Enquiries: Contaminated Sites Unit
Ph: +61 3 6165 4621 Fax: +61 3 6233 3800
Email: contaminatedsites@environment.tas.gov.au
Web: www.epa.tas.gov.au
Our Ref: (053671_9 | H359710) zp

EPA TASMANIA
ENVIRONMENT PROTECTION AUTHORITY

2 March 2015

COPY

SORELL COUNCIL
RECEIVED

Mr Avi Silver
Director and Company Secretary
Norvac Proprietary Limited
200 Hoddle Street
ABBOTSFORD VIC 3182

Dear Mr Silver

**521 OLD FORCETT ROAD, DODGES FERRY, TASMANIA**
**COMPLETION OF REMEDIATION NOTICE (RN) 8680/1**

On 12 December 2014, I received the Final Site Remediation and Validation Report required under Remediation Notice (RN) 8680/1. A review of this report, together with subsequent clarifications, has determined that NORVAC Pty Ltd has met all requirements of Remediation Notice 8680/1. As such, the notice will be withdrawn from the title and regulation by the EPA will cease. A Completion Certificate is enclosed with this correspondence.

In accordance with Section 74N of the EMPCA, an invoice is enclosed to cover the time spent by an officer assessing compliance with Remediation Notice 8680/1, based on 11 hours of officer time and to cover removal of the notice from the title.

If you have any queries with respect to the contents of this letter, please do not hesitate to contact Joanna O'Brien using the details at the head of this correspondence.

Yours sincerely

John Mollison
**Delegate for the Director, Environment Protection Authority**

Cc: Mr Robert Higgins, General Manager, Sorell Council, PO Box 126, SORELL TAS 7172
Mr Leon Pemberton, Senior Environmental Geologist, Tonkin and Taylor – LPemberton@tonkintaylor.com.au
Mr Ronak Katira, Environmental Manager, United Petroleum – ronak.katira@unitedpetroleum.com.au

Encl. Invoice

ENVIRONMENT PROTECTION AUTHORITY

# REMEDIATION NOTICE COMPLETION CERTIFICATE

Issued under the *Environmental Management and Pollution Control Act 1994*, Section 74K(2).

Remediation Notice Number: **8680/1**

Date of Issue: **21 December 2011**

Issued to: **NORVAC Pty Ltd**

I, John Mollison, Delegate for the Director, Environment Protection Authority, am satisfied, on the evidence available to me, that the requirements of the above Remediation Notice have been complied with in full by the persons bound by it.

*The Crown does not indemnify the person to whom this certificate is issued for any damages that may be suffered by any person or the environment, arising from the activity in relation to which the Remediation Notice was issued.*

John Mollison
**Delegate for the Director, Environment Protection Authority**

Date of Completion: 2 March 2015

## Appendix 4 WorkSafe Tasmania

# Statutory Declaration

I, Brett Hay, Tasmanian Area Manager, Gilbarco Australia Pty Ltd

of *110 Mornington road, Mornington, Tas 7018*

Do solemnly and sincerely declare that:

*I removed the following underground fuel tanks from*

*United Dodges Ferry, 521 Old Forcett Road, Dodges Ferry, Tasmania*

- *1 x 50 000 litre fuel tank, removal was conducted on the 15/8/2011*
- *1 x 20 000 litre fuel tank, removal was conducted on the 15/8/2011*
- *1 x 2000 litre fuel tank, removal was conducted on the 15/8/2011*

*All of these removals were conducted in accordance with the Dangerous Substances (Safe Handling) Act 2005 including the relevant prescribed Codes or Standard.*

I make this solemn declaration under the *Oaths Act 2001*.

Declared at *(place)* Sorell TAS Roxby on *(date)* 29/8/2012

Signature B Hay

before me (*Justice, commissioner for declarations or authorised person*)

Name ANITA GRIFFITHS Position CJC - Sorell TAS

Signature Date 29/8/12

Statutory Declaration > September 2011 Page 1 of 1

# Appendix 5 EPA Search Results

Environment Protection Authority

GPO Box 1550 HOBART TAS 7001 Australia

Enquiries: Contaminated Sites Unit
Phone: +61 3 6165 4599
Email: contaminatedsites@epa.tas.gov.au
Web: www.epa.tas.gov.au
Our Ref: (21/404: D21-59916

ENVIRONMENT PROTECTION AUTHORITY

27 April 2021

Ms Sarah Joyce
Geo Environmental Services
29 Kirksway Place
BATTERY POINT TAS 7004

sjoyce@geosolutions.net.au

Dear Ms Joyce

**PROPERTY INFORMATION REQUEST**
**Vacant Land, Old Forcett Road, Dodges Ferry**
**Certificate of Title: 40340/1000**

On 14 April 2021, the Contaminated Sites Unit received your Property Information Request relating to the land referred to above ('the Site'). A search of relevant databases and records has been undertaken.




The Site adjoins 521 Old Forcett Road, a former Service Station, which was regulated by EPA as a contaminated site following the discovery, during routine groundwater monitoring, of a phase separated hydrocarbon plume extending from the Service Station through the Site to the Primary School sports ground.

In May 2001, Environment Protection Notice (EPN) 575/1 was issued to the landowner formalising the remediation and monitoring works. Several of the groundwater monitoring, pumping and fluid recovery wells were located on the Site.

EPN 575/1 was replaced with Remediation Notice (RN) 8680/1 dated 21/12/2011. Regulation ceased on the 2 March 2015 when RN 8680/1 was Completed. The remediation conclusions considered the risk to off-site human receptors; a change of landuse may alter this risk based conclusion.

EPA hold nine volumes of records regarding the work undertaken including:

- pumping, treatment and re-injection of groundwater.
- removal of damaged underground storage tanks and replacement with Fibreglass circa 2005.
- Decommissioning of UPSS in 2012 and the excavation and removal of 300m$^3$ of contaminated soil.

Reports received include

- *United Dodges Ferry Service Station, 521 Old Forcett Road, Dodges Ferry, Tasmania, Underground Petroleum Storage System (UPSS) decommissioning assessment report dated 24 November 2011 prepared by EM&C*
- *Remediation Goals Paper: Addendum-521 Old Forcett Road, Dodges Ferry, Tasmania dated October 2013 prepared by Tonkin and Taylor P/L*
- *Remediation and Validation Report: 521 Old Forcett Road, Dodges Ferry, Tasmania dated December 2014 prepared by Tonkin and Taylor P/L*

No further records relating to contamination or potentially contaminating activities at the Site or adjacent properties were found.

The search of records is restricted to those held by EPA and includes records relating to: The *Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2020;* Industrial Sites (which are or have been regulated by EPA); historical landfills; and contamination issues reported to the Contaminated Sites Unit. In addition, the Incidents and Complaints database and records relating to the historical storage of dangerous goods (as detailed below) are searched.
Please note that the dangerous goods licensing records referred to by EPA are for sites with underground storage tanks that ceased holding Dangerous Goods Licences prior to 1993. WorkSafe Tasmania hold the records for these Licences after 1993.

The following additional sources of contaminated sites information may also be helpful to you

- The **LIST Map** layers available. https://epa.tas.gov.au/regulation/site-information
    - '***EPA Regulated Premises***' identifies the location of Level 2 regulated premises as well as contaminated sites which are currently regulated. Regulatory documents related to each premises are available from this layer
    - '***EPA Underground Petroleum Storage Systems***' shows sites where EPA has received notification of the registration, temporary decommissioning or permanent decommissioning of underground petroleum storage systems (UPSS) under the *Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2020* (UPSS Regulations).
- Local councils issue Development Approvals under the *Land Use Planning and Approvals Act 1993*, Environment Protection Notices and Environmental Infringement Notices, and record complaints. They may hold additional information that may be relevant to a potentially contaminated site.
- WorkSafe Tasmania (1300 366 322 or wstinfo@justice.tas.gov.au) may have issued dangerous goods licences and/or may hold relevant records for the Site and adjoining properties. As the storage of dangerous goods/fuels is an environmentally relevant activity, you may wish to contact them for further information.

EPA does not hold records on all sites that are or may be contaminated. You should consider obtaining a site history to determine the likelihood of contamination. If contamination on the Site or an adjacent property is considered likely, further assessment by a competent environmental assessment practitioner is recommended. Site assessments should be conducted in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999*, National Environment Protection Council (or as varied).
https://epa.tas.gov.au/regulation/contaminated-sites/identification-and-assessment-of-contaminated-land/contaminated-site-assessment

Please note since 1 July 2015, the Director requires all environmental site assessments and reports, submitted to the Contaminated Sites Unit for consideration, to be prepared by a person certified as a specialist contaminated sites consultant under a scheme approved by the Director.
Effective 30 June 2018, the endorsed scheme is operated by Certified Environmental Practitioners (CEnvP). Consultants certified under this scheme are approved to use the seal **CEnvP Site Contamination**.
https://www.cenvp.org.
Further details are available at: https://epa.tas.gov.au/regulation/contaminated-sites/identification-and-assessment-of-contaminated-land/engaging-a-contaminated-site-assessment-consultant

The *Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2020* contain requirements relating to the registration, operation and decommissioning of underground fuel tanks. Information is available at: https://epa.tas.gov.au/regulation/underground-fuel-tanks All underground petroleum storage systems in use after 30 March 2010 are required to be registered

Under the *Right to Information Act 2009* (RTI Act), you are entitled to apply for any records mentioned within this letter such as reports, letters, or other relevant documents. For further information on how the RTI process works and how to request information under the RTI Act please visit the Department of Primary Industries, Parks, Water and Environment website or https://dpipwe.tas.gov.au/about-the-department/governance-policies-and-legislation/right-to-information

If you are purchasing a property, you should consider Part 5A of the *Environmental Management and Pollution Control Act 1994* (EMPCA) which defines and specifies requirements for managing contaminated sites. If there is reason to believe the site is, or is likely to be, contaminated there are certain requirements that you must meet (e.g. notification of a likely contaminated site to the Director, EPA as outlined in section 74B of the EMPCA).

Although all due care has been taken in the preparation of this letter, the Crown gives no warranty, express or implied, as to the accuracy or completeness of the information provided. The Crown and its servants or agents accept no responsibility for any loss or damage arising from reliance upon this letter, and any person relying on the letter does so at their own risk absolutely.

If you have any queries in relation to the matters above, please contact the Contaminated Sites Unit using the details at the head of this correspondence or refer to the EPA website at www.epa.tas.gov.au and click on 'Regulation to locate information on Underground Fuel Tanks and Contaminated Sites.

As you are aware, property searches incur a charge of $243.00. An invoice will be emailed as instructed. If you require this letter and invoice posted, please advise the Contaminated Sites Unit.

Yours sincerely



Liz Canning
**SENIOR ENVIRONMENTAL OFFICER - CONTAMINATED SITES**

Cc: Miran@geosolutions.net.au

Attachment: Invoice

3

# Appendix 6 Groundwater Bore Reports

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 3011 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 551004 **Datum:** GDA94
**Northing:** 5255863 **Accuracy:** 50
**Ground level (m ASL):**

**Construction**

**Date drilled:** 18/09/1986
**Drilling company:** Mines Department (=Tasmania Department of Mines)
**Depth (metres):** 60.00
**Initial yield (L/sec):** 2.27
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 60.0 | 125.00 | Rotary/ Rotary Hammer (downhole hammer) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| 0.0 | 60.0 | | 125.00 | unplasticised polyvinylchloride uPVC |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| *NA* | | |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 2.5 | sand |
| 2.5 | 22.5 | sand/clayey sand and sandy clay |
| 22.5 | 37.5 | shale/clay and sandy clay |
| 37.5 | 45.0 | sandstone fragments |
| 45.0 | 60.0 | sandstone/shale and clay |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| 18/09/1986 | 38.0 | 57.0 | 2.27 |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):** 2300

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***Groundwater Feature Detailed Report***

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | functioning | 05/02/1998 |
| purpose | domestic garden | 05/02/1998 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 3332 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 551464 **Datum:** GDA94
**Northing:** 5255928 **Accuracy:** 50
**Ground level (m ASL):**

**Construction**

**Date drilled:** 12/02/1990
**Drilling company:** Gerald Spaulding Drillers Pty Ltd
**Depth (metres):** 33.50
**Initial yield (L/sec):** 0.00
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 33.5 | 203.00 | Air Percussion (Rotary air - R) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| *NA* | | | | |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| *NA* | | |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 1.5 | topsoil |
| 1.5 | 6.1 | clay |
| 6.1 | 33.5 | soft mudstone |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| *NA* | | | |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):**

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

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***Groundwater Feature Detailed Report***

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | abandoned | 30/10/1997 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 3344 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 550849 **Datum:** GDA94
**Northing:** 5255598 **Accuracy:** 50
**Ground level (m ASL):**

**Construction**

**Date drilled:** 25/02/1992
**Drilling company:** Mines Department (=Tasmania Department of Mines)
**Depth (metres):** 54.00
**Initial yield (L/sec):** 0.63
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 54.0 | 140.00 | Air Percussion (Rotary air - R) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| *NA* | | | | |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| *NA* | | |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 18.0 | sandstone |
| 18.0 | 27.0 | mudstone |
| 27.0 | 54.0 | sandstone |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| 25/02/1992 | 39.0 | | 0.25 |
| 25/02/1992 | 45.0 | | 0.63 |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):**

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***Groundwater Feature Detailed Report***

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | abandoned | 05/02/1998 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 3353 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 551424 **Datum:** GDA94
**Northing:** 5255563 **Accuracy:** 200
**Ground level (m ASL):**

**Construction**

**Date drilled:** 15/11/1993
**Drilling company:** KMR Drilling Pty Ltd
**Depth (metres):** 42.00
**Initial yield (L/sec):** 0.00
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 42.0 | 165.00 | Air Percussion (Rotary air - R) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| *NA* | | | | |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| *NA* | | |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 3.0 | sandy clay |
| 3.0 | 42.0 | mudstone/sandstone |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| *NA* | | | |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):**

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

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***Groundwater Feature Detailed Report***

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | abandoned | 21/10/1997 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 3354 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 551464 **Datum:** GDA94
**Northing:** 5255758 **Accuracy:** 50
**Ground level (m ASL):**

**Construction**

**Date drilled:** 15/11/1993
**Drilling company:** KMR Drilling Pty Ltd
**Depth (metres):** 30.00
**Initial yield (L/sec):** 0.38
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 30.0 | 140.00 | |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| 0.0 | 30.0 | | 100.00 | unplasticised polyvinylchloride uPVC |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| *NA* | | |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 3.0 | sand |
| 3.0 | 6.0 | sandy clay |
| 6.0 | 12.0 | fine sand |
| 12.0 | 30.0 | sandstone |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| 15/11/1993 | 18.5 | | 0.38 |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):**

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***Groundwater Feature Detailed Report***

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | functioning | 21/10/1997 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 16491 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 551434 **Datum:** GDA94
**Northing:** 5255828 **Accuracy:** 50
**Ground level (m ASL):**

**Construction**

**Date drilled:** 31/10/1994
**Drilling company:** KMR Drilling Pty Ltd
**Depth (metres):** 30.00
**Initial yield (L/sec):** 0.30
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 30.0 | 150.00 | Rotary (Rotary Mud) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| 0.0 | 9.0 | | 150.00 | unknown |
| 0.0 | 30.0 | | 100.00 | unplasticised polyvinylchloride uPVC |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| 0.0 | 0.0 | slotted casing |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 9.0 | grey and brown sand |
| 9.0 | 15.0 | white sandstone + mudstone |
| 15.0 | 18.0 | red sandstone + mudstone |
| 18.0 | 24.0 | brown sandstone + mudstone |
| 24.0 | 27.0 | green/grey sandstone + mudstone |
| 27.0 | 30.0 | soft brown clay |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| 31/10/1994 | 26.0 | | 0.30 |

**Main aquifer geology:** Triassic

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***Groundwater Feature Detailed Report***

**Final TDS (mg/L):** 980

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| 21/07/1997 | 7.60 |

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | functioning | 21/07/1997 |
| purpose | domestic garden | 21/07/1997 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 16518 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 550809 **Datum:** GDA94
**Northing:** 5255408 **Accuracy:** 500
**Ground level (m ASL):**

**Construction**

**Date drilled:** 27/04/1994
**Drilling company:** KMR Drilling Pty Ltd
**Depth (metres):** 36.00
**Initial yield (L/sec):** 0.38
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 36.0 | 140.00 | Air Percussion (Rotary air - R) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| 0.0 | 12.0 | | 150.00 | unknown |
| 0.0 | 36.0 | | 100.00 | unplasticised polyvinylchloride uPVC |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| 0.0 | 0.0 | slotted casing |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 12.0 | soft sands and sandstone |
| 12.0 | 36.0 | sandstone |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| 27/04/1994 | 32.0 | | 0.38 |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):**

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***Groundwater Feature Detailed Report***

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | functioning | 27/04/1994 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 16519 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 550794 **Datum:** GDA94
**Northing:** 5255383 **Accuracy:** 500
**Ground level (m ASL):**

**Construction**

**Date drilled:** 28/04/1994
**Drilling company:** KMR Drilling Pty Ltd
**Depth (metres):** 30.00
**Initial yield (L/sec):** 0.38
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 30.0 | 165.00 | Air Percussion (Rotary air - R) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| 0.0 | 30.0 | | 125.00 | unplasticised polyvinylchloride uPVC |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| 0.0 | 0.0 | slotted casing |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 2.5 | sand |
| 2.5 | 30.0 | sandstone |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| 28/04/1994 | 25.0 | | 0.38 |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):**

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

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***Groundwater Feature Detailed Report***

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | functioning | 28/04/1994 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 16520 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 550844 **Datum:** GDA94
**Northing:** 5255903 **Accuracy:** 50
**Ground level (m ASL):**

**Construction**

**Date drilled:** 09/02/1995
**Drilling company:** KMR Drilling Pty Ltd
**Depth (metres):** 36.00
**Initial yield (L/sec):** 0.38
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 36.0 | 150.00 | Rotary (Rotary Mud) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| 0.0 | 15.0 | | 150.00 | unplasticised polyvinylchloride uPVC |
| 0.0 | 36.0 | | 100.00 | unplasticised polyvinylchloride uPVC |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| 0.0 | 0.0 | slotted casing |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 15.0 | sand |
| 15.0 | 20.0 | clay |
| 20.0 | 36.0 | sandstone |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| 09/02/1995 | 28.0 | | 0.38 |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):**

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***Groundwater Feature Detailed Report***

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | functioning | 05/02/1998 |
| purpose | domestic garden | 05/02/1998 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 16521 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 551214 **Datum:** GDA94
**Northing:** 5255683 **Accuracy:** 500
**Ground level (m ASL):**

**Construction**

**Date drilled:** 13/07/1995
**Drilling company:** KMR Drilling Pty Ltd
**Depth (metres):** 18.00
**Initial yield (L/sec):**
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 18.0 | 150.00 | Rotary (Rotary Mud) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| 0.0 | 0.0 | | 50.00 | unplasticised polyvinylchloride uPVC |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| *NA* | | |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| *NA* | | |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| *NA* | | | |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):**

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

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***Groundwater Feature Detailed Report***

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | capped | 13/07/1995 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 16552 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 551134 **Datum:** GDA94
**Northing:** 5255611 **Accuracy:** 50
**Ground level (m ASL):**

**Construction**

**Date drilled:** 20/02/1991
**Drilling company:** Mines Department (=Tasmania Department of Mines)
**Depth (metres):** 80.00
**Initial yield (L/sec):** 0.63
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 80.0 | 140.00 | Air Percussion (Rotary air - R) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| *NA* | | | | |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| *NA* | | |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 4.0 | soil and soft sandstone |
| 4.0 | 80.0 | mudstone (50%) and sandstone (50%) |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| 20/02/1991 | 23.0 | | 0.06 |
| 20/02/1991 | 34.0 | | 0.25 |
| 20/02/1991 | 46.0 | | 0.38 |
| 20/02/1991 | 63.0 | | 0.63 |

**Main aquifer geology:** Triassic
**Final TDS (mg/L):** 3219

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***Groundwater Feature Detailed Report***

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

**Current status**

***Last recorded statuses***

| Type | Value | Date recorded |
|---|---|---|
| function | capped | 20/02/1991 |

***Groundwater Feature Detailed Report***

**Identification**

**Feature id:** 30900 **Feature type:** Bore

**Location**

**Locality:** Dodges Ferry
**Easting:** 551144 **Datum:** GDA94
**Northing:** 5255908 **Accuracy:** 200
**Ground level (m ASL):**

**Construction**

**Date drilled:** 21/11/2002
**Drilling company:** KMR Drilling Pty Ltd
**Depth (metres):** 42.00
**Initial yield (L/sec):** 3.03
**Initial EC (µS/cm):**

***Bore diameters***

| From (m) | To (m) | Diameter (mm) | Drilling technique |
|---|---|---|---|
| 0.0 | 42.0 | 203.00 | Downhole Hammer (Rotary Hammer) |

***Casings***

| From (m) | To (m) | Inside diameter (mm) | Outside diameter (mm) | Material |
|---|---|---|---|---|
| 0.0 | 42.0 | 125.00 | 125.00 | "unplasticised polyvinylchloride uPVC, Class 9" |

***Screens***

| From (m) | To (m) | Inlet type |
|---|---|---|
| 22.5 | 42.0 | slotted casing |

***Seals***

| From (m) | To (m) | Material type |
|---|---|---|
| *NA* | | |

**Geological / Hydrogeological Information**

***Lithological Log***

| From (m) | To (m) | Lithological description |
|---|---|---|
| 0.0 | 3.0 | sand |
| 3.0 | 9.0 | sandy clay |
| 9.0 | 42.0 | mudstone |

***Depth to water struck***

| Date | From (m) | To (m) | Cumulative yield |
|---|---|---|---|
| 21/11/2002 | 23.0 | 29.0 | 3.03 |

**Main aquifer geology:** Permian
**Final TDS (mg/L):**

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***Groundwater Feature Detailed Report***

**Standing Water Levels**

***Standing water levels***

| Date | SWL (metres) |
|---|---|
| *NA* | |

**Current status**

***Last recorded statuses***

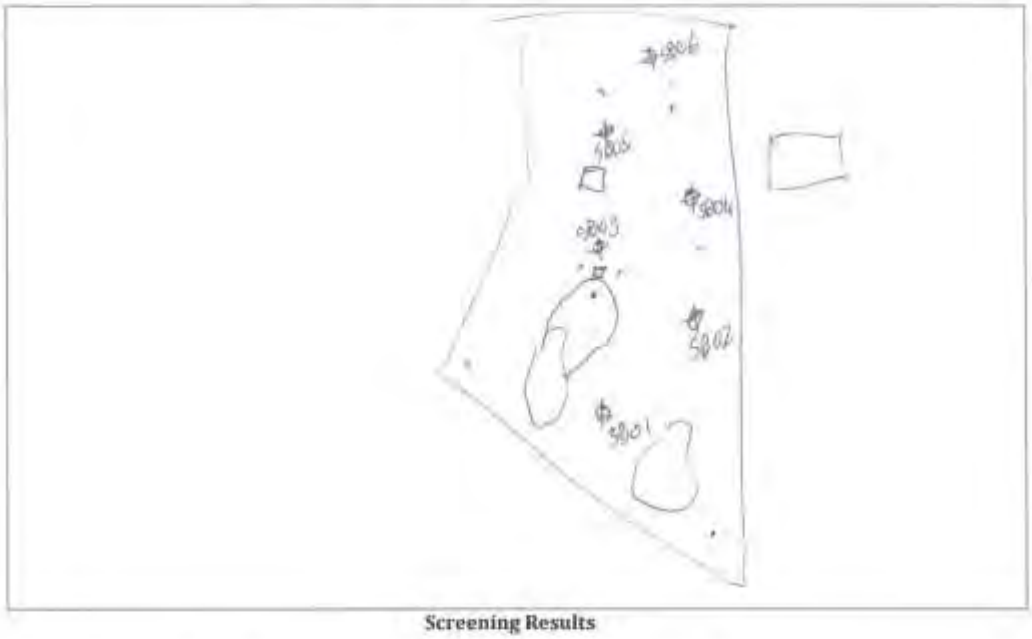
| Type | Value | Date recorded |
|---|---|---|
| function | functioning | 21/11/2002 |
| purpose | Unknown | 21/11/2002 |

## Appendix 7 Field Notes from current sampling

### VOC VAPOUR SCREENING FORM

| | |
|---|---|
| Date: 18-3-2021 | Screened By: AP |
| Project: DFP | Project No: |

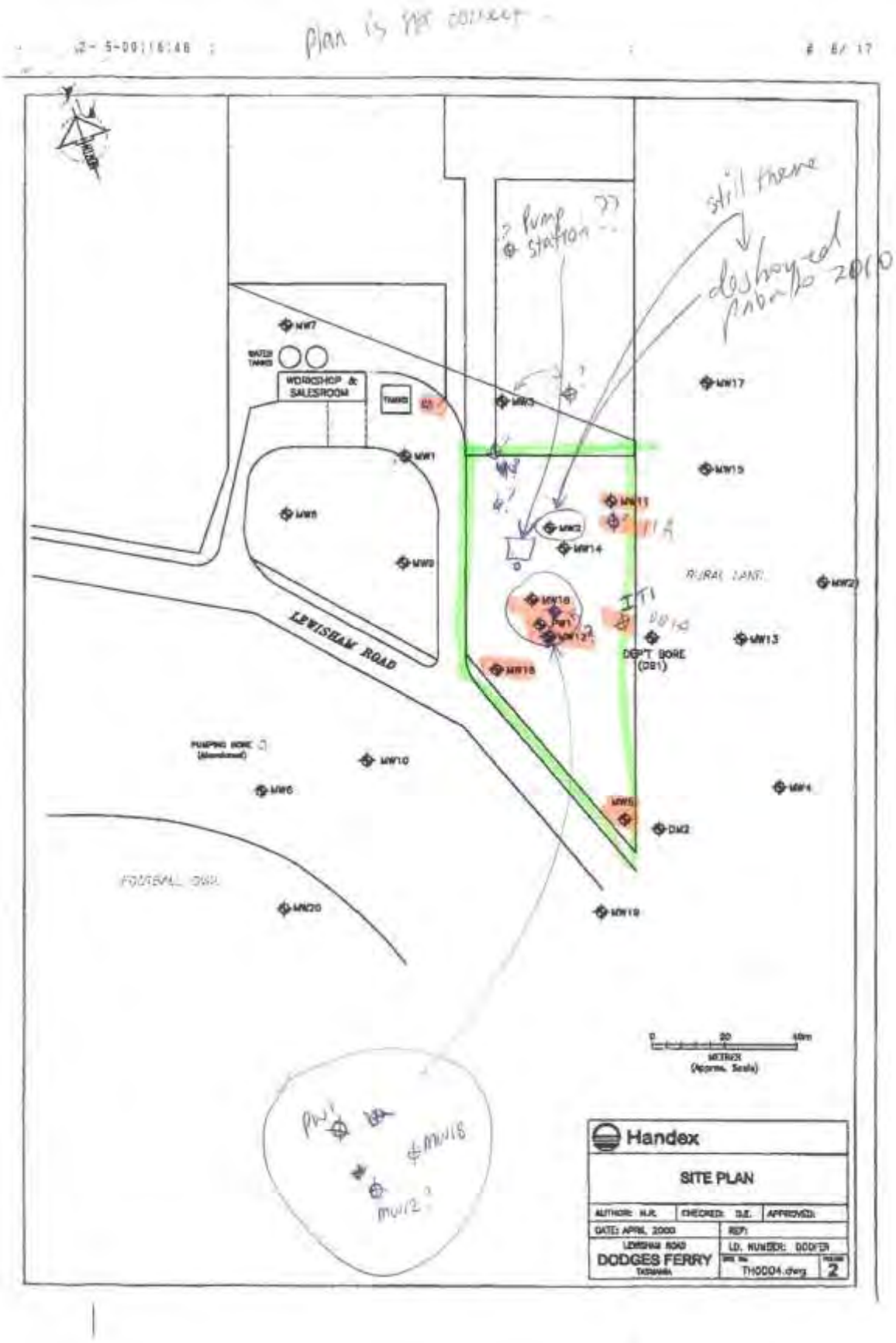
**Sketch of Sample Locations**

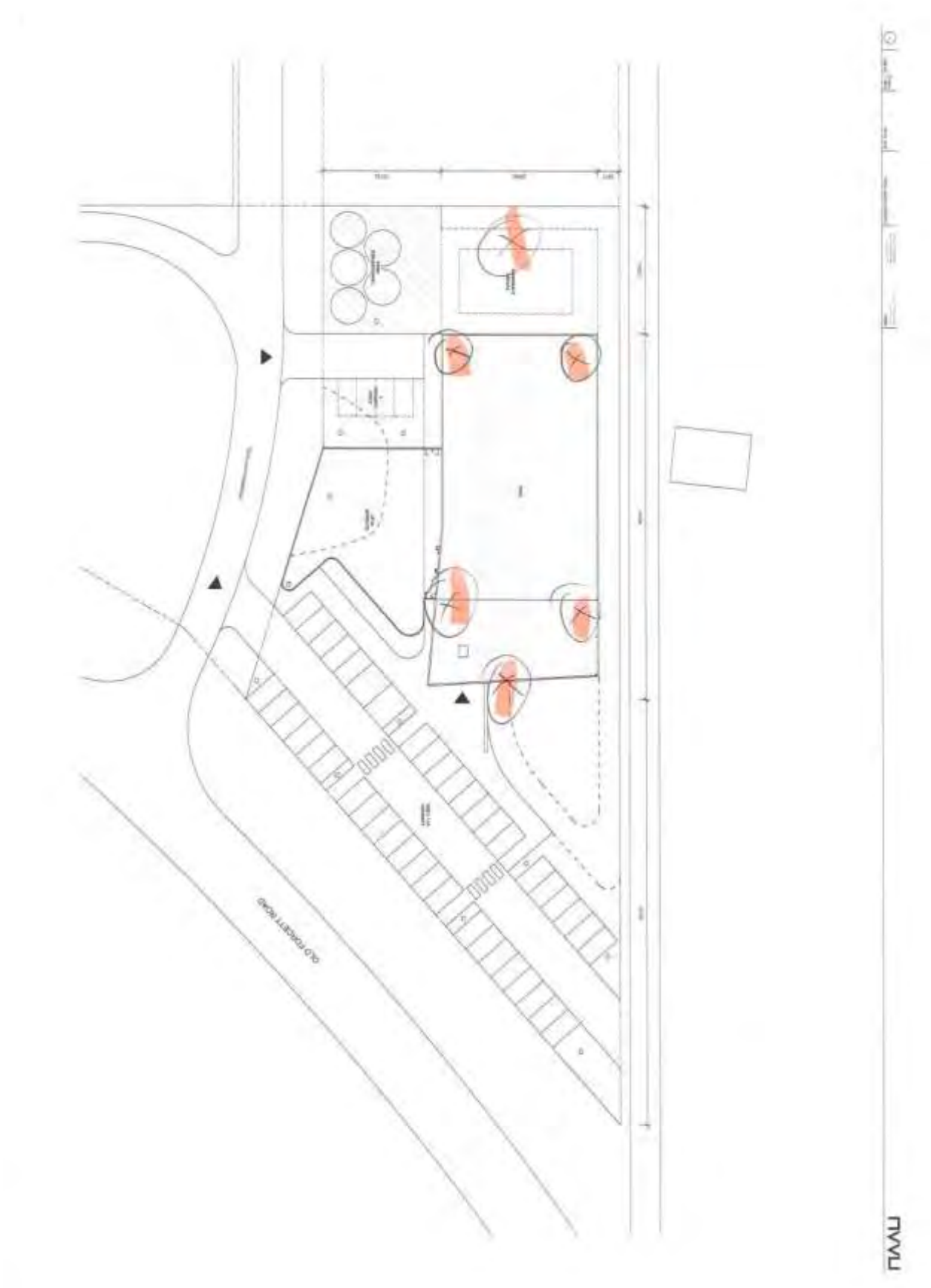



**Screening Results**

| Sample ID | Depth (m) | PID (ppm) | Comment | Sample ID | Depth (m) | PID (ppm) | Comment |
|---|---|---|---|---|---|---|---|
| SB01 | 0.1 | 5.3 | | | | | |
| | 0.5 | 0.0 | | | | | |
| | 1.0 | | | | | | |
| | ~~1.5~~ | | | | | | |
| | 2.0 | | | | | | |
| | 2.5 | V | | | | | |
| SB02 | 0.1 | 2.1 | | | | | |
| | 0.5 | 0.0 | | | | | |
| | 1.0 | | | | | | |
| | 2.0 | | | | | | |
| SB03 | 0.1 | 0.0 | | | | | |
| | 0.5 | | | | | | |
| | 1.0 | | | | | | |
| SB04 | 0.1 | | | | | | |

GEO-ENVIRONMENTAL SOLUTIONS PTY LTD – 29 KIRKSWAY PLACE, BATTERY POINT - PH: 03 6223 1839


Plan is not correct
still there
decommissioned prior to 2010
? Pump station ??
WORKSHOP & SALESROOM
WATER TANKS
TANKS
MW7
MW1
MW5
MW9
MW3
MW17
MW15
MW11
MW2
MW14
MW16
MW12
MW18
MW13
MW10
MW6
MW4
MW8
DM2
MW20
MW19
LEWISHAM ROAD
RURAL LAND
DG'T BORE (DB1)
FOOTBALL OVAL
METRES (Approx. Scale)
Handex
SITE PLAN
DODGES FERRY
TASMANIA
TH0004.dwg
2


OLD FORCETT ROAD

# DAILY FIELD NOTES

| Date: 18-3-21 | Logged By: ~~S.Joyce~~ AP |
|---|---|
| Sampling Event: | Project: DFP |

Details

SB01
0-0.2 A1 SAND to Silt (SM) dk gy. Fgrained, dry, loose
0.2-0.4 A2 Silty SAND (SM) Fgr, pgr, dry, mod
0.4-0.5 A3 Si SAND (SM) dk red-brn, dry, dense
0.5-1.4 B2 Clayey SILT / Silty CLAY (CL/ML) Lp, gr/pbr/yell, dry, VSt
1.4-2.4 C1 Sa SILTSTONE recovered as Sa SILT (ML) por/yell/pgr dry, vd, XW, VLS
2.4-2.5 C2 Si SANDSTONE/Sa ZSTONE mix (ML) dk o-br, dry, vd, VLS, micaceous
Ref.

SB02 (DUP = SB02 0.1-0.2m)
0-0.1 A1
0.1-0.5 A2
0.5-1.5 B2
1.5-2.3 C1
Ref.

SB03
0-0.1 A1
0.1-0.5 A2
0.5-0.6 B3
0.6-1.2 B2
1.2-1.3 C2 Sa STONE o/yell, dry, VS, XW
Ref.

GEO-ENVIRONMENTAL SOLUTIONS PTY LTD – 29 KIRKSWAY PLACE, BATTERY POINT - PH: 03 6223 1839

Page ____ of ____

# DAILY FIELD NOTES

| Date: 18-3-2021 | Logged By: ~~Sloyce~~ APlumme |
|---|---|
| Sampling Event: | Project: DFP |

Details

SB04 + SB05

0-0.1 A1
0.1-0.45 A2
0.45-0.55 A3
0.55-1.1 B2
1.1-1.4 C

↑ Ref

SB06

0-0.1 A1
0.1-0.5 A2
0.5-0.6 A3
0.6-1.5 B2
1.5-2.0 C1
2.0-2.2 C2 SA SILTSTONE

↑ Ref

GEO-ENVIRONMENTAL SOLUTIONS PTY LTD – 29 KIRKSWAY PLACE, BATTERY POINT - PH: 03 6223 1839

Page ____ of ____


Basemaps
Tools
-6.20
-0.50
-5.70mbgs
-7.00
-9.40mbgs.
-6.70
-0.5
-6.2mbgs
-5.50
-9.52
-4.98mbgs.
*check
5-5a TOC
-5.25mbc
-0.67
-4.98mbgs.
-5.02
-0.53
-4.49mbgs
2.57 TOC
-0.4
2.17mbgs.

## GROUNDWATER MONITORING LOG

Client: All Urban Planning — Date/Time: 22/03/2021

Project: Southern Beaches Learn to Swim Centre – Sampled by: Sarah Joyce & Alton Plummer

Borehole No: MW1 — Easting: ? — Northing: ?

Estimated Bore Yield (l/m): ? — Weather Conditions:

Well Depth BTOC (m): ? — Height of Collar (mm): ? — Temperature:

Groundwater Depth RL (m): ? — Bore Intern Diameter (mm): ? — Rainfall 7 Days (mm):

(25mm/50mm/65mm) — Station:

**Measurements from top of collar:**

Borehole Depth (m): — A

Groundwater Depth (m): 5.7 — B

Water Column Volume: — (A-B) x F — x3 =

25mm: F=0.5; 50mm: F=2; 65mm: F=x3.3

**Bore Water Purging:**

Purging Method: ? Bailer

Sampling Method: ? "

Volume to be Purged (L): — (Min. x3 Water Volume)

| Purging Cycles: | Cycle 1 | Cycle 2 | Cycle 3 |
|---|---|---|---|
| Start Time | 8:50 | 9:00 | 9:20 |
| Finish Time | 9:00 | 9:10 | 9:30 |
| Minutes | 10 | 10 | 10 |
| Volume (L) | 25 | 25 | 25 |
| Recovery Time Minutes | 0 | 0 | 0 |

Total Volume Purged (L): 75

Recovery Rate (L/m):

| Site Water Quality Measurements: | | | | Calibration: | Comments: |
|---|---|---|---|---|---|
| Temperature (oC) | 14.4 | 13.9 | 13.3 | | |
| pH (units) | 6.72 | 6.83 | 6.75 | | |
| Redox Potential (mV) | 158.4 | 104.8 | 72.8 | | |
| Conductivity (uS/cm) NS | 7.62 | 7.55 | 7.61 | | |
| Salinity (mg/L) | | | | | |
| Dissolved Oxygen (%) | | | | | |
| Dissolved Oxygen (mg/L) | | | | | |
| Turbidity | 5 | | | | |
| Odour | Y SI | | | | |
| Colour | clear | | | | |
| Sheen | — | | | | |

**Sampling Details:**

Sample Number: — Sample Bottles: Total No.

Sampling Time:

| | | | | |
|---|---|---|---|---|
| 1000mL plastic (non-pres) | x1 Green | 250mL plastic (Cd Nitrate) | x1 Blue | (Add NaOH |
| 500mL amber glass (non-pres) | x1 Orange | 125mL plastic (sulph acid) | x1 Purple | |
| 40mL amber glass (sulph acid) | x2 Maroon | 60mL plastic (non-pres) | x2 Red/Green | |
| 40mL amber glass (sulph acid) | x1 Purple | 500mL plastic (Na bisulph) | x1 Grey | |

General Comments:

Natural Attenuation

Duplicate Sample Collected

Triplicate Sample Collected

Sampled for natural attenuation

## GROUNDWATER MONITORING LOG

Client: All Urban Planning — Date/Time: 22/03/2021

Project: Southern Beaches Learn to Swim Centre – Sampled by: Sarah Joyce & Alton Plummer

Borehole No: MW1B — Easting: ? — Northing: ?

Estimated Bore Yield (l/m): ? — Weather Conditions:

Well Depth BTOC (m): ? — Height of Collar (mm): ? — Temperature:

Groundwater Depth RL (m): ? — Bore Intern Diameter (mm): ? — Rainfall 7 Days (mm):

(25mm/50mm/65mm) — Station:

**Measurements from top of collar:**

Borehole Depth (m): 18.6 — A

Groundwater Depth (m): 4.5 — B

Water Column Volume: 27.7 — (A-B) x F — x3 =

25mm: F=0.5; 50mm: F=2; 65mm: F=x3.3

**Bore Water Purging:**

Purging Method: ?

Sampling Method: ?

Volume to be Purged (L): 83.6 (Min. x3 Water Volume)

| Purging Cycles: | Cycle 1 | Cycle 2 | Cycle 3 |
|---|---|---|---|
| Start Time | 10:00 | 10:20 | |
| Finish Time | 10:10 | 10:30 | |
| Minutes | 10 | 10 | |
| Volume (L) | 15 | 15 | |
| Recovery Time Minutes | | | |

Total Volume Purged (L):

Recovery Rate (L/m):

| Site Water Quality Measurements: | | | | Calibration: | Comments: |
|---|---|---|---|---|---|
| Temperature (oC) | 14.6 | 13.5 | | | Hard to get water flow |
| pH (units) | 7.97 | 6.77 | | | |
| Redox Potential (mV) | 75.6 | 34.9 | | | 25 Lt. |
| Conductivity (uS/cm) NS | 7.51 | 7.57 | | | |
| Salinity (mg/L) | | | | | |
| Dissolved Oxygen (%) | | | | | |
| Dissolved Oxygen (mg/L) | | | | | |
| Turbidity | SI | | | | |
| Odour | SI | | | | |
| Colour | CI | | | | |
| Sheen | N | | | | |

**Sampling Details:**

Sample Number: — Sample Bottles: Total No.

Sampling Time

| | | | | |
|---|---|---|---|---|
| 1000mL plastic (non-pres) | x1 Green | 250mL plastic (Cd Nitrate) | x1 Blue | (Add NaOH |
| 500mL amber glass (non-pres) | x1 Orange | 125mL plastic (sulph acid) | x1 Purple | |
| 40mL amber glass (sulph acid) | x2 Maroon | 60mL plastic (non-pres) | x2 Red/Green | |
| 40mL amber glass (sulph acid) | x1 Purple | 500mL plastic (Na bisulph) | x1 Grey | |

General Comments:

Duplicate Sample Collected

Triplicate Sample Collected

Sampled for natural attenuation

## GROUNDWATER MONITORING LOG

GES ENVIRONMENTAL SOLUTIONS

Client: All Urban Planning — Date/Time: 18/03/2021

Project: Southern Beaches Learn to Swim Centre — Sampled by: Sarah Joyce & Aron Plummer

Borehole No: MW110 — Easting: ? — Northing: ?

Estimated Bore Yield (l/m): ? — Weather Conditions:

Well Depth BTOC (m): ? — Height of Collar (mm): ? — Temperature:

Groundwater Depth RL (m): ? — Bore Intern Diameter (mm): ? — Rainfall 7 Days (mm):

(25mm/50mm/65mm) — Station:

**Measurements from top of collar:**

Borehole Depth (m): 18.4 A

Groundwater Depth (m): 9.1 B

Water Column Volume: 13.4 (A-B) x F x3 =

25mm: F=0.5; 50mm: F=2; 65mm: F=3.3

**Bore Water Purging:**

Purging Method: ?

Sampling Method: ?

Volume to be Purged (L): 55 (Min. x3 Water Volume)

**Purging Cycles:**

| | Cycle 1 | Cycle 2 | Cycle 3 |
|---|---|---|---|
| Start Time | 11:45 | | |
| Finish Time | 11:55 | | |
| Minutes | 10 | | |
| Volume (L) | | | |
| Recovery Time Minutes | | | |

Total Volume Purged (L):

Recovery Rate (L/m):

**Site Water Quality Measurements:**

| | Cycle 1 | Cycle 2 | Cycle 3 | Calibration: | Comments: |
|---|---|---|---|---|---|
| Temperature (oC) | 14.1 | 13.6 | 17.7 | | |
| pH (units) | 6.53 | 6.56 | 6.55 | | |
| Redox Potential (mV) | 23.2 | 20.8 | -9.5 | | |
| Conductivity (uS/cm) MS | 12.42 | 12.42 | 12.61 | | |
| Salinity (mg/L) | | | | | |
| Dissolved Oxygen (%) | | | | | |
| Dissolved Oxygen (mg/L) | | | | | |
| Turbidity | | | | | |
| Odour | | | | | |
| Colour | | | | | |
| Sheen | | | | | |

**Sampling Details:**

Sample Number: — Sample Bottles: Total No:

Sampling Time:

| | | | | |
|---|---|---|---|---|
| 1000mL plastic (non-pres) | x1 Green | 250mL plastic (Cd Nitrate) | x1 Blue | /Add NaOH |
| 500mL amber glass (non-pres) | x1 Orange | 125mL plastic (sulph acid) | x1 Purple | |
| 40mL amber glass (sulph acid) | x2 Maroon | 60mL plastic (non-pres) | x2 Red/Green | |
| 40mL amber glass (sulph acid) | x1 Purple | 600mL plastic (Na bisulph) | x1 Grey | |

General Comments:

Natural Attenuation
Duplicate Sample Collected
Triplicate Sample Collected
Sampled for natural attenuation

## GROUNDWATER MONITORING LOG

GES ENVIRONMENTAL SOLUTIONS

Client: All Urban Planning — Date/Time: 18/03/2021

Project: Southern Beaches Learn to Swim Centre - — Sampled by: Sarah Joyce & Aron Plummer

Borehole No: MW117 — Easting: ? — Northing: ?

Estimated Bore Yield (l/m): ? — Weather Conditions:

Well Depth BTOC (m): ? — Height of Collar (mm): ? — Temperature:

Groundwater Depth RL (m): ? — Bore Intern Diameter (mm): ? — Rainfall 7 Days (mm):

(25mm/50mm/65mm) — Station:

**Measurements from top of collar:**

Borehole Depth (m): 10.35 A

Groundwater Depth (m): 6.2 B

Water Column Volume: 8.3 (A-B) x F x3 =

25mm: F=0.5; 50mm: F=2; 65mm: F=3.3

**Bore Water Purging:**

Purging Method: ?

Sampling Method: ?

Volume to be Purged (L): 24.9 (Min. x3 Water Volume)

**Purging Cycles:**

| | Cycle 1 | Cycle 2 | Cycle 3 |
|---|---|---|---|
| Start Time | 11:20 | 11:30 | 11:40 |
| Finish Time | 11:30 | 11:40 | 11:50 |
| Minutes | 10 | 10 | 10 |
| Volume (L) | 8 | 5 | 3 |
| Recovery Time Minutes | | | |

Total Volume Purged (L): 16

Recovery Rate (L/m):

**Site Water Quality Measurements:**

| | Cycle 1 | Cycle 2 | Cycle 3 | Calibration: | Comments: |
|---|---|---|---|---|---|
| Temperature (oC) | 17.2 | 14.0 | 13.3 | | Empty well. |
| pH (units) | 6.61 | 6.62 | 6.58 | | 16 L |
| Redox Potential (mV) | -2.2 | -36.3 | -16.7 | | |
| Conductivity (uS/cm) | 12.61 | 12.93 | 12.78 | | |
| Salinity (mg/L) | | | | | |
| Dissolved Oxygen (%) | | | | | |
| Dissolved Oxygen (mg/L) | | | | | |
| Turbidity | SI | | | | |
| Odour | Y SL | | | | |
| Colour | dSI | | | | |
| Sheen | Y | | | | |

**Sampling Details:**

Sample Number: — Sample Bottles: Total No:

Sampling Time:

| | | | | |
|---|---|---|---|---|
| 1000mL plastic (non-pres) | x1 Green | 250mL plastic (Cd Nitrate) | x1 Blue | /Add NaOH |
| 500mL amber glass (non-pres) | x1 Orange | 125mL plastic (sulph acid) | x1 Purple | |
| 40mL amber glass (sulph acid) | x2 Maroon | 60mL plastic (non-pres) | x2 Red/Green | |
| 40mL amber glass (sulph acid) | x1 Purple | 600mL plastic (Na bisulph) | x1 Grey | |

General Comments:

Duplicate Sample Collected
Triplicate Sample Collected
Sampled for natural attenuation

## GES — GROUNDWATER MONITORING LOG

Client: All Urban Planning — Date/Time: 18/03/2021
Project: Southern Beaches Learn to Swim Centre – Sampled by: Sarah Joyce & Anna Plummer

Borehole No: MW12-0 — Easting: ? — Northing: ?
Estimated Bore Yield (l/m): ? — Weather Conditions:
Well Depth BTOC (m): ? — Height of Collar (mm): ? — Temperature:
Groundwater Depth RL (m): ? — Bore Intern Diameter (mm): ? — Rainfall 7 Days (mm):
(25mm/50mm/65mm) — Station:

**Measurements from top of collar:**
Borehole Depth (m): 18-6 A
Groundwater Depth (m): 4-5 B
Water Column Volume: 14-2 (A-B) x F x3 =
25mm: F=0.5; 50mm: F=2; 65mm: F=3.3

**Bore Water Purging:**
Purging Method: ?
Sampling Method: ?
Volume to be Purged (L): (Min. x3 Water Volume)

| Purging Cycles: | Cycle 1 | Cycle 2 | Cycle 3 |
|---|---|---|---|
| Start Time | 10:40 | 10:50 | 11:00 |
| Finish Time | 10:50 | 11:20 | 11:10 |
| Minutes | 10 | 10 | 10 |
| Volume (L) | 15 | 10 | 5 |
| Recovery Time Minutes | | | |

Total Volume Purged (L): 30
Recovery Rate (L/m):

| Site Water Quality Measurements: | Cycle 1 | Cycle 2 | Cycle 3 | Calibration: | Comments: |
|---|---|---|---|---|---|
| Temperature (oC) | 14.4 | 13.6 | 13.5 | | Hard to get |
| pH (units) | 6.34 | 6.65 | 6.53 | | sample |
| Redox Potential (mV) | 59.7 | -2.7 | -45.1 | | |
| Conductivity (uS/cm) | 7.37 | 6.78 | 7.04 | | |
| Salinity (mg/L) | | | | | |
| Dissolved Oxygen (%) | | | | | |
| Dissolved Oxygen (mg/L) | | | | | |
| Turbidity | SI | | | | |
| Odour | N | | | | |
| Colour | Pbl | | | | |
| Sheen | — | | | | |

**Sampling Details:**
Sample Number: — Sample Bottles: Total No: —
Sampling Time:

| | | | | |
|---|---|---|---|---|
| 1000mL plastic (non-pres) | x1 Green | 250mL plastic (Cd Nitrate) | x1 Blue | (Acid NaOH |
| 500mL amber glass (non-pres) | x1 Orange | 125mL plastic (sulph acid) | x1 Purple | |
| 40mL amber glass (sulph acid) | x2 Maroon | 60mL plastic (non-pres) | x2 Red/Green | |
| 40mL amber glass (sulph acid) | x1 Purple | 600mL plastic (Na bisulph) | x1 Grey | |

General Comments:
Natural Attenuation
Duplicate Sample Collected
Triplicate Sample Collected
Sampled for natural attenuation

## GES — GROUNDWATER MONITORING LOG

Client: All Urban Planning — Date/Time: 18/03/2021
Project: Southern Beaches Learn to Swim Centre – Sampled by: Sarah Joyce & Anna Plummer

Borehole No: EF1 B — Easting: ? — Northing: ?
Estimated Bore Yield (l/m): ? — Weather Conditions:
Well Depth BTOC (m): ? — Height of Collar (mm): ? — Temperature:
Groundwater Depth RL (m): ? — Bore Intern Diameter (mm): ? — Rainfall 7 Days (mm):
(25mm/50mm/65mm) — Station:

**Measurements from top of collar:**
Borehole Depth (m): 18-2 A
Groundwater Depth (m): 5-0 B
Water Column Volume: 13-6 (A-B) x F 2.2 x3 =
25mm: F=0.5; 50mm: F=2; 65mm: F=3.3

**Bore Water Purging:**
Purging Method: ?
Sampling Method: ?
Volume to be Purged (L): 81-6 (Min. x3 Water Volume)

| Purging Cycles: | Cycle 1 | Cycle 2 | Cycle 3 |
|---|---|---|---|
| Start Time | 11:20 | 11:30 | |
| Finish Time | 11:30 | 11:35 | |
| Minutes | 10 | 5 | |
| Volume (L) | 15 | 5 | |
| Recovery Time Minutes | | | |

Total Volume Purged (L):
Recovery Rate (L/m): 7.5

| Site Water Quality Measurements: | Cycle 1 | Cycle 2 | Cycle 3 | Calibration: | Comments: |
|---|---|---|---|---|---|
| Temperature (oC) | 14.4 | 13.5 | 13.4 | | Hard to retrieve |
| pH (units) | 7.05 | 6.33 | 6.15 | | Sample ~25m |
| Redox Potential (mV) | 55.7 | 91.7 | 110.9 | | |
| Conductivity (uS/cm) NB | 7.35 | 7.53 | 7.50 | | |
| Salinity (mg/L) | | | | | |
| Dissolved Oxygen (%) | | | | | |
| Dissolved Oxygen (mg/L) | | | | | |
| Turbidity | NO | SI | SI | | |
| Odour | N* | N | N | | |
| Colour | cl | VPbl → | | | |
| Sheen | N | N | N | | |

**Sampling Details:**
Sample Number: — Sample Bottles: Total No: —
Sampling Time:

| | | | | |
|---|---|---|---|---|
| 1000mL plastic (non-pres) | x1 Green | 250mL plastic (Cd Nitrate) | x1 Blue | (Acid NaOH |
| 500mL amber glass (non-pres) | x1 Orange | 125mL plastic (sulph acid) | x1 Purple | |
| 40mL amber glass (sulph acid) | x2 Maroon | 60mL plastic (non-pres) | x2 Red/Green | |
| 40mL amber glass (sulph acid) | x1 Purple | 600mL plastic (Na bisulph) | x1 Grey | |

General Comments:
Duplicate Sample Collected
Triplicate Sample Collected
Sampled for natural attenuation

# QA/QC LOG

| Date: 18 - 22 March | Project: Dodges Ferry Pool | Project No: DFP | Sampled By: AP |
|---|---|---|---|

| Date | Name | Details | Dup Primary | Dup (XX-DUP-00) | ILS Primary | ILS (XX-ILS-00) | Trip Blank | Rinsate | Field |
|---|---|---|---|---|---|---|---|---|---|
| ~~22~~ 18-3-21 | | Soil Bores SB01 - SB06 | SB02 B1-0.2 | DUPLICATE Soil | - | - | 1 - P - Soil ~~2 - P - W~~ | 01 ✓ | 01 ✓ |
| 22-3-21 | | Groundwater | PW1 | Duplicate | PW1 | ILS | 2 - P - water 3 - S - " | 02 ✓ | 02 ✓ |
| | | | | | | | | ~~03~~ | ~~03~~ |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

GEO-ENVIRONMENTAL SOLUTIONS PTY LTD – 29 KIRKSWAY PLACE, BATTERY POINT - PH: 03 6223 1839

Note rinsates collected off nitrile gloves.

Late Updated:

## Appendix 8 Chain Of Custody and Sample Receipt Notification

ALS Environmental

# SAMPLE RECEIPT NOTIFICATION (SRN)

| | | | |
|---|---|---|---|
| Work Order | **EM2104986** | | |
| Client | **GEO-ENVIRONMENTAL SOLUTIONS** | Laboratory | Environmental Division Melbourne |
| Contact | DR JOHN PAUL CUMMING | Contact | Peter Ravlic |
| Address | 29 KIRKSWAY PLACE<br>BATTERY POINT TASMANIA, AUSTRALIA 7004 | Address | 4 Westall Rd Springvale VIC Australia 3171 |
| E-mail | jcumming@geosolutions.net.au | E-mail | peter.ravlic@alsglobal.com |
| Telephone | +61 03 6223 1839 | Telephone | +6138549 9645 |
| Facsimile | +61 03 6223 4539 | Facsimile | +61-3-8549 9626 |
| Project | DFP | Page | 1 of 3 |
| Order number | — | Quote number | EB2017GEOENVSOL0001 (EN/222) |
| C-O-C number | — | QC Level | NEPM 2013 B3 & ALS QC Standard |
| Site | — | | |
| Sampler | SARAH JOYCE | | |

## Dates

| | | | |
|---|---|---|---|
| Date Samples Received | 24-Mar-2021 10:15 | Issue Date | 24-Mar-2021 |
| Client Requested Due Date | 31-Mar-2021 | Scheduled Reporting Date | **30-Mar-2021** |

## Delivery Details

| | | | |
|---|---|---|---|
| Mode of Delivery | Carrier | Security Seal | Intact. |
| No. of coolers/boxes | 2 | Temperature | 8.0°C - Ice Bricks present |
| Receipt Detail | | No. of samples received / analysed | 35 / 27 |

## General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks). Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

RIGHT SOLUTIONS | RIGHT PARTNER

| | |
|---|---|
| Issue Date | 24-Mar-2021 |
| Page | 2 of 3 |
| Work Order | EM2104986 Amendment 0 |
| Client | GEO-ENVIRONMENTAL SOLUTIONS |

## *Sample Container(s)/Preservation Non-Compliances*

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

## *Summary of Sample(s) and Requested Analysis*

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

| Laboratory sample ID | Sampling date / time | Sample ID | On hold: SOIL - No analysis requested | SOIL - EN55 ^03 Moisture Content | SOIL - 5-1b TRHC6-C9/BTEXN | SOIL - 5-21 TRHC10-C36/BTEXN/PAH + Ph |
|---|---|---|---|---|---|---|
| EM2104986-001 | 18-Mar-2021 00:00 | SB01 0.1-0.2 | | ✓ | | ✓ |
| EM2104986-002 | 18-Mar-2021 00:00 | SB01 0.5-0.6 | ✓ | | | |
| EM2104986-003 | 18-Mar-2021 00:00 | SB01 1.0-1.1 | | ✓ | | ✓ |
| EM2104986-004 | 18-Mar-2021 00:00 | SB01 2.0-2.1 | ✓ | | | |
| EM2104986-005 | 18-Mar-2021 00:00 | SB01 2.4-2.5 | | ✓ | | ✓ |
| EM2104986-006 | 18-Mar-2021 00:00 | SB02 0.1-0.2 | | ✓ | | ✓ |
| EM2104986-007 | 18-Mar-2021 00:00 | SB02 1.0-1.1 | ✓ | | | |
| EM2104986-008 | 18-Mar-2021 00:00 | SB02 2.0-2.1 | | ✓ | | ✓ |
| EM2104986-009 | 18-Mar-2021 00:00 | SB03 0.1-0.2 | | ✓ | | ✓ |
| EM2104986-010 | 18-Mar-2021 00:00 | SB03 0.5-0.6 | ✓ | | | |
| EM2104986-011 | 18-Mar-2021 00:00 | SB03 1.0-1.1 | | ✓ | | ✓ |
| EM2104986-012 | 18-Mar-2021 00:00 | Duplicate Soil | | ✓ | | ✓ |
| EM2104986-013 | 18-Mar-2021 00:00 | SB04 0.1-0.2 | | ✓ | | ✓ |
| EM2104986-014 | 18-Mar-2021 00:00 | SB04 0.5-0.6 | ✓ | | | |
| EM2104986-015 | 18-Mar-2021 00:00 | SB04 1.0-1.1 | | ✓ | | ✓ |
| EM2104986-016 | 18-Mar-2021 00:00 | SB05 0.1-0.2 | | ✓ | | ✓ |
| EM2104986-017 | 18-Mar-2021 00:00 | SB05 0.5-0.6 | ✓ | | | |
| EM2104986-018 | 18-Mar-2021 00:00 | SB05 1.0-1.1 | | ✓ | | ✓ |
| EM2104986-019 | 18-Mar-2021 00:00 | SB06 0.1-0.2 | ✓ | | | |
| EM2104986-020 | 18-Mar-2021 00:00 | SB06 0.5-0.6 | | ✓ | | ✓ |
| EM2104986-021 | 18-Mar-2021 00:00 | SB06 1.0-1.1 | ✓ | | | |
| EM2104986-022 | 18-Mar-2021 00:00 | SB06 2.0-2.1 | | ✓ | | ✓ |
| EM2104986-026 | 18-Mar-2021 00:00 | Trip Blank 01 | | ✓ | ✓ | |

| | |
|---|---|
| Issue Date: | 24-Mar-2021 |
| Page | 3 of 3 |
| Work Order: | EM2104966 Amendment 0 |
| Client | GEO-ENVIRONMENTAL SOLUTIONS |

Matrix: **WATER**

| Laboratory sample ID | Sampling date / time | Sample ID | WATER - W16 TRH(C8 - C36)/TEX | WATER - W21 THM/BTEX/Naphthalene/PAL |
|---|---|---|---|---|
| EM2104966-023 | 18-Mar-2021 00:00 | Rinsate 01 | | ✓ |
| EM2104966-024 | 22-Mar-2021 00:00 | Rinsate 02 | | ✓ |
| EM2104966-025 | 18-Mar-2021 00:00 | Field 01 | | ✓ |
| EM2104966-027 | 22-Mar-2021 00:00 | Field 02 | | ✓ |
| EM2104966-028 | 22-Mar-2021 00:00 | Trip Blank 02 | ✓ | |
| EM2104966-029 | 22-Mar-2021 00:00 | PW1 | | ✓ |
| EM2104966-030 | 22-Mar-2021 00:00 | IT1 | | ✓ |
| EM2104966-031 | 22-Mar-2021 00:00 | MW11 | | ✓ |
| EM2104966-032 | 22-Mar-2021 00:00 | MW11A | | ✓ |
| EM2104966-033 | 22-Mar-2021 00:00 | MW12 | | ✓ |
| EM2104966-034 | 22-Mar-2021 00:00 | MW18 | | ✓ |
| EM2104966-035 | 22-Mar-2021 00:00 | Duplicate Water | | ✓ |

## Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

## Requested Deliverables

**All Invoices**

| | | |
|---|---|---|
| - A4 - AU Tax Invoice (INV) | Email | smcintosh@geosolutions.net.au |

**JOHN PAUL CUMMING**

| | | |
|---|---|---|
| - *AU Certificate of Analysis - NATA (COA) | Email | jcumming@geosolutions.net.au |
| - *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) | Email | jcumming@geosolutions.net.au |
| - *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) | Email | jcumming@geosolutions.net.au |
| - A4 - AU Sample Receipt Notification - Environmental HT (SRN) | Email | jcumming@geosolutions.net.au |
| - A4 - AU Tax Invoice (INV) | Email | jcumming@geosolutions.net.au |
| - Chain of Custody (CoC) (COC) | Email | jcumming@geosolutions.net.au |
| - EDI Format - ENMRG (ENMRG) | Email | jcumming@geosolutions.net.au |
| - EDI Format - ESDAT (ESDAT) | Email | jcumming@geosolutions.net.au |

**M IRAN**

| | | |
|---|---|---|
| - A4 - AU Tax Invoice (INV) | Email | miran@geosolutions.net.au |

**SARAH JOYCE**

| | | |
|---|---|---|
| - *AU Certificate of Analysis - NATA (COA) | Email | sjoyce@geosolutions.net.au |
| - *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) | Email | sjoyce@geosolutions.net.au |
| - *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) | Email | sjoyce@geosolutions.net.au |
| - A4 - AU Sample Receipt Notification - Environmental HT (SRN) | Email | sjoyce@geosolutions.net.au |
| - A4 - AU Tax Invoice (INV) | Email | sjoyce@geosolutions.net.au |
| - Chain of Custody (CoC) (COC) | Email | sjoyce@geosolutions.net.au |
| - EDI Format - ENMRG (ENMRG) | Email | sjoyce@geosolutions.net.au |
| - EDI Format - ESDAT (ESDAT) | Email | sjoyce@geosolutions.net.au |

ALS Environmental

FREIGHT

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

| | | | |
|---|---|---|---|
| CLIENT: | GEOENVIRONMENTAL SOLUTIONS | TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics) | ★ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date): |
| OFFICE: | 29 Kirkaway Pl, Battery Point TAS 7004 | | |
| PROJECT: | DFP | ALS QUOTE NO.: | |
| ORDER NUMBER: | | | COC SEQUENCE NUMBER (Circle) COC 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7 |
| PROJECT MANAGER: | JP Cumming | CONTACT PH: | |
| SAMPLER: | Sarah Joyce | SAMPLER MOBILE: 0438 255 259 | RELINQUISHED BY: S. Joyce DATE/TIME: 23·3 2021 |
| COC emailed to ALS? ( YES / NO) | | EDD FORMAT: default [redacted] | RECEIVED BY: DATE/TIME: |
| Email Reports to jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au | | | RELINQUISHED BY: DATE/TIME: |
| Email Invoice to: mirian@geosolutions.net.au, sjoyce@geosolutions.net.au; jcumming@geosolutions.net.au | | | RECEIVED BY: DATE/TIME: |

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

| LAB ID | SAMPLE ID | DATE / TIME | MATRIX | TYPE & PRESERVATIVE (refer to codes below) | TOTAL CONTAINERS | TPH, BTEXN, PAH, Metals (lead) [redacted] | Tas EPA (8100 (no TBT) | LOW LOR BVolp | TRH C6 - C10 | HOLD | Additional Information |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SB01 0.1 - 0.2 | 18·3·21 | S | Jar | 1 | ✓ | | | | | Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. |
| 2 | 0.5 - 0.6 | | | | 1 | | | | | ✓ | |
| 3 | 1.0 - 1.1 | | | | 1 | ✓ | | | | | |
| 4 | 2.0 - 2.1 | | | | 1 | | | | | ✓ | |
| 5 | 2.4 - 2.5 | | | | 1 | ✓ | | | | | |
| 6 | SB02 0.1 - 0.2 | | | | 1 | ✓ | | | | | |
| 7 | 1.0 - 1.1 | | | | 1 | | | | | ✓ | |
| 8 | 2.0 - 2.1 | | | | 1 | ✓ | | | | | |
| 9 | SB03 0.1 - 0.2 | | | | 1 | ✓ | | | | | |
| 10 | 0.5 - 0.6 | | | | 1 | | | | | ✓ | |
| 11 | 1.0 - 1.1 | | | | 1 | ✓ | | | | | |
| 12 | DUPLICATE SOIL | | | | 1 | ✓ | | | | | |
| | | | | TOTAL | | | | | | | |

Environmental Division Melbourne
Work Order Reference
EM2104986

Telephone : + 61-3-8549 9600

Received: 24/3, 10·15 Carrier: TNT
C/note: 857089
Temp: 5·0 °C Seal (Y) N
Ice / Icepacks / NA

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Callemondah Drive Clinton QLD 4680

MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

NEWCASTLE 5 Rose Gum Road Wetherill Park NSW 2164 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com

PERTH 10 Hod Way Malaga WA 6090

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 16 Kenny Street Wollongong NSW 2500

| | | | |
|---|---|---|---|
| CLIENT: | GEOENVIRONMENTAL SOLUTIONS | TURNAROUND REQUIREMENTS : ★ Standard TAT (List due date): | |
| OFFICE: | 29 Kirksway Pl, Battery Point TAS 7004 | (Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date): | |
| PROJECT: | DFP | ALS QUOTE NO.: | COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 |
| ORDER NUMBER: | | | CF: 1 2 3 4 5 6 7 |
| PROJECT MANAGER: | JP Cumming | CONTACT PH: | |
| SAMPLER: | Sarah Joyce | SAMPLER MOBILE: 0438 255 259 | |
| COC emailed to ALS? ( YES / NO) | | EDD FORMAT: default ~~plus AEGGWG EDAT EDD~~ | |
| Email Reports to jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au | | | |
| Email Invoice to: miran@geosolutions.net.au, sjoyce@geosolutions.net.au; jcumming@geosolutions.net.au | | | |

| RELINQUISHED BY: | RECEIVED BY: | RELINQUISHED BY: | RECEIVED BY: |
|---|---|---|---|
| S. Joyce | | | Moan |
| DATE/TIME: 23-3-2021 | DATE/TIME: | DATE/TIME: | DATE/TIME: |

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

| | | | | | | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required). | | | | | | | | Additional Information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LAB ID | SAMPLE ID | DATE / TIME | MATRIX | TYPE & PRESERVATIVE (refer to codes below) | TOTAL CONTAINERS | TPH, BTEXN, PAH, Metals (lead) ~~Nonmetal Compounds~~ | Tas EPA IB195 (no TBT) | LOW LOR BXHP | TRH C6 - C10 | HOLD | | | | Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. |
| 13 | SB04 0.1-0.2 | 18·3·21 | S | Jar | 1 | ✓ | | | | | | | | |
| 14 | 0.5-0.6 | | | | 1 | | | | | ✓ | | | | |
| 15 | 1.0-1.1 | | | | 1 | ✓ | | | | | | | | |
| 16 | SB05 0.1-0.2 | | | | 1 | ✓ | | | | | | | | |
| 17 | 0.5-0.6 | | | | 1 | | | | | ✓ | | | | |
| 18 | 1.0-1.1 | | | | 1 | ✓ | | | | | | | | |
| 19 | SB06 0.1-0.2 | | | | 1 | | | | | ✓ | | | | |
| 20 | 0.5-0.6 | | | | 1 | ✓ | | | | | | | | |
| 21 | 1.0-1.1 | | | | 1 | | | | | ✓ | | | | |
| 22 | 2.0-2.1 | | | | 1 | ✓ | | | | | | | | |
| 23 | Rinsate 01 | | W | 2V 1P 1A | 4 | ✓ | | | | | | | | |
| 24 | Rinsate 02 | 22·8·21 | | | 4 | ✓ | | | | | | | | |
| | | | | TOTAL | | | | | | | | | | |

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag

ALS Environmental

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

★ MELBOURNE 24 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: newcastle@alsglobal.com

PERTH 46 Dunlop Road Mt Richon WA 6112 Ph: 08 9290 7688 E: perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: samples.townsville@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

| | | | |
|---|---|---|---|
| CLIENT: | GEOENVIRONMENTAL SOLUTIONS | TURNAROUND REQUIREMENTS: ★ Standard TAT (List due date): | |
| OFFICE: | 29 Kirksway Pl, Battery Point TAS 7004 | (Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date): | |
| PROJECT: | DFR | ALS QUOTE NO.: | COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 |
| ORDER NUMBER: | | | OF: 1 2 3 4 5 6 7 |
| PROJECT MANAGER: | JP Cumming | CONTACT PH: | |
| SAMPLER: | Sarah Joyce | SAMPLER MOBILE: 0438 255 259 | RELINQUISHED BY: S. Joyce |
| COC emailed to ALS? ( YES / NO) | | EDD FORMAT: default ~~plus AECOM EDSAT EDD~~ | DATE/TIME: 23·3·2021 |
| Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au | | | RECEIVED BY: DATE/TIME: |
| Email Invoice to: mmm@geosolutions.net.au, sjoyce@geosolutions.net.au jcumming@geosolutions.net.au | | | RELINQUISHED BY: DATE/TIME: |
| | | | RECEIVED BY: DATE/TIME: |

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

| ALS USE ONLY | [illegible] | [illegible] | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required). | | | | | | | | | Additional Information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LAB ID | SAMPLE ID | DATE / TIME | MATRIX | TYPE & PRESERVATIVE (refer to codes below) | TOTAL CONTAINERS | TPH, BTEXN, PAH, Metals (inc) ~~Chlorinated Compounds~~ | Tas EPA IS105 (no TBT) | LOW LOR B(a)p | TRH C6 - C10 | HOLD | | | | Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. |
| 25 | Field 01 | 18·3·21 | W | 2V 1P 1A | 4 | ✓ | | | | | | | | |
| 26 | Trip Blank 01 | | S | Jar | 1 | | | | ✓ | | | | | |
| 27 | Field 02 | 22·3·21 | W | 2V 1P 1A | 4 | ✓ | | | | | | | | |
| 28 | Trip Blank 02 | | W | 2V | | | | | ✓ | | | | | |
| 29 | PW1 | | | 2V 1P 1A | 4 | ✓ | | | | | | | | |
| 30 | IT1 | | | | | ✓ | | | | | | | | |
| 31 | MW11 | | | | | ✓ | | | | | | | | |
| 32 | MW11A | | | | | ✓ | | | | | | | | |
| 33 | MW12 | | | | | ✓ | | | | | | | | |
| 34 | MW18 | | | | | ✓ | | | | | | | | |
| 35 | Duplicate-Water | | | | | ✓ | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | TOTAL | | | | | | | | | | |

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AC = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

## SAMPLE RECEIPT NOTIFICATION (SRN)

| | | | |
|---|---|---|---|
| Work Order | **ES2110567** | | |
| Client | **GEO-ENVIRONMENTAL SOLUTIONS** | Laboratory | Environmental Division Sydney |
| Contact | DR JOHN PAUL CUMMING | Contact | Peter Ravlic |
| Address | 29 KIRKSWAY PLACE<br>BATTERY POINT TASMANIA,<br>AUSTRALIA 7004 | Address | 277-289 Woodpark Road Smithfield<br>NSW Australia 2164 |
| E-mail | jcumming@geosolutions.net.au | E-mail | peter.ravlic@alsglobal.com |
| Telephone | +61 03 6223 1839 | Telephone | +6138549 9645 |
| Facsimile | +61 03 6223 4539 | Facsimile | +61-2-8784 8500 |
| Project | DFP Second | Page | 1 of 2 |
| Order number | — | Quote number | EB2017GEOENVSOL0001 (EN/222) |
| C-O-C number | — | QC Level | NEPM 2013 B3 & ALS QC Standard |
| Site | — | | |
| Sampler | SARAH JOYCE | | |

### Dates

| | | | |
|---|---|---|---|
| Date Samples Received | 24-Mar-2021 11:30 | Issue Date | 25-Mar-2021 |
| Client Requested Due Date | 31-Mar-2021 | Scheduled Reporting Date | **31-Mar-2021** |

### Delivery Details

| | | | |
|---|---|---|---|
| Mode of Delivery | Carrier | Security Seal | Intact. |
| No. of coolers/boxes | 1 | Temperature | 11.3' C - Ice Bricks present |
| Receipt Detail | | No. of samples received / analysed | 2 / 2 |

### General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

RIGHT SOLUTIONS | RIGHT PARTNER

| | |
|---|---|
| Issue Date | 25-Mar-2021 |
| Page | 2 of 2 |
| Work Order | ES2110567 Amendment 0 |
| Client | GEO-ENVIRONMENTAL SOLUTIONS |

## Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

## Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Matrix: **WATER**

| Laboratory sample ID | Sampling date / time | Sample ID | WATER - EP071(V) - TPH-W(V) TPH (C6-C40) (NEPM) | WATER - W-21 TRH (C6-C40) (NEPM) Fraction |
|---|---|---|---|---|
| ES2110567-001 | 22-Mar-2021 00:00 | TRIP BLANK 03 | ✓ | |
| ES2110567-002 | 22-Mar-2021 00:00 | ILS | | ✓ |

## Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

## Requested Deliverables

| | | |
|---|---|---|
| **All Invoices** | | |
| - A4 - AU Tax Invoice (INV) | Email | smcintosh@geosolutions.net.au |
| **JOHN PAUL CUMMING** | | |
| - *AU Certificate of Analysis - NATA (COA) | Email | jcumming@geosolutions.net.au |
| - *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) | Email | jcumming@geosolutions.net.au |
| - *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) | Email | jcumming@geosolutions.net.au |
| - A4 - AU Sample Receipt Notification - Environmental HT (SRN) | Email | jcumming@geosolutions.net.au |
| - A4 - AU Tax Invoice (INV) | Email | jcumming@geosolutions.net.au |
| - Chain of Custody (CoC) (COC) | Email | jcumming@geosolutions.net.au |
| - EDI Format - ENMRG (ENMRG) | Email | jcumming@geosolutions.net.au |
| - EDI Format - ESDAT (ESDAT) | Email | jcumming@geosolutions.net.au |
| **M IRAN** | | |
| - A4 - AU Tax Invoice (INV) | Email | miran@geosolutions.net.au |
| **SARAH JOYCE** | | |
| - *AU Certificate of Analysis - NATA (COA) | Email | sjoyce@geosolutions.net.au |
| - *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) | Email | sjoyce@geosolutions.net.au |
| - *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) | Email | sjoyce@geosolutions.net.au |
| - A4 - AU Sample Receipt Notification - Environmental HT (SRN) | Email | sjoyce@geosolutions.net.au |
| - A4 - AU Tax Invoice (INV) | Email | sjoyce@geosolutions.net.au |
| - Chain of Custody (CoC) (COC) | Email | sjoyce@geosolutions.net.au |
| - EDI Format - ENMRG (ENMRG) | Email | sjoyce@geosolutions.net.au |
| - EDI Format - ESDAT (ESDAT) | Email | sjoyce@geosolutions.net.au |

ALS Environmental

CLIENT: GEOENVIRONMENTAL SOLUTIONS
OFFICE: 29 Kirksway Pl, Battery Point TAS 7004
PROJECT: [redacted] DFP Second
ORDER NUMBER:
PROJECT MANAGER: JP Cumming
SAMPLER: Sarah Joyce
COC emailed to ALS? ( YES / NO)
Email Reports to: jcumming@geosolutions.net.au; sjoyce@geosolutions.net.au
Email Invoice to: jcumming@geosolutions.net.au; miran@geosolutions.net.au; sjoyce@geosolutions.net.au
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

CONTACT PH:
SAMPLER MOBILE: 0438 255 259
EDD FORMAT: default

TURNAROUND REQUIREMENTS: ★ Standard TAT (List due date):
(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):
ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)
COC 1 2 3 4 5 6 7
SP 1 2 3 4 5 6 7

RELINQUISHED BY: S. Joyce
DATE/TIME: 23.3.21
RECEIVED BY: TAS
DATE/TIME: 24/3/21 11:30
RELINQUISHED BY:
DATE/TIME:
RECEIVED BY:
DATE/TIME:

| LAB ID | SAMPLE ID | DATE / TIME | MATRIX | TYPE & PRESERVATIVE (codes below) | (refer to) | TOTAL CONTAINERS | TPH, BTEX, PAH | 15 Metals | 8 Metals | Tas EPA IB105 (no TBT) | LOW LOR B(a)p | TRH C6 - C10 | HOLD | LEAD | Additional Information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Trip Blank 03 | 22.3.21 | W | 2V | | 1 | | | | | | | | | |
| 2 | TLS | | W | 2V 1P 1A | | 4 | ✓ | | | | | ✓ | | ✓ | |

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to ensure suite price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.

TOTAL

Environmental Division
Sydney
Work Order Reference
ES2110567

Telephone : 61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved Plastic; S = Sodium Hydroxide/Zinc Acetate Preserved; B = Unpreserved Bag; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; A = Unpreserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = SulfuricPreserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulfate Soils; Q = Unpreserved Plastic.

# Appendix 9 Laboratory QA and QC Reports

ALS Environmental

# QUALITY CONTROL REPORT

| | | | |
|---|---|---|---|
| Work Order | EM2104986 | Page | 1 of 9 |
| Client | GEO-ENVIRONMENTAL SOLUTIONS | Laboratory | Environmental Division Melbourne |
| Contact | DR JOHN PAUL CUMMING | Contact | Peter Ravlic |
| Address | 29 KIRKSWAY PLACE<br>BATTERY POINT TASMANIA, AUSTRALIA 7004 | Address | 4 Westall Rd Springvale VIC Australia 3171 |
| Telephone | +61 03 6223 1839 | Telephone | +6138549 9645 |
| Project | DFP | Date Samples Received | 24-Mar-2021 |
| Order number | --- | Date Analysis Commenced | 24-Mar-2021 |
| C-O-C number | --- | Issue Date | 30-Mar-2021 |
| Sampler | SARAH JOYCE | | |
| Site | --- | | |
| Quote number | EN/222 | | |
| No. of samples received | 35 | | |
| No. of samples analysed | 27 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

## Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories | Position | Accreditation Category |
|---|---|---|
| Aranie Vijayaratnam | Non-Metals Team Leader | Melbourne Inorganics, Springvale, VIC |
| Dilani Fernando | Senior Inorganic Chemist | Melbourne Inorganics, Springvale, VIC |
| Nancy Wang | 2IC Organic Chemist | Melbourne Organics, Springvale, VIC |
| Nikki Stepniewski | Senior Inorganic Instrument Chemist | Melbourne Inorganics, Springvale, VIC |

RIGHT SOLUTIONS RIGHT PARTNER



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In cases where developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-ENVI/38 and are dependent on the magnitude of results in comparison to the level of reporting (Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%).

Sub-Matrix: SOIL

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | LOR | Unit | Laboratory Duplicate (DUP) Report: Original Result | Duplicate Result | RPD (%) | Acceptable RPD (%) |
|---|---|---|---|---|---|---|---|---|---|
| **EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3585842)** | | | | | | | | | |
| EM2104986-009 | SB03 0.1-0.2 | EG005T: Lead | 7439-92-1 | 5 | mg/kg | <5 | <5 | 0.00 | No Limit |
| EM2104879-001 | Anonymous | EG005T: Lead | 7439-92-1 | 5 | mg/kg | 11 | 11 | 0.00 | No Limit |
| **EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3584523)** | | | | | | | | | |
| EM2104967-044 | Anonymous | EA055: Moisture Content | --- | 0.1 | % | 2.0 | 2.0 | 0.00 | 0% - 50% |
| EM2104986-001 | SB01 0.1-0.2 | EA055: Moisture Content | --- | 0.1 | % | 2.7 | 2.4 | 14.5 | No Limit |
| **EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3584524)** | | | | | | | | | |
| EM2104986-016 | SB05 0.1-0.2 | EA055: Moisture Content | --- | 0.1 | % | 5.1 | 4.8 | 7.41 | No Limit |
| EM2105002-026 | Anonymous | EA055: Moisture Content | --- | 0.1 | % | 19.9 | 21.6 | 8.26 | 0% - 20% |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3585418)** | | | | | | | | | |
| EM2104986-001 | SB01 0.1-0.2 | EP075(SIM): Naphthalene | 91-20-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Acenaphthylene | 208-96-8 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Acenaphthene | 83-32-9 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Fluorene | 86-73-7 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Phenanthrene | 85-01-8 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Anthracene | 120-12-7 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Fluoranthene | 206-44-0 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Pyrene | 129-00-0 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(a)anthracene | 56-55-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Chrysene | 218-01-9 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo[b+j]fluoranthene | 205-99-2<br>205-82-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(k)fluoranthene | 207-08-9 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(a)pyrene | 50-32-8 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |

Page: 3 of 9
Work Order: EM2104986
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

| Sub-Matrix: SOIL | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | LOR | Unit | Laboratory Duplicate (DUP) Report: Original Result | Duplicate Result | RPD (%) | Acceptable RPD (%) |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3585478) - continued** | | | | | | | | | |
| EM2104986-001 | SB01 0.1-0.2 | EP075(SIM): Dibenz(a,h)anthracene | 53-70-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(g,h,i)perylene | 191-24-2 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| EM2104986-016 | SB05 0.1-0.2 | EP075(SIM): Naphthalene | 91-20-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Acenaphthylene | 208-96-8 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Acenaphthene | 83-32-9 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Fluorene | 86-73-7 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Phenanthrene | 85-01-8 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Anthracene | 120-12-7 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Fluoranthene | 206-44-0 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Pyrene | 129-00-0 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benz(a)anthracene | 56-55-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Chrysene | 218-01-9 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(b+j)fluoranthene | 205-99-2<br>205-82-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(k)fluoranthene | 207-08-9 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(a)pyrene | 50-32-8 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Dibenz(a,h)anthracene | 53-70-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(g,h,i)perylene | 191-24-2 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3584451)** | | | | | | | | | |
| EM2104986-001 | SB01 0.1-0.2 | EP080: C6 - C9 Fraction | --- | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| EM2104986-015 | SB04 1.0-1.1 | EP080: C6 - C9 Fraction | --- | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3585419)** | | | | | | | | | |
| EM2104986-001 | SB01 0.1-0.2 | EP071: C15 - C28 Fraction | --- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: C29 - C36 Fraction | --- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: C10 - C14 Fraction | --- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| | | EP071: C10 - C36 Fraction (sum) | --- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| EM2104986-016 | SB05 0.1-0.2 | EP071: C15 - C28 Fraction | --- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: C29 - C36 Fraction | --- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: C10 - C14 Fraction | --- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| | | EP071: C10 - C36 Fraction (sum) | --- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3584451)** | | | | | | | | | |
| EM2104986-001 | SB01 0.1-0.2 | EP080: C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| EM2104986-015 | SB04 1.0-1.1 | EP080: C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3585419)** | | | | | | | | | |
| EM2104986-001 | SB01 0.1-0.2 | EP071: >C16 - C34 Fraction | --- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C34 - C40 Fraction | --- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C10 - C16 Fraction | --- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| | | EP071: >C10 - C40 Fraction (sum) | --- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |

Page: 4 of 9
Work Order: EM2104986
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

| Sub-Matrix: SOIL | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | LOR | Unit | Laboratory Duplicate (DUP) Report: Original Result | Duplicate Result | RPD (%) | Acceptable RPD (%) |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3585419) - continued** | | | | | | | | | |
| EM2104986-016 | SB05 0.1-0.2 | EP071: >C16 - C34 Fraction | --- | 100 | mg/kg | 120 | <100 | 14.8 | No Limit |
| | | EP071: >C34 - C40 Fraction | --- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C10 - C16 Fraction | --- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| | | EP071: >C10 - C40 Fraction (sum) | --- | 50 | mg/kg | 120 | <50 | 82.4 | No Limit |
| **EP080: BTEXN (QC Lot: 3584451)** | | | | | | | | | |
| EM2104986-001 | SB01 0.1-0.2 | EP080: Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 1 | mg/kg | <1 | <1 | 0.00 | No Limit |
| EM2104986-015 | SB04 1.0-1.1 | EP080: Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 1 | mg/kg | <1 | <1 | 0.00 | No Limit |

| Sub-Matrix: WATER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | LOR | Unit | Laboratory Duplicate (DUP) Report: Original Result | Duplicate Result | RPD (%) | Acceptable RPD (%) |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 3586575)** | | | | | | | | | |
| EM2104975-002 | Anonymous | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.00 | No Limit |
| EM2104982-007 | Anonymous | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.00 | No Limit |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 3586574)** | | | | | | | | | |
| EM2104986-032 | MW11A | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | 0.002 | 0.003 | 0.00 | No Limit |
| EM2104984-006 | Anonymous | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.00 | No Limit |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3583936)** | | | | | | | | | |
| EM2105011-001 | Anonymous | EP075(SIM): Benzo(a)pyrene | 50-32-8 | 0.5 | µg/L | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Naphthalene | 91-20-3 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Acenaphthylene | 208-96-8 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Acenaphthene | 83-32-9 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Fluorene | 86-73-7 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Phenanthrene | 85-01-8 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Anthracene | 120-12-7 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Fluoranthene | 206-44-0 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Pyrene | 129-00-0 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Benz(a)anthracene | 56-55-3 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Chrysene | 218-01-9 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |

Page : 5 of 9
Work Order : EM2104986
Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : DFP

Sub-Matrix: **WATER**

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | LOR | Unit | Laboratory Duplicate (DUP) Report: Original Result | Duplicate Result | RPD (%) | Acceptable RPD (%) |
|---|---|---|---|---|---|---|---|---|---|
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3583958) - continued** | | | | | | | | | |
| EM2105211-001 | Anonymous | EP075(SIM): Benzo(b+j)fluoranthene | 205-99-2<br>205-82-3 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(k)fluoranthene | 207-08-9 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Indeno(1,2,3-cd)pyrene | 193-39-5 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Dibenz(a,h)anthracene | 53-70-3 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(g,h,i)perylene | 191-24-2 | 1 | µg/L | <1.0 | <1.0 | 0.00 | No Limit |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3583934)** | | | | | | | | | |
| EM2104986-030 | ITT | EP080: C6 - C9 Fraction | --- | 20 | µg/L | 40 | 50 | 0.00 | No Limit |
| EM2104986-034 | MW18 | EP080: C6 - C9 Fraction | --- | 20 | µg/L | 50 | 40 | 0.00 | No Limit |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3583951)** | | | | | | | | | |
| EM2105211-001 | Anonymous | EP071: C15 - C28 Fraction | --- | 100 | µg/L | <100 | <100 | 0.00 | No Limit |
| | | EP071: C10 - C14 Fraction | --- | 50 | µg/L | <50 | <50 | 0.00 | No Limit |
| | | EP071: C29 - C36 Fraction | --- | 50 | µg/L | <50 | <50 | 0.00 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3583934)** | | | | | | | | | |
| EM2104986-030 | ITT | EP080: C6 - C10 Fraction | C6_C10 | 20 | µg/L | 50 | 40 | 0.00 | No Limit |
| EM2104986-034 | MW18 | EP080: C6 - C10 Fraction | C6_C10 | 20 | µg/L | 40 | 30 | 0.00 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3583951)** | | | | | | | | | |
| EM2105211-001 | Anonymous | EP071: >C10 - C16 Fraction | --- | 100 | µg/L | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C16 - C34 Fraction | --- | 100 | µg/L | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C34 - C40 Fraction | --- | 100 | µg/L | <100 | <100 | 0.00 | No Limit |
| **EP080: BTEXN (QC Lot: 3583934)** | | | | | | | | | |
| EM2104986-030 | ITT | EP080: Benzene | 71-43-2 | 1 | µg/L | <1 | <1 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 5 | µg/L | <5 | <5 | 0.00 | No Limit |
| EM2104986-034 | MW18 | EP080: Benzene | 71-43-2 | 1 | µg/L | 4 | 4 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 5 | µg/L | <5 | <5 | 0.00 | No Limit |

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Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : DFP

## *Method Blank (MB) and Laboratory Control Sample (LCS) Report*

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method performance and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|---|
| **EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3585842)** | | | | | | | | |
| EG005T: Lead | 7439-92-1 | 5 | mg/kg | <5 | 82.4 mg/kg | 90.2 | 70.0 | 130 |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3585413)** | | | | | | | | |
| EP075(SIM): Naphthalene | 91-20-3 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 110 | 69.7 | 123 |
| EP075(SIM): Acenaphthylene | 208-96-8 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 101 | 81.0 | 123 |
| EP075(SIM): Acenaphthene | 83-32-9 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 109 | 83.6 | 120 |
| EP075(SIM): Fluorene | 86-73-7 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 101 | 81.3 | 126 |
| EP075(SIM): Phenanthrene | 85-01-8 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 109 | 79.4 | 123 |
| EP075(SIM): Anthracene | 120-12-7 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 109 | 81.7 | 127 |
| EP075(SIM): Fluoranthene | 206-44-0 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 109 | 76.1 | 124 |
| EP075(SIM): Pyrene | 129-00-0 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 114 | 79.9 | 128 |
| EP075(SIM): Benz(a)anthracene | 56-55-3 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 103 | 76.9 | 123 |
| EP075(SIM): Chrysene | 218-01-9 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 122 | 80.9 | 132 |
| EP075(SIM): Benzo(b+j)fluoranthene | 205-99-2<br>205-82-3 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 97.5 | 70.0 | 121 |
| EP075(SIM): Benzo(k)fluoranthene | 207-08-9 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 111 | 80.4 | 130 |
| EP075(SIM): Benzo(a)pyrene | 50-32-8 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 101 | 70.2 | 123 |
| EP075(SIM): Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 94.1 | 67.5 | 122 |
| EP075(SIM): Dibenz(a,h)anthracene | 53-70-3 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 93.7 | 65.8 | 123 |
| EP075(SIM): Benzo(g,h,i)perylene | 191-24-2 | 0.5 | mg/kg | <0.5 | 3 mg/kg | 87.7 | 65.8 | 127 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3584451)** | | | | | | | | |
| EP080: C6 - C9 Fraction | --- | 10 | mg/kg | <10 | 36 mg/kg | 87.5 | 58.6 | 131 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3585418)** | | | | | | | | |
| EP071: C10 - C14 Fraction | --- | 50 | mg/kg | <50 | 900 mg/kg | 88.5 | 75.0 | 128 |
| EP071: C15 - C28 Fraction | --- | 100 | mg/kg | <100 | 3030 mg/kg | 93.6 | 82.0 | 123 |
| EP071: C29 - C36 Fraction | --- | 100 | mg/kg | <100 | 1520 mg/kg | 87.5 | 82.4 | 121 |
| EP071: C10 - C36 Fraction (sum) | --- | 50 | mg/kg | <50 | --- | --- | --- | --- |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3584451)** | | | | | | | | |
| EP080: C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | 45 mg/kg | 85.8 | 59.3 | 128 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3585418)** | | | | | | | | |
| EP071: >C10 - C16 Fraction | --- | 50 | mg/kg | <50 | 1160 mg/kg | 83.2 | 77.0 | 130 |
| EP071: >C16 - C34 Fraction | --- | 100 | mg/kg | <100 | 4020 mg/kg | 94.8 | 81.3 | 120 |
| EP071: >C34 - C40 Fraction | --- | 100 | mg/kg | <100 | 280 mg/kg | 94.4 | 73.3 | 137 |
| EP071: >C10 - C40 Fraction (sum) | --- | 50 | mg/kg | <50 | --- | --- | --- | --- |
| **EP080: BTEXN (QCLot: 3584451)** | | | | | | | | |

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Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : DFP

Sub-Matrix: **SOIL**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | High |
|---|---|---|---|---|---|---|---|---|
| **EP080: BTEXN (QCLot: 3584451) - continued** | | | | | | | | |
| EP080: Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | 2 mg/kg | 91.3 | 81.8 | 117 |
| EP080: Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | 2 mg/kg | 91.3 | 85.8 | 125 |
| EP080: Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | 2 mg/kg | 91.5 | 85.8 | 124 |
| EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 0.5 | mg/kg | <0.5 | 4 mg/kg | 104 | 84.9 | 134 |
| EP080: ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | 2 mg/kg | 105 | 89.7 | 132 |
| EP080: Naphthalene | 91-20-3 | 1 | mg/kg | <1 | 0.5 mg/kg | 87.3 | 81.8 | 123 |

Sub-Matrix: **WATER**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | High |
|---|---|---|---|---|---|---|---|---|
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 3588979)** | | | | | | | | |
| EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 97.9 | 84.6 | 108 |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 3588974)** | | | | | | | | |
| EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 93.6 | 84.6 | 108 |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3583850)** | | | | | | | | |
| EP075(SIM): Naphthalene | 91-20-3 | 1 | µg/L | <1.0 | 5 µg/L | 76.3 | 42.8 | 114 |
| EP075(SIM): Acenaphthylene | 208-96-8 | 1 | µg/L | <1.0 | 5 µg/L | 94.2 | 48.6 | 119 |
| EP075(SIM): Acenaphthene | 83-32-9 | 1 | µg/L | <1.0 | 5 µg/L | 82.2 | 47.0 | 117 |
| EP075(SIM): Fluorene | 86-73-7 | 1 | µg/L | <1.0 | 5 µg/L | 100 | 48.5 | 119 |
| EP075(SIM): Phenanthrene | 85-01-8 | 1 | µg/L | <1.0 | 5 µg/L | 83.1 | 48.4 | 121 |
| EP075(SIM): Anthracene | 120-12-7 | 1 | µg/L | <1.0 | 5 µg/L | 88.1 | 48.4 | 122 |
| EP075(SIM): Fluoranthene | 206-44-0 | 1 | µg/L | <1.0 | 5 µg/L | 91.2 | 50.3 | 124 |
| EP075(SIM): Pyrene | 129-00-0 | 1 | µg/L | <1.0 | 5 µg/L | 87.3 | 50.0 | 126 |
| EP075(SIM): Benz(a)anthracene | 56-55-3 | 1 | µg/L | <1.0 | 5 µg/L | 80.4 | 49.4 | 127 |
| EP075(SIM): Chrysene | 218-01-9 | 1 | µg/L | <1.0 | 5 µg/L | 78.6 | 48.7 | 128 |
| EP075(SIM): Benzo[b+j]fluoranthene | 205-99-2<br>205-82-3 | 1 | µg/L | <1.0 | 5 µg/L | 102 | 54.5 | 134 |
| EP075(SIM): Benzo[k]fluoranthene | 207-08-9 | 1 | µg/L | <1.0 | 5 µg/L | 82.0 | 56.1 | 134 |
| EP075(SIM): Benzo(a)pyrene | 50-32-8 | 0.5 | µg/L | <0.5 | 5 µg/L | 88.3 | 55.6 | 135 |
| EP075(SIM): Indeno(1.2.3.cd)pyrene | 193-39-5 | 1 | µg/L | <1.0 | 5 µg/L | 99.9 | 54.4 | 136 |
| EP075(SIM): Dibenz(a.h)anthracene | 53-70-3 | 1 | µg/L | <1.0 | 5 µg/L | 100 | 54.5 | 135 |
| EP075(SIM): Benzo(g.h.i)perylene | 191-24-2 | 1 | µg/L | <1.0 | 5 µg/L | 93.7 | 54.4 | 135 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3583924)** | | | | | | | | |
| EP080: C6 - C9 Fraction | --- | 20 | µg/L | <20 | 360 µg/L | 85.3 | 66.3 | 134 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3583951)** | | | | | | | | |
| EP071: C10 - C14 Fraction | --- | 50 | µg/L | <50 | 4600 µg/L | 88.5 | 44.2 | 140 |
| EP071: C15 - C28 Fraction | --- | 100 | µg/L | <100 | 16100 µg/L | 92.3 | 46.9 | 127 |
| EP071: C29 - C36 Fraction | --- | 50 | µg/L | <50 | 8130 µg/L | 91.8 | 47.4 | 128 |

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Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : DFP

Sub-Matrix: **WATER**

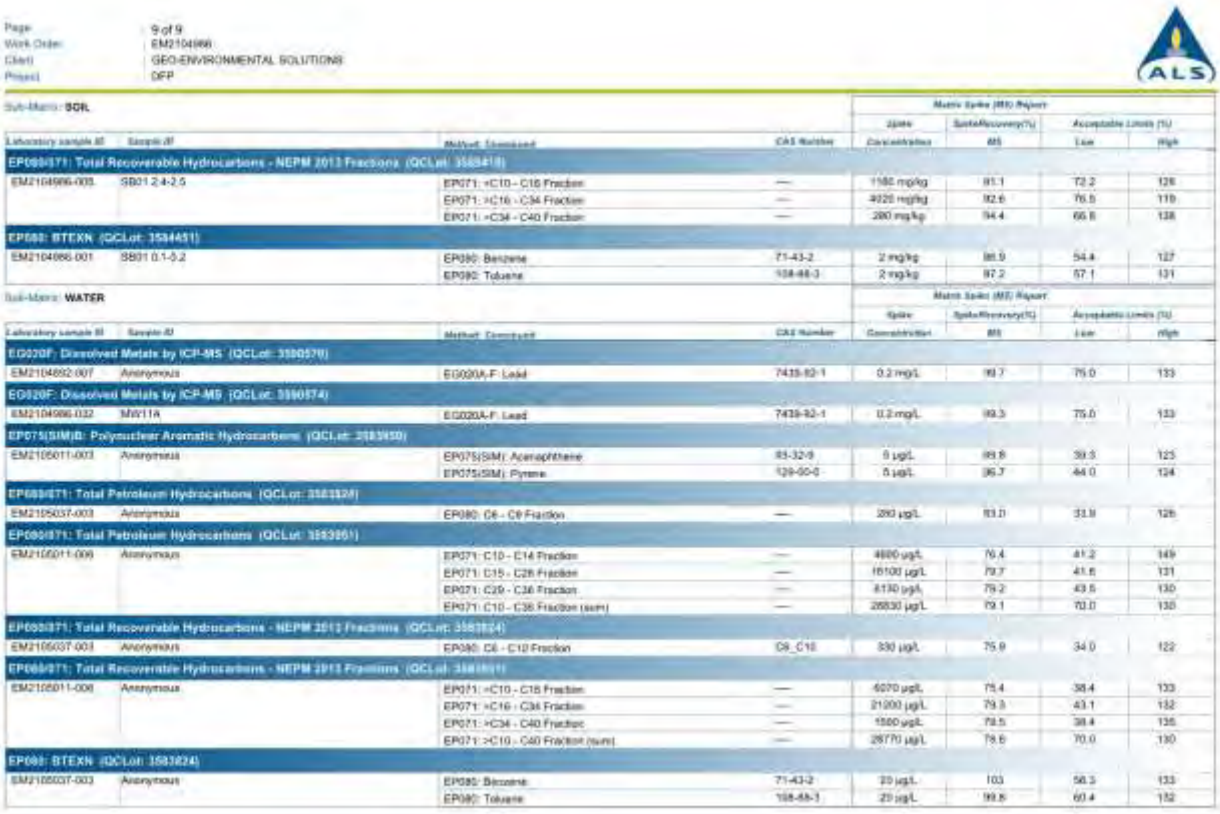
| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | High |
|---|---|---|---|---|---|---|---|---|
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3583851) - continued** | | | | | | | | |
| EP071: C10 - C36 Fraction (sum) | --- | --- | µg/L | --- | 25830 µg/L | 91.4 | 70.0 | 130 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3583824)** | | | | | | | | |
| EP080: C6 - C10 Fraction | C6_C10 | 20 | µg/L | <20 | 450 µg/L | 85.2 | 66.2 | 132 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3583951)** | | | | | | | | |
| EP071: >C10 - C16 Fraction | --- | 100 | µg/L | <100 | 6070 µg/L | 86.3 | 43.0 | 127 |
| EP071: >C16 - C34 Fraction | --- | 100 | µg/L | <100 | 21200 µg/L | 91.5 | 48.6 | 129 |
| EP071: >C34 - C40 Fraction | --- | 100 | µg/L | <100 | 1500 µg/L | 94.3 | 42.2 | 133 |
| EP071: >C10 - C40 Fraction (sum) | --- | --- | µg/L | --- | 28770 µg/L | 90.9 | 70.0 | 130 |
| **EP080: BTEXN (QCLot: 3583924)** | | | | | | | | |
| EP080: Benzene | 71-43-2 | 1 | µg/L | <1 | 20 µg/L | 85.9 | 69.8 | 127 |
| EP080: Toluene | 108-88-3 | 2 | µg/L | <2 | 20 µg/L | 89.0 | 72.9 | 129 |
| EP080: Ethylbenzene | 100-41-4 | 2 | µg/L | <2 | 20 µg/L | 87.3 | 71.7 | 130 |
| EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2 | µg/L | <2 | 40 µg/L | 86.8 | 72.3 | 136 |
| EP080: ortho-Xylene | 95-47-6 | 2 | µg/L | <2 | 20 µg/L | 87.1 | 75.8 | 134 |
| EP080: Naphthalene | 91-20-3 | 5 | µg/L | <5 | 5 µg/L | 89.8 | 68.3 | 131 |

## *Matrix Spike (MS) Report*

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Wider recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report: Spike Concentration | Spike Recovery (%): MS | Acceptable Limits (%): Low | High |
|---|---|---|---|---|---|---|---|
| **EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3585842)** | | | | | | | |
| EM2104966-001 | Anonymous | EG005T: Lead | 7439-92-1 | 250 mg/kg | 95.1 | 80.0 | 120 |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3585419)** | | | | | | | |
| EM2104966-003 | SB01 1.5-1.1 | EP075(SIM): Acenaphthene | 83-32-9 | 3 mg/kg | 101 | 77.2 | 116 |
| | | EP075(SIM): Pyrene | 129-00-0 | 3 mg/kg | 116 | 65.5 | 136 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3584451)** | | | | | | | |
| EM2104966-001 | SB01 0.1-0.2 | EP080: C6 - C9 Fraction | --- | 28 mg/kg | 93.5 | 33.4 | 124 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3585419)** | | | | | | | |
| EM2104966-003 | SB01 2.4-2.5 | EP071: C10 - C14 Fraction | --- | 600 mg/kg | 89.7 | 71.2 | 125 |
| | | EP071: C15 - C28 Fraction | --- | 3030 mg/kg | 91.4 | 75.6 | 122 |
| | | EP071: C29 - C36 Fraction | --- | 1520 mg/kg | 95.6 | 78.0 | 120 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3584451)** | | | | | | | |
| EM2104966-001 | SB01 0.1-0.2 | EP080: C6 - C10 Fraction | C6_C10 | 33 mg/kg | 92.9 | 30.8 | 120 |



| | |
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Sub-Matrix: **SOIL**

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report: Spike Concentration | Matrix Spike (MS) Report: SpikeRecovery(%) MS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3584418)** | | | | | | | |
| EM2104986-005 | SB01 2.4-2.5 | EP071: >C10 - C16 Fraction | --- | 1160 mg/kg | 91.1 | 72.2 | 126 |
| | | EP071: >C16 - C34 Fraction | --- | 4020 mg/kg | 92.6 | 76.5 | 119 |
| | | EP071: >C34 - C40 Fraction | --- | 280 mg/kg | 94.4 | 66.8 | 138 |
| **EP080: BTEXN (QCLot: 3584451)** | | | | | | | |
| EM2104986-001 | SB01 0.1-0.2 | EP080: Benzene | 71-43-2 | 2 mg/kg | 88.9 | 54.4 | 127 |
| | | EP080: Toluene | 108-88-3 | 2 mg/kg | 87.2 | 57.1 | 131 |

Sub-Matrix: **WATER**

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report: Spike Concentration | Matrix Spike (MS) Report: SpikeRecovery(%) MS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 3580570)** | | | | | | | |
| EM2104892-007 | Anonymous | EG020A-F: Lead | 7439-92-1 | 0.2 mg/L | 99.7 | 75.0 | 133 |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 3580574)** | | | | | | | |
| EM2104986-032 | MW11A | EG020A-F: Lead | 7439-92-1 | 0.2 mg/L | 99.3 | 75.0 | 133 |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3583450)** | | | | | | | |
| EM2105011-003 | Anonymous | EP075(SIM): Acenaphthene | 83-32-9 | 5 µg/L | 99.8 | 39.3 | 125 |
| | | EP075(SIM): Pyrene | 129-00-0 | 5 µg/L | 96.7 | 44.0 | 124 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3583529)** | | | | | | | |
| EM2105037-003 | Anonymous | EP080: C6 - C9 Fraction | --- | 280 µg/L | 93.0 | 33.9 | 126 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3583351)** | | | | | | | |
| EM2105011-006 | Anonymous | EP071: C10 - C14 Fraction | --- | 4600 µg/L | 76.4 | 41.2 | 149 |
| | | EP071: C15 - C28 Fraction | --- | 16100 µg/L | 79.7 | 41.6 | 131 |
| | | EP071: C29 - C36 Fraction | --- | 8130 µg/L | 79.2 | 43.5 | 130 |
| | | EP071: C10 - C36 Fraction (sum) | --- | 28830 µg/L | 79.1 | 70.0 | 130 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3583524)** | | | | | | | |
| EM2105037-003 | Anonymous | EP080: C6 - C10 Fraction | C6_C10 | 330 µg/L | 75.9 | 34.0 | 122 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3583351)** | | | | | | | |
| EM2105011-006 | Anonymous | EP071: >C10 - C16 Fraction | --- | 6070 µg/L | 75.4 | 38.4 | 133 |
| | | EP071: >C16 - C34 Fraction | --- | 21000 µg/L | 79.3 | 43.1 | 132 |
| | | EP071: >C34 - C40 Fraction | --- | 1560 µg/L | 79.5 | 38.4 | 135 |
| | | EP071: >C10 - C40 Fraction (sum) | --- | 28770 µg/L | 79.6 | 70.0 | 130 |
| **EP080: BTEXN (QCLot: 3583524)** | | | | | | | |
| EM2105037-003 | Anonymous | EP080: Benzene | 71-43-2 | 20 µg/L | 103 | 56.3 | 133 |
| | | EP080: Toluene | 108-88-3 | 20 µg/L | 99.8 | 60.4 | 132 |

ALS Environmental

## QA/QC Compliance Assessment to assist with Quality Review

| | | | |
|---|---|---|---|
| Work Order | **EM2104986** | Page | 1 of 10 |
| Client | **GEO-ENVIRONMENTAL SOLUTIONS** | Laboratory | Environmental Division Melbourne |
| Contact | DR JOHN PAUL CUMMING | Telephone | +61 3 8549 9600 |
| Project | DFP | Date Samples Received | 24-Mar-2021 |
| Site | --- | Issue Date | 30-Mar-2021 |
| Sampler | SARAH JOYCE | No. of samples received | 35 |
| Order number | --- | No. of samples analysed | 27 |

**This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.**

Brief method summaries and references are also provided to assist in traceability.

### *Summary of Outliers*

#### *Outliers : Quality Control Samples*

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

#### *Outliers : Analysis Holding Time Compliance*

- **NO Analysis Holding Time Outliers exist.**

#### *Outliers : Frequency of Quality Control Samples*

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

RIGHT SOLUTIONS RIGHT PARTNER

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Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

### Regular Sample Surrogates

Sub-Matrix: **WATER**

| Compound Group Name | Laboratory Sample ID | Client Sample ID | Analyte | CAS Number | Data | Units | Comment |
|---|---|---|---|---|---|---|---|
| **Samples Submitted** | | | | | | | |
| EP075(SIM)T: PAH Surrogates | EM2104988-032 | MW11A | **2-Fluorobiphenyl** | 321-60-8 | 147 % | 35.2-127 % | **Recovery greater than upper data quality objective** |

### Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

| Quality Control Sample Type | Count | | Rate (%) | | Quality Control Specification |
|---|---|---|---|---|---|
| Method | QC | Regular | Actual | Expected | |
| Laboratory Duplicates (DUP) | | | | | |
| PAH/Phenols (GC/MS - SIM) | 1 | 16 | 6.25 | 10.00 | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | 1 | 16 | 6.25 | 10.00 | NEPM 2013 B3 & ALS QC Standard |

## Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarises extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach data with the shortest analytic holding time for the applicable soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days, others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive (e.g Vinyl Chloride and Styrene are not key analytes of interest/concern).

Matrix: **SOIL**

Evaluation: ✦ = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EA055)** | | | | | | | |
| SB01 0.1-0.2, SB01 2.4-2.5, SB02 2.0-2.1, SB03 1.0-1.1, SB04 0.1-0.2, SB05 0.1-0.2, SB08 0.5-0.6, Trip Blank 01 | SB21 1.0-1.1, SB02 0.1-0.2, SB03 0.1-0.2, Duplicate Soil, SB04 1.0-1.1, SB05 1.0-1.1, SB06 2.0-2.1 | 18-Mar-2021 | --- | --- | --- | 25-Mar-2021 | 01-Apr-2021 | ✓ |

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Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

Matrix: **SOIL**

Evaluation: ✦ = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EG005(ED093)T: Total Metals by ICP-AES** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EG005T)** | | | | | | | |
| SB01 0.1-0.2, SB01 2.4-2.5, SB02 2.0-2.1, SB03 1.0-1.1, SB04 0.1-0.2, SB05 0.1-0.2, SB08 0.5-0.6 | SB21 1.0-1.1, SB02 0.1-0.2, SB03 0.1-0.2, Duplicate Soil, SB04 1.0-1.1, SB05 1.0-1.1, SB06 2.0-2.1 | 18-Mar-2021 | 25-Mar-2021 | 14-Sep-2021 | ✓ | 27-Mar-2021 | 14-Sep-2021 | ✓ |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EP075(SIM))** | | | | | | | |
| SB01 0.1-0.2, SB01 2.4-2.5, SB02 2.0-2.1, SB03 1.0-1.1, SB04 0.1-0.2, SB05 0.1-0.2, SB08 0.5-0.6 | SB21 1.0-1.1, SB02 0.1-0.2, SB03 0.1-0.2, Duplicate Soil, SB04 1.0-1.1, SB05 1.0-1.1, SB06 2.0-2.1 | 18-Mar-2021 | 25-Mar-2021 | 01-Apr-2021 | ✓ | 26-Mar-2021 | 09-May-2021 | ✓ |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EP080)** | | | | | | | |
| SB01 0.1-0.2, SB01 2.4-2.5, SB02 2.0-2.1, SB03 1.0-1.1, SB04 0.1-0.2, SB05 0.1-0.2, SB08 0.5-0.6, Trip Blank 01 | SB21 1.0-1.1, SB02 0.1-0.2, SB03 0.1-0.2, Duplicate Soil, SB04 1.0-1.1, SB05 1.0-1.1, SB06 2.0-2.1 | 18-Mar-2021 | 25-Mar-2021 | 01-Apr-2021 | ✓ | 26-Mar-2021 | 01-Apr-2021 | ✓ |
| **Soil Glass Jar - Unpreserved (EP071)** | | | | | | | |
| SB01 0.1-0.2, SB01 2.4-2.5, SB02 2.0-2.1, SB03 1.0-1.1, SB04 0.1-0.2, SB05 0.1-0.2, SB08 0.5-0.6 | SB21 1.0-1.1, SB02 0.1-0.2, SB03 0.1-0.2, Duplicate Soil, SB04 1.0-1.1, SB05 1.0-1.1, SB06 2.0-2.1 | 18-Mar-2021 | 25-Mar-2021 | 01-Apr-2021 | ✓ | 26-Mar-2021 | 09-May-2021 | ✓ |

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Work Order: EM2104989
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

Matrix: **SOIL**

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation: Date extracted | Due for extraction | Evaluation | Analysis: Date analysed | Due for analysis | Evaluation |
|---|---|---|---|---|---|---|---|
| **EP068(ST): Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EP068)** | | | | | | | |
| SB01 0.1-0.2, | SB01 1.0-1.1, | 16-Mar-2021 | 25-Mar-2021 | 01-Apr-2021 | ✓ | 26-Mar-2021 | 05-Apr-2021 | ✓ |
| SB01 2.4-2.5, | SB02 0.1-0.2, | | | | | | | |
| SB02 2.0-2.1, | SB03 0.1-0.2, | | | | | | | |
| SB03 1.0-1.1, | Duplicate Soil, | | | | | | | |
| SB04 0.1-0.2, | SB04 1.0-1.1, | | | | | | | |
| SB05 0.1-0.2, | SB05 1.0-1.1, | | | | | | | |
| SB06 0.5-0.6, | SB06 2.0-2.1, | | | | | | | |
| Trip Blank 01 | | | | | | | | |
| **Soil Glass Jar - Unpreserved (EP071)** | | | | | | | |
| SB01 0.1-0.2, | SB01 1.0-1.1, | 16-Mar-2021 | 26-Mar-2021 | 01-Apr-2021 | ✓ | 26-Mar-2021 | 05-May-2021 | ✓ |
| SB01 2.4-2.5, | SB02 0.1-0.2, | | | | | | | |
| SB02 2.0-2.1, | SB03 0.1-0.2, | | | | | | | |
| SB03 1.0-1.1, | Duplicate Soil, | | | | | | | |
| SB04 0.1-0.2, | SB04 1.0-1.1, | | | | | | | |
| SB05 0.1-0.2, | SB05 1.0-1.1, | | | | | | | |
| SB06 0.5-0.6, | SB06 2.0-2.1, | | | | | | | |
| **EP080: BTEXN** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EP080)** | | | | | | | |
| SB01 0.1-0.2, | SB01 1.0-1.1, | 16-Mar-2021 | 25-Mar-2021 | 01-Apr-2021 | ✓ | 26-Mar-2021 | 05-Apr-2021 | ✓ |
| SB01 2.4-2.5, | SB02 0.1-0.2, | | | | | | | |
| SB02 2.0-2.1, | SB03 0.1-0.2, | | | | | | | |
| SB03 1.0-1.1, | Duplicate Soil, | | | | | | | |
| SB04 0.1-0.2, | SB04 1.0-1.1, | | | | | | | |
| SB05 0.1-0.2, | SB05 1.0-1.1, | | | | | | | |
| SB06 0.5-0.6, | SB06 2.0-2.1, | | | | | | | |
| Trip Blank 01 | | | | | | | | |

Matrix: **WATER**

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation: Date extracted | Due for extraction | Evaluation | Analysis: Date analysed | Due for analysis | Evaluation |
|---|---|---|---|---|---|---|---|
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | |
| **Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)** | | | | | | | |
| Rinsate 01, | Field 01 | 16-Mar-2021 | --- | --- | --- | 25-Mar-2021 | 14-Sep-2021 | ✓ |
| **Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)** | | | | | | | |
| Rinsate 02, | Field 02, | 22-Mar-2021 | --- | --- | --- | 29-Mar-2021 | 19-Sep-2021 | ✓ |
| PW1, | IT1, | | | | | | | |
| MW11, | MW11A, | | | | | | | |
| MW12, | MW18, | | | | | | | |
| Duplicate Water | | | | | | | | |

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Work Order: EM2104989
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

Matrix: **WATER**

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation: Date extracted | Due for extraction | Evaluation | Analysis: Date analysed | Due for analysis | Evaluation |
|---|---|---|---|---|---|---|---|
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | |
| **Amber Glass Bottle - Unpreserved (EP075(SIM))** | | | | | | | |
| Rinsate 01, | Field 01 | 16-Mar-2021 | 24-Mar-2021 | 25-Mar-2021 | ✓ | 26-Mar-2021 | 03-May-2021 | ✓ |
| **Amber Glass Bottle - Unpreserved (EP075(SIM))** | | | | | | | |
| Rinsate 02, | Field 02, | 22-Mar-2021 | 24-Mar-2021 | 29-Mar-2021 | ✓ | 26-Mar-2021 | 03-May-2021 | ✓ |
| PW1, | IT1, | | | | | | | |
| MW11, | MW11A, | | | | | | | |
| MW12, | MW18, | | | | | | | |
| Duplicate Water | | | | | | | | |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | |
| **Amber Glass Bottle - Unpreserved (EP071)** | | | | | | | |
| Rinsate 01, | Field 01 | 16-Mar-2021 | 24-Mar-2021 | 25-Mar-2021 | ✓ | 26-Mar-2021 | 03-May-2021 | ✓ |
| **Amber Glass Bottle - Unpreserved (EP071)** | | | | | | | |
| Rinsate 02, | Field 02, | 22-Mar-2021 | 24-Mar-2021 | 29-Mar-2021 | ✓ | 26-Mar-2021 | 03-May-2021 | ✓ |
| PW1, | IT1, | | | | | | | |
| MW11, | MW11A, | | | | | | | |
| MW12, | MW18, | | | | | | | |
| Duplicate Water | | | | | | | | |
| **Amber VOC Vial - Sulfuric Acid (EP080)** | | | | | | | |
| Rinsate 01, | Field 01 | 16-Mar-2021 | 30-Mar-2021 | 01-Apr-2021 | ✓ | 26-Mar-2021 | 01-Apr-2021 | ✓ |
| **Amber VOC Vial - Sulfuric Acid (EP080)** | | | | | | | |
| Rinsate 02, | Field 02, | 22-Mar-2021 | 26-Mar-2021 | 06-Apr-2021 | ✓ | 26-Mar-2021 | 05-Apr-2021 | ✓ |
| Trip Blank 02, | PW1, | | | | | | | |
| IT1, | MW11, | | | | | | | |
| MW11A, | MW12, | | | | | | | |
| MW18, | Duplicate Water | | | | | | | |
| **EP068(ST): Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | |
| **Amber Glass Bottle - Unpreserved (EP071)** | | | | | | | |
| Rinsate 01, | Field 01 | 16-Mar-2021 | 24-Mar-2021 | 25-Mar-2021 | ✓ | 26-Mar-2021 | 03-May-2021 | ✓ |
| **Amber Glass Bottle - Unpreserved (EP071)** | | | | | | | |
| Rinsate 02, | Field 02, | 22-Mar-2021 | 24-Mar-2021 | 29-Mar-2021 | ✓ | 26-Mar-2021 | 03-May-2021 | ✓ |
| PW1, | IT1, | | | | | | | |
| MW11, | MW11A, | | | | | | | |
| MW12, | MW18, | | | | | | | |
| Duplicate Water | | | | | | | | |
| **Amber VOC Vial - Sulfuric Acid (EP080)** | | | | | | | |
| Rinsate 01, | Field 01 | 16-Mar-2021 | 26-Mar-2021 | 01-Apr-2021 | ✓ | 26-Mar-2021 | 01-Apr-2021 | ✓ |
| **Amber VOC Vial - Sulfuric Acid (EP080)** | | | | | | | |
| Rinsate 02, | Field 02, | 22-Mar-2021 | 26-Mar-2021 | 06-Apr-2021 | ✓ | 26-Mar-2021 | 05-Apr-2021 | ✓ |
| Trip Blank 02, | PW1, | | | | | | | |
| IT1, | MW11, | | | | | | | |
| MW11A, | MW12, | | | | | | | |
| MW18, | Duplicate Water | | | | | | | |

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Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

Matrix: **WATER**

| Method / Container / Client Sample ID(s) | | Sample Date | Extraction / Preparation: Date extracted | Extraction / Preparation: Due for extraction | Extraction / Preparation: Evaluation | Analysis: Date analysed | Analysis: Due for analysis | Analysis: Evaluation |
|---|---|---|---|---|---|---|---|---|
| **EP080: BTEXN** | | | | | | | | |
| **Amber VOC Vial - Sulfuric Acid (EP080)** | | | | | | | | |
| Rinsate 01 | Field 01 | 18-Mar-2021 | 29-Mar-2021 | 01-Apr-2021 | ✓ | 29-Mar-2021 | 01-Apr-2021 | ✓ |
| **Amber VOC Vial - Sulfuric Acid (EP080)** | | | | | | | | |
| Rinsate 02, | Field 02, | 22-Mar-2021 | 29-Mar-2021 | 05-Apr-2021 | ✓ | 29-Mar-2021 | 05-Apr-2021 | ✓ |
| Trip Blank 02, | PW1, | | | | | | | |
| IT1, | MW11, | | | | | | | |
| MW11A, | MW12, | | | | | | | |
| MW18, | Duplicate Water | | | | | | | |

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Client: GEO-ENVIRONMENTAL SOLUTIONS
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## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical batch(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type / Analytical Methods | Method | Count: QC | Count: Results | Rate (%): Actual | Rate (%): Expected | Evaluation | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| Laboratory Duplicates (DUP) | | | | | | | |
| Moisture Content | EA055 | 4 | 31 | 12.90 | 10.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| PAH/Phenols (SIM) | EP075(SIM) | 2 | 16 | 12.50 | 10.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Metals by ICP-AES | EG005T | 2 | 19 | 10.53 | 10.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 2 | 16 | 12.50 | 10.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 2 | 16 | 12.50 | 10.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Laboratory Control Samples (LCS) | | | | | | | |
| PAH/Phenols (SIM) | EP075(SIM) | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Metals by ICP-AES | EG005T | 1 | 19 | 5.26 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Method Blanks (MB) | | | | | | | |
| PAH/Phenols (SIM) | EP075(SIM) | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Metals by ICP-AES | EG005T | 1 | 19 | 5.26 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Matrix Spikes (MS) | | | | | | | |
| PAH/Phenols (SIM) | EP075(SIM) | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Metals by ICP-AES | EG005T | 1 | 19 | 5.26 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type / Analytical Methods | Method | Count: QC | Count: Results | Rate (%): Actual | Rate (%): Expected | Evaluation | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| Laboratory Duplicates (DUP) | | | | | | | |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 4 | 32 | 12.50 | 10.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | 1 | 16 | 6.25 | 10.00 | ✗ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 16 | 6.25 | 10.00 | ✗ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 2 | 20 | 10.00 | 10.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Laboratory Control Samples (LCS) | | | | | | | |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 32 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | 5.00 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Method Blanks (MB) | | | | | | | |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 32 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |

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Work Order: EM2104488
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type / Analytical Method | Method | QC | Regular | Rate (%) Actual | Rate (%) Expected | Evaluation | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| **Method Blanks (MB) - Continued** | | | | | | | |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | 5.00 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Matrix Spikes (MS)** | | | | | | | |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 32 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 16 | 6.25 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | 5.00 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |

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Work Order: EM2104488
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognised procedures such as those published by the US EPA, APHA, AS and NEPM, in house developed procedures, as employed in the absence of documented standards or by client request. The following report provides brief descriptions of the laboratory procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been derived are provided with the Method Descriptions.

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Moisture Content | EA055 | SOIL | In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3). |
| Total Metals by ICP-AES | EG005T | SOIL | In house: Referenced to APHA 3120, USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3). |
| TRH - Semivolatile Fraction | EP071 | SOIL | In house: Referenced to USEPA SW 846 - 8015. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3). |
| PAH/Phenols (SIM) | EP075(SIM) | SOIL | In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3). |
| TRH Volatiles/BTEX | EP080 | SOIL | In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended. |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | WATER | In house: Referenced to APHA 3125, USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. |
| TRH - Semivolatile Fraction | EP071 | WATER | In house: Referenced to USEPA SW 846 - 8015. The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3). |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | WATER | In house: References to USEPA SW 846 - 8270. Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3). |
| TRH Volatiles/BTEX | EP080 | WATER | In house: Referenced to USEPA SW 846 - 8260. Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3). |
| **Preparation Methods** | **Method** | **Matrix** | **Method Descriptions** |
| Hot Block Digest for metals in soils, sediments and sludges | ENSB | SOIL | In house: Referenced to USEPA 200.2. Hot Block Acid Digestion: 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3). |
| Methanolic Extraction of Soils for Purge and Trap | ORG16 | SOIL | In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS. |



| | |
|---|---|
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| Work Order | EM2104888 |
| Client | GEO-ENVIRONMENTAL SOLUTIONS |
| Project | DFP |

| Preparation Method | Matrix | Method | Method Description |
|---|---|---|---|
| Tumbler Extraction of Solids | ORG17 | SOIL | In house: Mechanical agitation (tumbler). 10g of sample, $Na_2SO_4$ and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis. |
| Separatory Funnel Extraction of Liquids | ORG15 | WATER | In house: Referenced to USEPA SW 846 - 3510. 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3). ALS default excludes sediment which may be resident in the container. |
| Volatiles Water Preparation | ORG16-W | WATER | A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging. |

ALS Environmental

## QUALITY CONTROL REPORT

| | | | |
|---|---|---|---|
| Work Order | : ES2110567 | Page | : 1 of 4 |
| Client | : GEO-ENVIRONMENTAL SOLUTIONS | Laboratory | : Environmental Division Sydney |
| Contact | : DR JOHN PAUL CUMMING | Contact | : Peter Ravlic |
| Address | : 29 KIRKSWAY PLACE<br>BATTERY POINT TASMANIA, AUSTRALIA 7004 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : +61 03 6223 1839 | Telephone | : +6138549 9645 |
| Project | : DFP Second | Date Samples Received | : 24-Mar-2021 |
| Order number | : --- | Date Analysis Commenced | : 25-Mar-2021 |
| C-O-C number | : --- | Issue Date | : 31-Mar-2021 |
| Sampler | : SARAH JOYCE | | |
| Site | : --- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories | Position | Accreditation Category |
|---|---|---|
| Celine Conceicao | Senior Spectroscopist | Sydney Inorganics, Smithfield, NSW |
| Edwardy Fadjar | Organic Coordinator | Sydney Organics, Smithfield, NSW |

RIGHT SOLUTIONS RIGHT PARTNER



ALS

### General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

### Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-ENVI/38 and are dependent on the magnitude of results in comparison to the level of reporting (result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%).

Sub-Matrix: **WATER**

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | Laboratory Duplicate (DUP) Report: LOR | Unit | Original Result | Duplicate Result | RPD (%) | Acceptable RPD (%) |
|---|---|---|---|---|---|---|---|---|---|
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 3588824)** | | | | | | | | | |
| ES2110792-002 | Anonymous | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.00 | No Limit |
| ES2110326-001 | Anonymous | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.00 | No Limit |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3586644)** | | | | | | | | | |
| ES2110541-007 | Anonymous | EP080: C6 - C9 Fraction | --- | 20 | µg/L | <20 | <20 | 0.00 | No Limit |
| ES2110621-001 | Anonymous | EP080: C6 - C9 Fraction | --- | 20 | µg/L | <20 | <20 | 0.00 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3586644)** | | | | | | | | | |
| ES2110541-007 | Anonymous | EP080: C6 - C10 Fraction | C6_C10 | 20 | µg/L | <20 | <20 | 0.00 | No Limit |
| ES2110621-001 | Anonymous | EP080: C6 - C10 Fraction | C6_C10 | 20 | µg/L | <20 | <20 | 0.00 | No Limit |
| **EP080: BTEXN (QC Lot: 3586644)** | | | | | | | | | |
| ES2110541-007 | Anonymous | EP080: Benzene | 71-43-2 | 1 | µg/L | <1 | <1 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 5 | µg/L | <5 | <5 | 0.00 | No Limit |
| ES2110621-001 | Anonymous | EP080: Benzene | 71-43-2 | 1 | µg/L | <1 | <1 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 2 | µg/L | <2 | <2 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 5 | µg/L | <5 | <5 | 0.00 | No Limit |

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Client : GEO-ENVIRONMENTAL SOLUTIONS
Project : DFP Second

## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|---|
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 3588924)** | | | | | | | | |
| EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 99.9 | 83.0 | 111 |
| **EP075(SIM): Polynuclear Aromatic Hydrocarbons (QCLot: 3565806)** | | | | | | | | |
| EP075(SIM): Naphthalene | 91-20-3 | 1 | µg/L | <1.0 | 5 µg/L | 69.1 | 50.0 | 94.0 |
| EP075(SIM): Acenaphthylene | 208-96-8 | 1 | µg/L | <1.0 | 5 µg/L | 79.0 | 63.8 | 114 |
| EP075(SIM): Acenaphthene | 83-32-9 | 1 | µg/L | <1.0 | 5 µg/L | 84.7 | 62.2 | 113 |
| EP075(SIM): Fluorene | 86-73-7 | 1 | µg/L | <1.0 | 5 µg/L | 77.8 | 63.9 | 115 |
| EP075(SIM): Phenanthrene | 85-01-8 | 1 | µg/L | <1.0 | 5 µg/L | 70.7 | 62.8 | 116 |
| EP075(SIM): Anthracene | 120-12-7 | 1 | µg/L | <1.0 | 5 µg/L | 72.2 | 64.3 | 116 |
| EP075(SIM): Fluoranthene | 206-44-0 | 1 | µg/L | <1.0 | 5 µg/L | 75.6 | 63.6 | 118 |
| EP075(SIM): Pyrene | 129-00-0 | 1 | µg/L | <1.0 | 5 µg/L | 77.0 | 63.1 | 118 |
| EP075(SIM): Benz(a)anthracene | 56-55-3 | 1 | µg/L | <1.0 | 5 µg/L | 69.4 | 64.1 | 117 |
| EP075(SIM): Chrysene | 218-01-9 | 1 | µg/L | <1.0 | 5 µg/L | 73.7 | 62.5 | 116 |
| EP075(SIM): Benzo(bn)fluoranthene | 205-99-2<br>205-82-3 | 1 | µg/L | <1.0 | 5 µg/L | 72.8 | 61.7 | 119 |
| EP075(SIM): Benzo(k)fluoranthene | 207-08-9 | 1 | µg/L | <1.0 | 5 µg/L | 71.9 | 63.0 | 115 |
| EP075(SIM): Benzo(a)pyrene | 50-32-8 | 0.5 | µg/L | <0.5 | 5 µg/L | 78.2 | 63.3 | 117 |
| EP075(SIM): Indeno(1,2,3-cd)pyrene | 193-39-5 | 1 | µg/L | <1.0 | 5 µg/L | 78.3 | 59.8 | 119 |
| EP075(SIM): Dibenz(a,h)anthracene | 53-70-3 | 1 | µg/L | <1.0 | 5 µg/L | 80.0 | 61.2 | 117 |
| EP075(SIM): Benzo(g,h,i)perylene | 191-24-2 | 1 | µg/L | <1.0 | 5 µg/L | 76.5 | 59.1 | 119 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3565807)** | | | | | | | | |
| EP071: C10 - C14 Fraction | --- | 50 | µg/L | <50 | 400 µg/L | 69.6 | 55.8 | 112 |
| EP071: C15 - C28 Fraction | --- | 100 | µg/L | <100 | 800 µg/L | 89.0 | 71.8 | 113 |
| EP071: C29 - C36 Fraction | --- | 50 | µg/L | <50 | 400 µg/L | 69.2 | 56.0 | 121 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3588644)** | | | | | | | | |
| EP080: C6 - C9 Fraction | --- | 20 | µg/L | <20 | 280 µg/L | 91.7 | 75.0 | 127 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3565807)** | | | | | | | | |
| EP071: >C10 - C16 Fraction | --- | 100 | µg/L | <100 | 500 µg/L | 91.8 | 57.9 | 119 |
| EP071: >C16 - C34 Fraction | --- | 100 | µg/L | <100 | 700 µg/L | 92.5 | 62.5 | 110 |
| EP071: >C34 - C40 Fraction | --- | 100 | µg/L | <100 | 300 µg/L | 101 | 61.8 | 121 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3588644)** | | | | | | | | |
| EP080: C6 - C10 Fraction | C6_C10 | 20 | µg/L | <20 | 310 µg/L | 85.3 | 75.0 | 127 |
| **EP080: BTEXN (QCLot: 3588644)** | | | | | | | | |
| EP080: Benzene | 71-43-2 | 1 | µg/L | <1 | 10 µg/L | 89.5 | 70.0 | 122 |
| EP080: Toluene | 108-88-3 | 2 | µg/L | <2 | 10 µg/L | 90.4 | 69.0 | 123 |



Sub-Matrix: **WATER**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|---|
| **EP080: BTEXN (QCLot: 3588644) - continued** | | | | | | | | |
| EP080: Ethylbenzene | 100-41-4 | 2 | µg/L | <2 | 10 µg/L | 90.0 | 70.0 | 120 |
| EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2 | µg/L | <2 | 10 µg/L | 96.8 | 69.0 | 121 |
| EP080: ortho-Xylene | 95-47-6 | 2 | µg/L | <2 | 10 µg/L | 89.8 | 72.0 | 122 |
| EP080: Naphthalene | 91-20-3 | 5 | µg/L | <5 | 10 µg/L | 91.4 | 70.0 | 120 |

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report: Spike Concentration | Spike Recovery(%): MS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 3588924)** | | | | | | | |
| ES2110328-002 | Anonymous | EG020A-F: Lead | 7439-92-1 | 1 mg/L | 94.4 | 70.0 | 130 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 3588644)** | | | | | | | |
| ES2110541-007 | Anonymous | EP080: C6 - C9 Fraction | --- | 325 µg/L | 91.2 | 70.0 | 130 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3588644)** | | | | | | | |
| ES2110541-007 | Anonymous | EP080: C6 - C10 Fraction | C6_C10 | 375 µg/L | 96.8 | 70.0 | 130 |
| **EP080: BTEXN (QCLot: 3588644)** | | | | | | | |
| ES2110541-007 | Anonymous | EP080: Benzene | 71-43-2 | 25 µg/L | 91.7 | 70.0 | 130 |
| | | EP080: Toluene | 108-88-3 | 25 µg/L | 93.1 | 70.0 | 130 |
| | | EP080: Ethylbenzene | 100-41-4 | 25 µg/L | 95.3 | 70.0 | 130 |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 25 µg/L | 98.1 | 70.0 | 130 |
| | | EP080: ortho-Xylene | 95-47-6 | 25 µg/L | 96.2 | 70.0 | 130 |
| | | EP080: Naphthalene | 91-20-3 | 25 µg/L | 97.0 | 70.0 | 130 |

ALS Environmental

## QA/QC Compliance Assessment to assist with Quality Review

| | | | |
|---|---|---|---|
| Work Order | ES2110567 | Page | 1 of 4 |
| Client | GEO-ENVIRONMENTAL SOLUTIONS | Laboratory | Environmental Division Sydney |
| Contact | DR JOHN PAUL CUMMING | Telephone | +6138549 9645 |
| Project | DFP Second. | Date Samples Received | 24-Mar-2021 |
| Site | --- | Issue Date | 31-Mar-2021 |
| Sampler | SARAH JOYCE | No. of samples received | 2 |
| Order number | --- | No. of samples analysed | 2 |

**This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.**

Brief method summaries and references are also provided to assist in traceability.

### Summary of Outliers

#### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

#### Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

#### Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

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#### Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

| Quality Control Sample Type / Method | Count QC | Count Regular | Rate (%) Actual | Rate (%) Expected | Quality Control Specification |
|---|---|---|---|---|---|
| Laboratory Duplicates (DUP) | | | | | |
| PAH/Phenols (GC/MS - SIM) | 0 | 6 | 0.00 | 10.00 | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | 0 | 5 | 0.00 | 10.00 | NEPM 2013 B3 & ALS QC Standard |
| Matrix Spikes (MS) | | | | | |
| PAH/Phenols (GC/MS - SIM) | 0 | 6 | 0.00 | 5.00 | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | 0 | 5 | 0.00 | 5.00 | NEPM 2013 B3 & ALS QC Standard |

### Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarises extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates recorded represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach data with the shortest analyte holding time for the equivalent soil method. Times are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-routine parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive as Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER** Evaluation: ✦ = Holding time breach ; ✓ = Within holding time

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation: Date extracted | Due for extraction | Evaluation | Analysis: Date analysed | Due for analysis | Evaluation |
|---|---|---|---|---|---|---|---|
| EG020F: Dissolved Metals by ICP-MS | | | | | | | |
| Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) | | | | | | | |
| ILS | 22-Mar-2021 | --- | --- | --- | 30-Mar-2021 | 15-Sep-2021 | ✓ |
| EP075(SIM)B: Polynuclear Aromatic Hydrocarbons | | | | | | | |
| Amber Glass Bottle - Unpreserved (EP075(SIM)) | | | | | | | |
| ILS | 22-Mar-2021 | 25-Mar-2021 | 29-Mar-2021 | ✓ | 30-Mar-2021 | 04-May-2021 | ✓ |
| EP080/071: Total Petroleum Hydrocarbons | | | | | | | |
| Amber Glass Bottle - Unpreserved (EP071) | | | | | | | |
| ILS | 22-Mar-2021 | 25-Mar-2021 | 29-Mar-2021 | ✓ | 30-Mar-2021 | 04-May-2021 | ✓ |
| Amber VOC Vial - Sulfuric Acid (EP080) | | | | | | | |
| TRIP BLANK 03. ILS | 22-Mar-2021 | 29-Mar-2021 | 05-Apr-2021 | ✓ | 29-Mar-2021 | 05-Apr-2021 | ✓ |
| EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions | | | | | | | |
| Amber Glass Bottle - Unpreserved (EP071) | | | | | | | |
| ILS | 22-Mar-2021 | 25-Mar-2021 | 29-Mar-2021 | ✓ | 30-Mar-2021 | 04-May-2021 | ✓ |
| Amber VOC Vial - Sulfuric Acid (EP080) | | | | | | | |
| TRIP BLANK 03. ILS | 22-Mar-2021 | 29-Mar-2021 | 05-Apr-2021 | ✓ | 29-Mar-2021 | 05-Apr-2021 | ✓ |
| EP080: BTEXN | | | | | | | |
| Amber VOC Vial - Sulfuric Acid (EP080) | | | | | | | |
| ILS | 22-Mar-2021 | 29-Mar-2021 | 05-Apr-2021 | ✓ | 29-Mar-2021 | 05-Apr-2021 | ✓ |

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Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP Secret

## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical batch(s) in which the submitted sample(s) was/were processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✓ = Quality Control frequency met within specification. ✗ = Quality Control frequency within specification.

| Quality Control Sample Type / Analytical Methods | Method | Count: QC | Count: Regular | Rate (%): Actual | Rate (%): Expected | Evaluation | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| **Laboratory Duplicates (DUP)** | | | | | | | |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 9 | 22.22 | 10.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | 0 | 6 | 0.00 | 10.00 | ✗ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 0 | 5 | 0.00 | 10.00 | ✗ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 2 | 20 | 10.00 | 10.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Laboratory Control Samples (LCS)** | | | | | | | |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 9 | 11.11 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | 1 | 6 | 16.67 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 5 | 20.00 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | 5.00 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Method Blanks (MB)** | | | | | | | |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 9 | 11.11 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | 1 | 6 | 16.67 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 5 | 20.00 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | 5.00 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Matrix Spikes (MS)** | | | | | | | |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 9 | 11.11 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | 0 | 6 | 0.00 | 5.00 | ✗ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 0 | 5 | 0.00 | 5.00 | ✗ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | 5.00 | 5.00 | ✓ | NEPM 2013 B3 & ALS QC Standard |

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Work Order: ES2110947
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP Secret

## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognised procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | WATER | In house: Referenced to APHA 3125, USEPA SW846 - 6020, ALS QWI-ENVEG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. |
| TRH - Semivolatile Fraction | EP071 | WATER | In house: Referenced to USEPA SW 846 - 8015. The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3). |
| PAH/Phenols (GC/MS - SIM) | EP075(SIM) | WATER | In house: Referenced to USEPA SW 846 - 8270. Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3). |
| TRH Volatiles/BTEX | EP080 | WATER | In house: References to USEPA SW 846 - 8260. Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GC/MS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3). |
| **Preparation Methods** | **Method** | **Matrix** | **Method Descriptions** |
| Separatory Funnel Extraction of Liquids | ORG14 | WATER | In house: References to USEPA SW 846 - 3510. 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3). ALS default excludes sediment which may be resident in the container. |
| Volatiles Water Preparation | ORG16-W | WATER | A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging. |

## Appendix 10 QA and QC Results for Duplicate, ILS and blank samples

Soil Rinsate, Field and Trip Blank results

| Quality Control Blanks | | Lead | Benzene | Toluene | Ethylbenzene | meta- & para-Xylene | ortho-Xylene | Total Xylenes | Sum of BTEX | Naphthalene | C6 - C9 Fraction | C10 - C14 Fraction | C15 - C28 Fraction | C29 - C36 Fraction | C10 - C36 Fraction (sum) | C6 - C10 Fraction | C6 - C10 Fraction minus BTEX (F1) | >C10 - C16 Fraction | >C16 - C34 Fraction | >C34 - C40 Fraction | >C10 - C40 Fraction (sum) | >C10 - C16 Fraction minus Naphthalene (F2) | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benz(a)anthracene | Chrysene | Benzo(b+j)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Indeno(1.2.3.cd)pyrene | Dibenz(a.h)anthracene | Benzo(g.h.i)perylene | Sum of polycyclic aromatic hydrocarbons | Benzo(a)pyrene TEQ (zero) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | | mg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| LOR | | 0.001 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 5 | 20 | 50 | 100 | 50 | 50 | 20 | 20 | 100 | 100 | 100 | 100 | 100 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 | 1 | 1 | 0.5 | 0.5 |
| Date | Sample | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18/03/2021 | Rinsate 01 | <0.001 | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <5 | <20 | <50 | <100 | <50 | <50 | <20 | <20 | <100 | <100 | <100 | <100 | <100 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |
| 18/03/2021 | Field 01 | <0.001 | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <5 | <20 | <50 | <100 | <50 | <50 | <20 | <20 | <100 | <100 | <100 | <100 | <100 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 |
| 18/03/2021 | Trip Blank 01 | ---- | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.2 | <1 | <10 | ---- | ---- | ---- | ---- | <10 | <10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

Soil duplicate results comparison

| Duplicate Comparrison | Sample | Lead | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benz(a)anthracene | Chrysene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Indeno(1.2.3.cd)pyrene | Dibenz(a.h)anthracene | Benzo(g.h.i)perylene | Sum of polycyclic aromatic hydrc | Benzo(a)pyrene TEQ (WHO) | Benzene | Toluene | Ethylbenzene | meta- & para-Xylene | ortho-Xylene | Sum of BTEX | Total Xylenes | Naphthalene | C6 - C9 Fraction | C10 - C14 Fraction | C15 - C28 Fraction | C29 - C36 Fraction | C10 - C36 Fraction (sum) | C6 - C10 Fraction | F1 | >C10 - C16 Fraction | >C16 - C34 Fraction | >C34 - C40 Fraction | >C10 - C40 Fraction (sum) | F2 | Benzo(a)pyrene TEQ (half LOR) | Benzo(a)pyrene TEQ (LOR) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg |
| LOR | | 5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.2 | 0.5 | 1 | 10 | 50 | 100 | 100 | 50 | 10 | 10 | 50 | 100 | 100 | 50 | 50 | 0.5 | 0.5 |
| 18/03/2021 | SB02 0.1-0.2 | <5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.2 | <0.5 | <1 | <10 | <50 | <100 | <100 | <50 | <10 | <10 | <50 | <100 | <100 | <50 | <50 | 0.6 | 1.2 |
| 18/03/2021 | Duplicate Soil | <5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.2 | <0.5 | <1 | <10 | <50 | <100 | <100 | <50 | <10 | <10 | <50 | <100 | <100 | <50 | <50 | 0.6 | 1.2 |
| Relative Percentage Difference (RPD) % | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.0 | 0.0 |
| RPD Compliance Limit % | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 50 |
| Method Detection Limit (MDL) | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 10 |
| MDL Class | | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | LOW |
| RPD Compliance With MDL? | 42/42 (100%) | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |

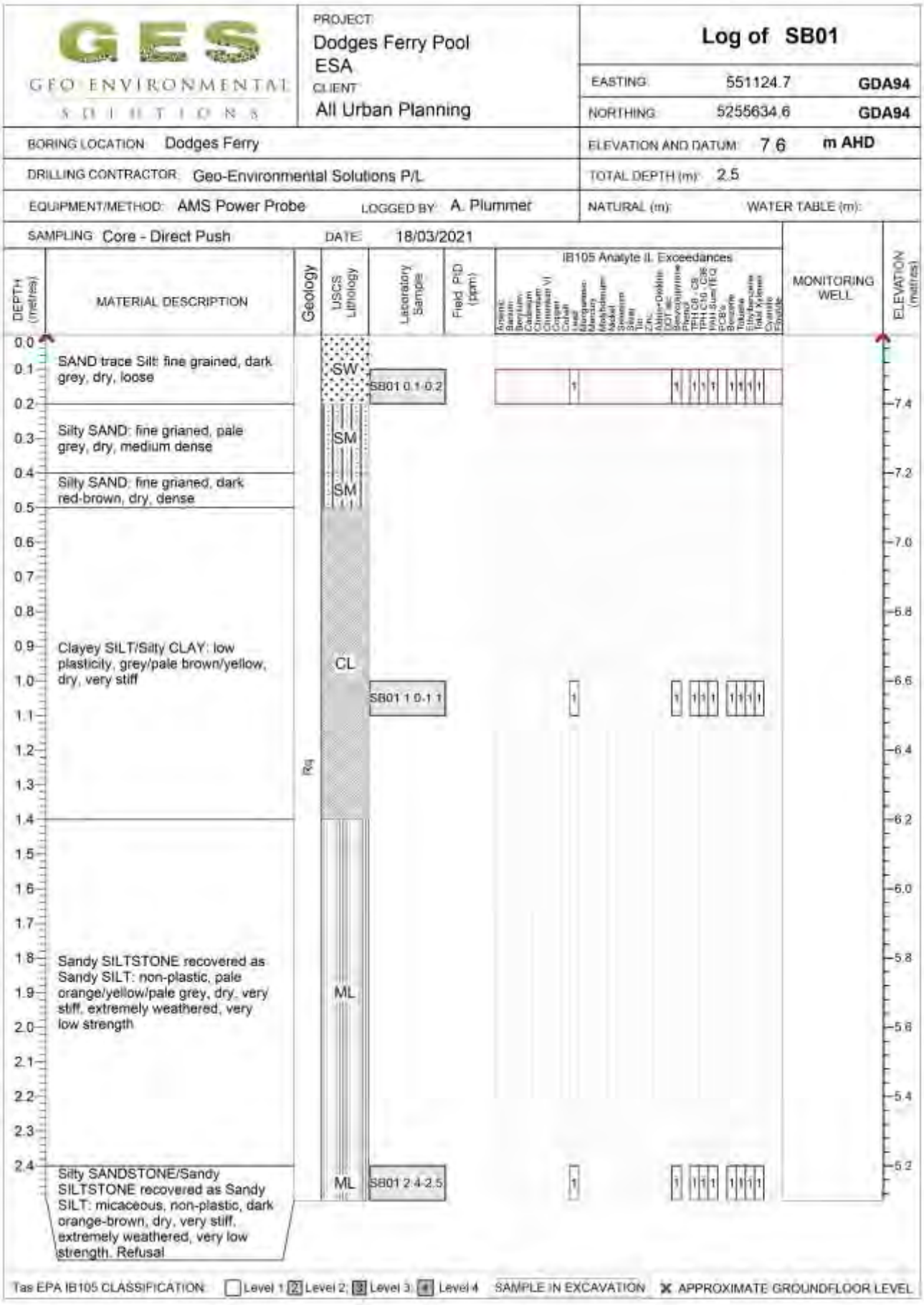
Groundwater analysis Duplicate and ILS

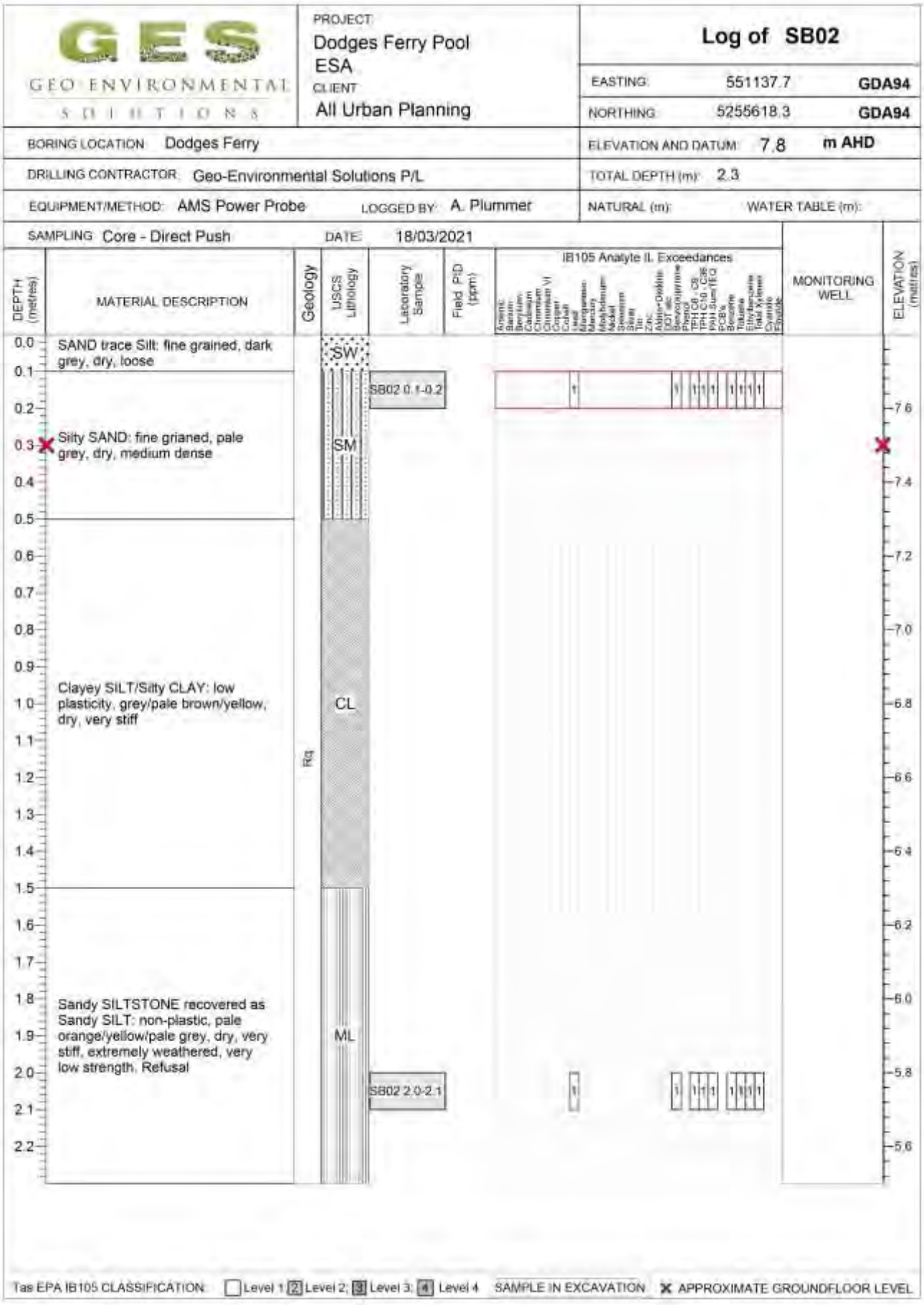
| Sample Date | Client sample ID (Primary): | | EP075(SIM)B: Polynuclear Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | EP080: BTEXN | | | | | | | | EP080/071:TPH | | | | | EP080/071: TRH - NEPM 2013 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lead | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benz(a)anthracene | Chrysene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Indeno(1.2.3.cd)pyrene | Dibenz(a.h)anthracene | Benzo(g.h.i)perylene | Sum of polycyclic aromatic hydrocarbons | Benzo(a)pyrene TEQ (WHO) | Benzene | Toluene | Ethylbenzene | meta- & para-Xylene | ortho-Xylene | Total Xylenes | Sum of BTEX | Naphthalene | C6 - C9 Fraction | C10 - C14 Fraction | C15 - C28 Fraction | C29 - C36 Fraction | C10 - C36 Fraction (sum) | C6 - C10 Fraction | F1 | >C10 - C16 Fraction | >C16 - C34 Fraction | >C34 - C40 Fraction | >C10 - C40 Fraction (sum) | F2 |
| | LOR | 0.001 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 | 1 | 1 | 0.5 | 0.5 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 5 | 20 | 50 | 100 | 50 | 50 | 20 | 20 | 100 | 100 | 100 | 100 | 100 |
| **Duplicate / Triplicate** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Groundwater Splits - Fixed RPD Method (20%)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22/03/2021 | Duplicate Water | <0.001 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 | 20 | <2 | <2 | <2 | <2 | <2 | 20 | <5 | 280 | 100 | <100 | <50 | 100 | 280 | 260 | 100 | <100 | <100 | 100 | 100 |
| 22/03/2021 | PW1 | <0.001 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 | 20 | <2 | <2 | <2 | <2 | <2 | 20 | <5 | 250 | 100 | <100 | <50 | 100 | 260 | 240 | 100 | <100 | <100 | 100 | 100 |
| **RPD %** | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0 | NA | NA | NA | NA | NA | 0 | NA | 11 | 0 | NA | NA | 0 | 7 | 8 | 0 | NA | NA | 0 | 0 |
| 22/03/2021 | ILS | <0.001 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <5 | <20 | <50 | <100 | <50 | <50 | <20 | <20 | <100 | <100 | <100 | <100 | <100 |
| 22/03/2021 | PW1 | <0.001 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 | 20 | <2 | <2 | <2 | <2 | <2 | 20 | <5 | 250 | 100 | <100 | <50 | 100 | 260 | 240 | 100 | <100 | <100 | 100 | 100 |
| **RPD %** | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **Groundwater Splits - Mean Detection Limit (MDL) Method (Variable %)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOR | | <0.001 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 | <1.0 | <2 | <2 | <2 | <2 | <2 | <1.0 | <5 | <20 | <50 | <100 | <50 | <50 | <20 | <20 | <100 | <100 | <100 | <100 | <100 |
| **Duplicate** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level Calculation | | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | LOW | NONE | NONE | NONE | NONE | NONE | LOW | NONE | LOW | LOW | NONE | NONE | LOW | LOW | LOW | NONE | NONE | NONE | NONE | NONE |
| **Compliance?** | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | YES | NA | NA | NA | NA | NA | YES | NA | YES | YES | NA | NA | YES | YES | YES | NA | NA | NA | NA | NA |
| **Triplicate** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Level Calculation | | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NA | NONE | NONE | NONE | NONE | NONE | NA | NONE | LOW | NONE | NONE | NONE | NONE | LOW | LOW | NONE | NONE | NONE | NONE | NONE |
| **Compliance?** | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | <LOR | <LOR | NA | NA | <LOR | <LOR | <LOR | NA | NA | NA | NA | NA |

Groundwater Rinsate, Field and Trip Blank results

| Sample Date | Client sample ID (Primary): | | EP075(SIM)B: Polynuclear Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | EP080: BTEXN | | | | | | | | EP080/071:TPH | | | | | EP080/071: TRH - NEPM 2013 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lead | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benz(a)anthracene | Chrysene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Indeno(1.2.3.cd)pyrene | Dibenz(a.h)anthracene | Benzo(g.h.i)perylene | Sum of polycyclic aromatic hydrocarbons | Benzo(a)pyrene TEQ (WHO) | Benzene | Toluene | Ethylbenzene | meta- & para-Xylene | ortho-Xylene | Total Xylenes | Sum of BTEX | Naphthalene | C6 - C9 Fraction | C10 - C14 Fraction | C15 - C28 Fraction | C29 - C36 Fraction | C10 - C36 Fraction (sum) | C6 - C10 Fraction | F1 | >C10 - C16 Fraction | >C16 - C34 Fraction | >C34 - C40 Fraction | >C10 - C40 Fraction (sum) | F2 |
| | LOR | 0.001 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 | 1 | 1 | 0.5 | 0.5 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 5 | 20 | 50 | 100 | 50 | 50 | 20 | 20 | 100 | 100 | 100 | 100 | 100 |
| **Blanks** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22/03/2021 | Rinsate 02 | <0.001 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <5 | <20 | <50 | <100 | <50 | <50 | <20 | <20 | <100 | <100 | <100 | <100 | <100 |
| 22/03/2021 | Field 02 | <0.001 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <1.0 | <0.5 | <0.5 | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <5 | <20 | <50 | <100 | <50 | <50 | <20 | <20 | <100 | <100 | <100 | <100 | <100 |
| 22/03/2021 | Trip Blank 02 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <5 | <20 | ---- | ---- | ---- | ---- | <20 | <20 | ---- | ---- | ---- | ---- | ---- |
| 22/03/2021 | TRIP BLANK 03 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | <20 | ---- | ---- | ---- | ---- | <20 | <20 | ---- | ---- | ---- | ---- | ---- |

# Appendix 11 Soil Bore Logs


GES
GEO ENVIRONMENTAL SOLUTIONS
PROJECT: Dodges Ferry Pool ESA
CLIENT: All Urban Planning
Log of SB01
EASTING: 551124.7 GDA94
NORTHING: 5255634.6 GDA94
BORING LOCATION: Dodges Ferry
ELEVATION AND DATUM: 7.6 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 2.5
EQUIPMENT/METHOD: AMS Power Probe
LOGGED BY: A. Plummer
NATURAL (m):
WATER TABLE (m):
SAMPLING: Core - Direct Push
DATE: 18/03/2021
DEPTH (metres)
MATERIAL DESCRIPTION
Geology
USCS Lithology
Laboratory Sample
Field PID (ppm)
IB105 Analyte IL Exceedances
MONITORING WELL
ELEVATION (metres)
SAND trace Silt: fine grained, dark grey, dry, loose
SW
SB01 0.1-0.2
Silty SAND: fine grianed, pale grey, dry, medium dense
SM
Silty SAND: fine grianed, dark red-brown, dry, dense
SM
Clayey SILT/Silty CLAY: low plasticity, grey/pale brown/yellow, dry, very stiff
CL
SB01 1.0-1.1
Rq
Sandy SILTSTONE recovered as Sandy SILT: non-plastic, pale orange/yellow/pale grey, dry, very stiff, extremely weathered, very low strength
ML
Silty SANDSTONE/Sandy SILTSTONE recovered as Sandy SILT: micaceous, non-plastic, dark orange-brown, dry, very stiff, extremely weathered, very low strength. Refusal
ML
SB01 2.4-2.5
Tas EPA IB105 CLASSIFICATION: Level 1 Level 2 Level 3 Level 4
SAMPLE IN EXCAVATION
APPROXIMATE GROUNDFLOOR LEVEL


GES
GEO ENVIRONMENTAL SOLUTIONS
PROJECT: Dodges Ferry Pool ESA
CLIENT: All Urban Planning
Log of SB02
EASTING: 551137.7 GDA94
NORTHING: 5255618.3 GDA94
BORING LOCATION: Dodges Ferry
ELEVATION AND DATUM: 7.8 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 2.3
EQUIPMENT/METHOD: AMS Power Probe
LOGGED BY: A. Plummer
NATURAL (m):
WATER TABLE (m):
SAMPLING: Core - Direct Push
DATE: 18/03/2021
DEPTH (metres)
MATERIAL DESCRIPTION
Geology
USCS Lithology
Laboratory Sample
Field PID (ppm)
IB105 Analyte IL Exceedances
MONITORING WELL
ELEVATION (metres)
SAND trace Silt: fine grained, dark grey, dry, loose
SW
SB02 0.1-0.2
Silty SAND: fine grianed, pale grey, dry, medium dense
SM
Clayey SILT/Silty CLAY: low plasticity, grey/pale brown/yellow, dry, very stiff
CL
Rq
Sandy SILTSTONE recovered as Sandy SILT: non-plastic, pale orange/yellow/pale grey, dry, very stiff, extremely weathered, very low strength. Refusal
ML
SB02 2.0-2.1
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2.0
2.1
2.2
7.6
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.0
5.8
5.6
Tas EPA IB105 CLASSIFICATION: Level 1 2 Level 2; 3 Level 3; 4 Level 4
SAMPLE IN EXCAVATION
APPROXIMATE GROUNDFLOOR LEVEL

GES GEO ENVIRONMENTAL SOLUTIONS

PROJECT: Dodges Ferry Pool ESA
CLIENT: All Urban Planning

## Log of SB03

EASTING: 551155.1 GDA94
NORTHING: 5255630.7 GDA94
BORING LOCATION: Dodges Ferry
ELEVATION AND DATUM: 8.8 m AHD
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
TOTAL DEPTH (m): 1.3
EQUIPMENT/METHOD: AMS Power Probe LOGGED BY: A. Plummer
NATURAL (m): WATER TABLE (m):
SAMPLING: Core - Direct Push DATE: 18/03/2021

| DEPTH (metres) | MATERIAL DESCRIPTION | Geology | USCS Lithology | Laboratory Sample | Field PID (ppm) | IB105 Analyte IL Exceedances | MONITORING WELL | ELEVATION (metres) |
|---|---|---|---|---|---|---|---|---|
| 0.0 | SAND trace Silt: fine grained, dark grey, dry, loose | Rq | SW | | | | | 8.8 |
| 0.1 | | | | SB03 0.1-0.2 | | | | |
| 0.2 | | | | | | | | 8.6 |
| 0.3 | Silty SAND: fine grianed, pale grey, dry, medium dense | | SM | | | | | |
| 0.4 | | | | | | | | 8.4 |
| 0.5 | Silty SAND: fine grianed, dark red-brown, dry, dense | | SM | | | | | |
| 0.6 | | | | | | | | 8.2 |
| 0.7 | | | | | | | | |
| 0.8 | | | | | | | | 8.0 |
| 0.9 | Clayey SILT/Silty CLAY: low plasticity, grey/pale brown/yellow, dry, very stiff | | CL | | | | | |
| 1.0 | | | | SB03 1.0-1.1 | | | | 7.8 |
| 1.1 | | | | | | | | |
| 1.2 | | | | | | | | 7.6 |
| 1.3 | Silty SANDSTONE/Sandy SILTSTONE recovered as Sandy SILT: micaceous, non-plastic, dark orange-brown, dry, very stiff, extremely weathered, very low strength. Refusal | | ML | | | | | |

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2; ☐3 Level 3; ☐4 Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

GES GEO ENVIRONMENTAL SOLUTIONS

PROJECT: Dodges Ferry Pool ESA

CLIENT: All Urban Planning

## Log of SB04

EASTING: 551159.9 GDA94

NORTHING: 5255610.2 GDA94

BORING LOCATION: Dodges Ferry

ELEVATION AND DATUM: 8.9 m AHD

DRILLING CONTRACTOR: Geo-Environmental Solutions P/L

TOTAL DEPTH (m): 1.4

EQUIPMENT/METHOD: AMS Power Probe LOGGED BY: A. Plummer

NATURAL (m): WATER TABLE (m):

SAMPLING: Core - Direct Push DATE: 18/03/2021

| DEPTH (metres) | MATERIAL DESCRIPTION | Geology | USCS Lithology | Laboratory Sample | Field PID (ppm) | IB105 Analyte IL Exceedances | MONITORING WELL | ELEVATION (metres) |
|---|---|---|---|---|---|---|---|---|
| 0.0 | SAND trace Silt: fine grained, dark grey, dry, loose | Rq | SW | | | | | 8.8 |
| 0.1 | | | | SB04 0.1-0.2 | | | | |
| 0.2 | Silty SAND: fine grianed, pale grey, dry, medium dense | | SM | | | | | 8.6 |
| 0.3 | | | | | | | | |
| 0.4 | | | | | | | | 8.4 |
| 0.5 | Silty SAND: fine grianed, dark red-brown, dry, dense | | SM | | | | | |
| 0.6 | | | | | | | | 8.2 |
| 0.7 | | | | | | | | |
| 0.8 | Clayey SILT/Silty CLAY: low plasticity, grey/pale brown/yellow, dry, very stiff | | CL | | | | | 8.0 |
| 0.9 | | | | | | | | |
| 1.0 | | | | SB04 1.0-1.1 | | | | |
| 1.1 | Silty SANDSTONE/Sandy SILTSTONE recovered as Sandy SILT: micaceous, non-plastic, dark orange-brown, dry, very stiff, extremely weathered, very low strength. Refusal | | | | | | | 7.8 |
| 1.2 | | | ML | | | | | |
| 1.3 | | | | | | | | 7.6 |

Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2; ☐3 Level 3; ☐4 Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

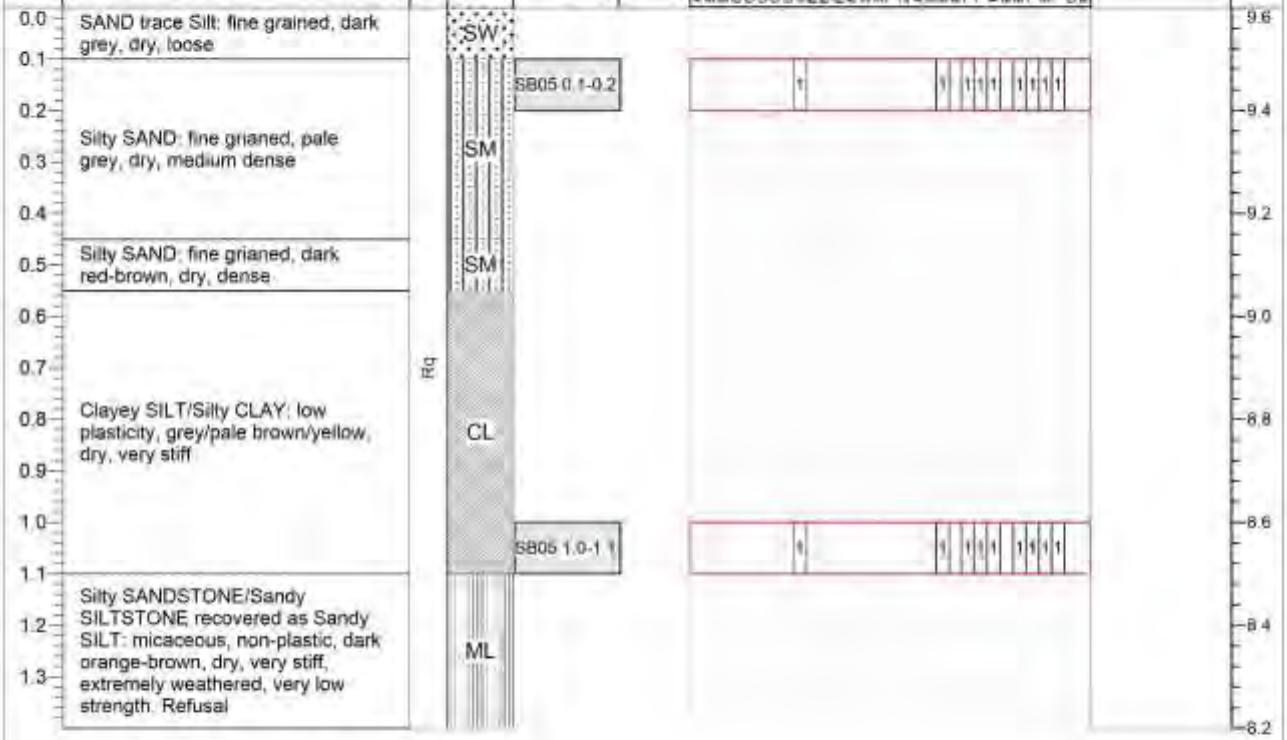
GES GEO ENVIRONMENTAL SOLUTIONS

PROJECT: Dodges Ferry Pool ESA
CLIENT: All Urban Planning

## Log of SB05

| | | |
|---|---|---|
| EASTING: | 551176.6 | GDA94 |
| NORTHING: | 5255619.7 | GDA94 |
| ELEVATION AND DATUM: | 9.6 | m AHD |
| TOTAL DEPTH (m): | 1.4 | |
| NATURAL (m): | WATER TABLE (m): | |

BORING LOCATION: Dodges Ferry
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
EQUIPMENT/METHOD: AMS Power Probe LOGGED BY: A. Plummer
SAMPLING: Core - Direct Push DATE: 18/03/2021




Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐2 Level 2; ☐3 Level 3; ☐4 Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

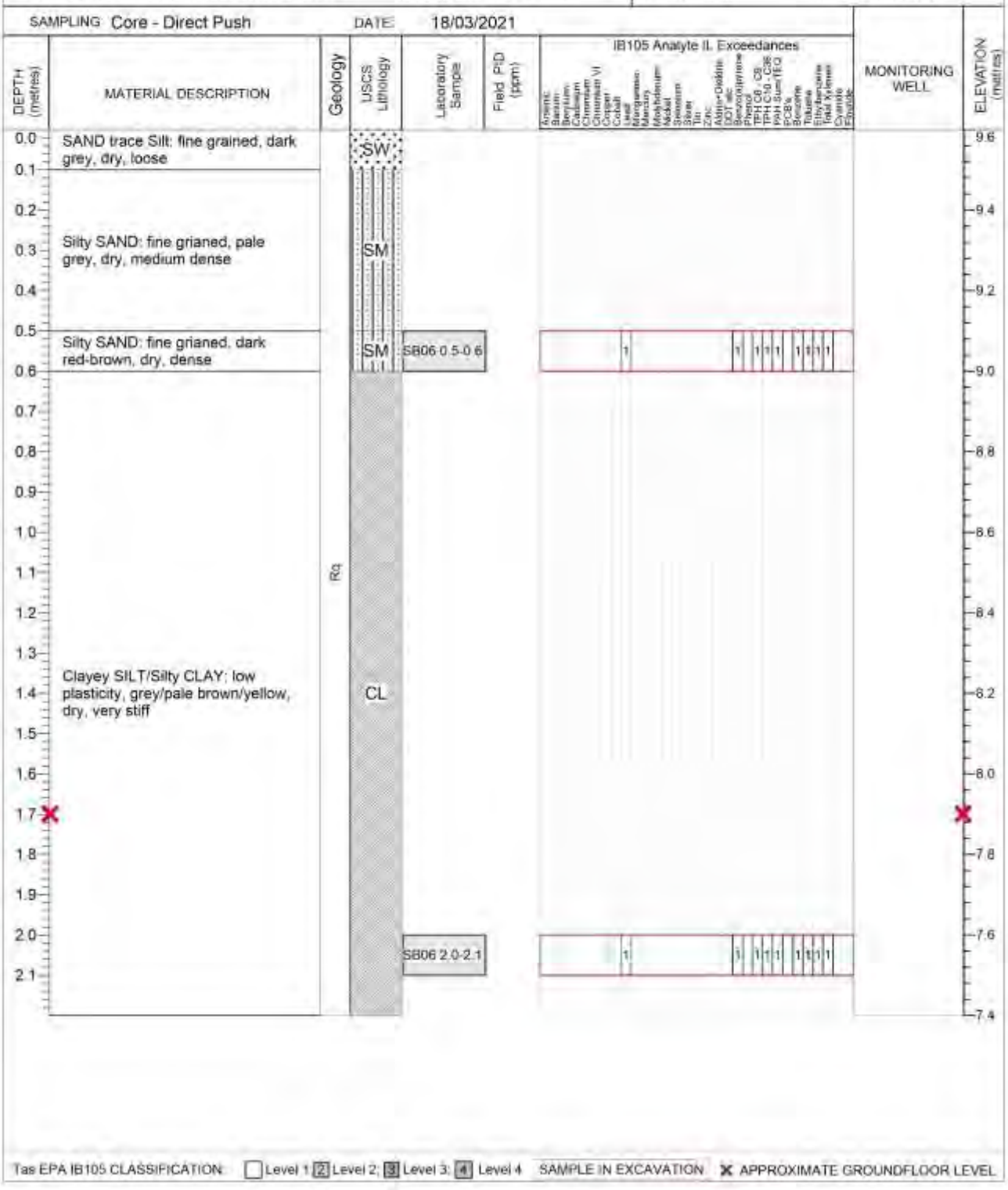
GES
GEO ENVIRONMENTAL SOLUTIONS

PROJECT: Dodges Ferry Pool ESA
CLIENT: All Urban Planning

## Log of SB06

| | | |
|---|---|---|
| EASTING: | 551181.1 | GDA94 |
| NORTHING: | 5255604.3 | GDA94 |
| ELEVATION AND DATUM: | 9.6 | m AHD |
| TOTAL DEPTH (m): | 2.2 | |
| NATURAL (m): | WATER TABLE (m): | |

BORING LOCATION: Dodges Ferry
DRILLING CONTRACTOR: Geo-Environmental Solutions P/L
EQUIPMENT/METHOD: AMS Power Probe
LOGGED BY: A. Plummer
SAMPLING: Core - Direct Push
DATE: 18/03/2021




Tas EPA IB105 CLASSIFICATION: ☐ Level 1 ☐ Level 2; ☐ Level 3; ☐ Level 4 SAMPLE IN EXCAVATION ✖ APPROXIMATE GROUNDFLOOR LEVEL

## Appendix 12 Analytical Results - Certificate of Analysis

ALS Environmental

## CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| Work Order | EM2104986 | Page | 1 of 15 |
| Client | GEO-ENVIRONMENTAL SOLUTIONS | Laboratory | Environmental Division Melbourne |
| Contact | DR JOHN PAUL CUMMING | Contact | Peter Ravlic |
| Address | 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004 | Address | 4 Westall Rd Springvale VIC Australia 3171 |
| Telephone | +61 03 6223 1839 | Telephone | +6138549 9645 |
| Project | DFP | Date Samples Received | 24-Mar-2021 10:15 |
| Order number | --- | Date Analysis Commenced | 24-Mar-2021 |
| C-O-C number | --- | Issue Date | 30-Mar-2021 13:12 |
| Sampler | SARAH JOYCE | | |
| Site | --- | | |
| Quote number | EN/222 | | |
| No. of samples received | 35 | | |
| No. of samples analysed | 27 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories | Position | Accreditation Category |
|---|---|---|
| Ammal Vijayaratnam | Non-Metals Team Leader | Melbourne Inorganics, Springvale, VIC |
| Dilani Fernando | Senior Inorganic Chemist | Melbourne Inorganics, Springvale, VIC |
| Nancy Wang | 2IC Organic Chemist | Melbourne Organics, Springvale, VIC |
| Nikki Stepniewski | Senior Inorganic Instrument Chemist | Melbourne Inorganics, Springvale, VIC |

RIGHT SOLUTIONS RIGHT PARTNER



### General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits, the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
* = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benzo(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1,2,3-cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benzo(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1,2,3-cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note 'TEQ 1/2LOR' and 'TEQ LOR' will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP075(SIM): Particular sample EM2104986_032 required dilution due to the presence of high level contaminants. LOR values have been adjusted accordingly.
- EP071: EM2104986_032 required dilution due to the presence of high level contaminants. LOR values have been adjusted accordingly.
- EP075(SIM): Surrogate recoveries for sample EM2104986_32 fall outside of published limits as a result of suspected matrix interferences. Surrogate recoveries have been confirmed by re-analysis.

Page: 3 of 15
Work Order: EM2104986
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Sample ID | SB01 0.1-0.2 | SB01 1.6-1.1 | SB01 2.4-2.5 | SB02 0.1-0.2 | SB02 2.0-2.1 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 16-Mar-2021 00:00 | 16-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-001 | EM2104986-003 | EM2104986-005 | EM2104986-006 | EM2104986-008 |
| | | | | | Result | Result | Result | Result | Result |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | | | |
| Moisture Content | --- | 1.0 | % | | 2.7 | 17.3 | 12.2 | 4.2 | 15.7 |
| **EG005(ED093)T: Total Metals by ICP-AES** | | | | | | | | | |
| Lead | 7439-92-1 | 5 | mg/kg | | <5 | 9 | 22 | <5 | 10 |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | | | |
| Naphthalene | 91-20-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Acenaphthylene | 208-96-8 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Acenaphthene | 83-32-9 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Fluorene | 86-73-7 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Phenanthrene | 85-01-8 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Anthracene | 120-12-7 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Fluoranthene | 206-44-0 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Pyrene | 129-00-0 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benz[a]anthracene | 56-55-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chrysene | 218-01-9 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzo[b+j]fluoranthene | 205-99-2 205-82-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzo[k]fluoranthene | 207-08-9 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzo[a]pyrene | 50-32-8 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dibenz[a,h]anthracene | 53-70-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzo[g,h,i]perylene | 191-24-2 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ^ Sum of polycyclic aromatic hydrocarbons | --- | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ^ Benzo(a)pyrene TEQ (zero) | --- | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ^ Benzo(a)pyrene TEQ (half LOR) | --- | 0.5 | mg/kg | | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| ^ Benzo(a)pyrene TEQ (LOR) | --- | 0.5 | mg/kg | | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | | |
| C6 - C9 Fraction | --- | 10 | mg/kg | | <10 | <10 | <10 | <10 | <10 |
| C10 - C14 Fraction | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| C15 - C28 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | <100 |
| C29 - C36 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | <100 |
| ^ C10 - C36 Fraction (sum) | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 10 | mg/kg | | <10 | <10 | <10 | <10 | <10 |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 10 | mg/kg | | <10 | <10 | <10 | <10 | <10 |

Page: 4 of 15
Work Order: EM2104986
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Sample ID | SB01 0.1-0.2 | SB01 1.6-1.1 | SB01 2.4-2.5 | SB02 0.1-0.2 | SB02 2.0-2.1 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 16-Mar-2021 00:00 | 16-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-001 | EM2104986-003 | EM2104986-005 | EM2104986-006 | EM2104986-008 |
| | | | | | Result | Result | Result | Result | Result |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued** | | | | | | | | | |
| >C10 - C16 Fraction | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| >C16 - C34 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | <100 |
| >C34 - C40 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | <100 |
| ^ >C10 - C40 Fraction (sum) | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| ^ >C16 - C35 Fraction minus Naphthalene (F2) | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| **EP080: BTEXN** | | | | | | | | | |
| Benzene | 71-43-2 | 0.2 | mg/kg | | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | 108-88-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | 100-41-4 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| meta- & para-Xylene | 108-38-3 106-42-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ortho-Xylene | 95-47-6 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ^ Sum of BTEX | --- | 0.2 | mg/kg | | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| ^ Total Xylenes | --- | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Naphthalene | 91-20-3 | 1 | mg/kg | | <1 | <1 | <1 | <1 | <1 |
| **EP075(SIM)S: Phenolic Compound Surrogates** | | | | | | | | | |
| Phenol-d6 | 13127-88-3 | 0.5 | % | | 89.8 | 88.8 | 85.3 | 87.9 | 81.7 |
| 2-Chlorophenol-D4 | 93951-73-6 | 0.5 | % | | 80.8 | 87.6 | 83.1 | 86.3 | 81.6 |
| 2,4,6-Tribromophenol | 118-79-6 | 0.5 | % | | 76.8 | 75.3 | 66.6 | 80.4 | 65.9 |
| **EP075(SIM)T: PAH Surrogates** | | | | | | | | | |
| 2-Fluorobiphenyl | 321-60-8 | 0.5 | % | | 96.7 | 93.2 | 90.4 | 95.3 | 87.5 |
| Anthracene-d10 | 1719-06-8 | 0.5 | % | | 107 | 116 | 115 | 101 | 114 |
| 4-Terphenyl-d14 | 1718-51-0 | 0.5 | % | | 116 | 117 | 114 | 119 | 111 |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | | |
| 1,2-Dichloroethane-D4 | 17060-07-0 | 0.2 | % | | 71.8 | 80.8 | 78.8 | 82.1 | 77.2 |
| Toluene-D8 | 2037-26-5 | 0.2 | % | | 76.8 | 87.8 | 83.2 | 91.0 | 86.7 |
| 4-Bromofluorobenzene | 460-00-4 | 0.2 | % | | 92.9 | 98.7 | 95.7 | 105 | 103 |

Page: 5 of 15
Work Order: EM2104986
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Sample ID | SB03 0.1-0.2 | SB03 1.0-1.1 | Duplicate Soil | SB04 0.1-0.2 | SB04 1.0-1.1 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-009 | EM2104986-011 | EM2104986-012 | EM2104986-013 | EM2104986-015 |
| | | | | | Result | Result | Result | Result | Result |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | | | |
| Moisture Content | --- | 1.0 | % | | 3.4 | 14.1 | 3.8 | 3.1 | 13.1 |
| **EG005(ED093)T: Total Metals by ICP-AES** | | | | | | | | | |
| Lead | 7439-92-1 | 5 | mg/kg | | <5 | 7 | <5 | <5 | 29 |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | | | |
| Naphthalene | 91-20-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Acenaphthylene | 208-96-8 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Acenaphthene | 83-32-9 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Fluorene | 86-73-7 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Phenanthrene | 85-01-8 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Anthracene | 120-12-7 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Fluoranthene | 206-44-0 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Pyrene | 129-00-0 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benz(a)anthracene | 56-55-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chrysene | 218-01-9 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzo(b+j)fluoranthene | 205-99-2 205-82-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzo(k)fluoranthene | 207-08-9 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzo(a)pyrene | 50-32-8 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Indeno(1.2.3-cd)pyrene | 193-39-5 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Dibenz(a.h)anthracene | 53-70-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Benzo(g.h.i)perylene | 191-24-2 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ^ Sum of polycyclic aromatic hydrocarbons | --- | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ^ Benzo(a)pyrene TEQ (zero) | --- | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ^ Benzo(a)pyrene TEQ (half LOR) | --- | 0.5 | mg/kg | | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| ^ Benzo(a)pyrene TEQ (LOR) | --- | 0.5 | mg/kg | | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | | |
| C6 - C9 Fraction | --- | 10 | mg/kg | | <10 | <10 | <10 | <10 | <10 |
| C10 - C14 Fraction | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| C15 - C28 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | <100 |
| C29 - C36 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | <100 |
| ^ C10 - C36 Fraction (sum) | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 10 | mg/kg | | <10 | <10 | <10 | <10 | <10 |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 10 | mg/kg | | <10 | <10 | <10 | <10 | <10 |

Page: 6 of 15
Work Order: EM2104986
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Sample ID | SB03 0.1-0.2 | SB03 1.0-1.1 | Duplicate Soil | SB04 0.1-0.2 | SB04 1.0-1.1 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 | 15-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-009 | EM2104986-011 | EM2104986-012 | EM2104986-013 | EM2104986-015 |
| | | | | | Result | Result | Result | Result | Result |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued** | | | | | | | | | |
| >C10 - C16 Fraction | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| >C16 - C34 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | <100 |
| >C34 - C40 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | <100 |
| ^ >C10 - C40 Fraction (sum) | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| ^ >C16 - C35 Fraction minus Naphthalene (F2) | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | <50 |
| **EP080: BTEXN** | | | | | | | | | |
| Benzene | 71-43-2 | 0.2 | mg/kg | | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | 108-88-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | 100-41-4 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| meta- & para-Xylene | 108-38-3 106-42-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ortho-Xylene | 95-47-6 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ^ Sum of BTEX | --- | 0.2 | mg/kg | | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| ^ Total Xylenes | --- | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Naphthalene | 91-20-3 | 1 | mg/kg | | <1 | <1 | <1 | <1 | <1 |
| **EP075(SIM)S: Phenolic Compound Surrogates** | | | | | | | | | |
| Phenol-d6 | 13127-88-3 | 0.5 | % | | 86.3 | 84.8 | 87.8 | 85.3 | 84.3 |
| 2-Chlorophenol-D4 | 93951-73-6 | 0.5 | % | | 85.7 | 84.8 | 90.7 | 84.7 | 80.8 |
| 2.4.6-Tribromophenol | 118-79-6 | 0.5 | % | | 73.0 | 65.8 | 79.2 | 79.2 | 77.5 |
| **EP075(SIM)T: PAH Surrogates** | | | | | | | | | |
| 2-Fluorobiphenyl | 321-60-8 | 0.5 | % | | 92.5 | 90.7 | 93.5 | 90.7 | 90.3 |
| Anthracene-d10 | 1719-06-8 | 0.5 | % | | 118 | 118 | 99.9 | 127 | 128 |
| 4-Terphenyl-d14 | 1718-51-0 | 0.5 | % | | 112 | 114 | 118 | 112 | 119 |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | | |
| 1.2-Dichloroethane-D4 | 17060-07-0 | 0.2 | % | | 72.8 | 76.5 | 75.6 | 81.3 | 78.9 |
| Toluene-D8 | 2037-26-5 | 0.2 | % | | 74.2 | 83.4 | 81.1 | 89.0 | 89.1 |
| 4-Bromofluorobenzene | 460-00-4 | 0.2 | % | | 91.4 | 98.5 | 90.8 | 93.6 | 88.8 |

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Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Sample ID | SB05 0.1-0.2 | SB05 1.0-1.1 | SB06 0.5-0.6 | SB06 2.0-2.1 | Trip Blank 01 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 18-Mar-2021 00:00 | 18-Mar-2021 00:00 | 18-Mar-2021 00:00 | 18-Mar-2021 00:00 | 18-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-016 | EM2104986-018 | EM2104986-020 | EM2104986-022 | EM2104986-026 |
| | | | | | Result | Result | Result | Result | Result |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | | | |
| Moisture Content | --- | 1.0 | % | | 5.1 | 19.7 | 10.7 | 15.4 | <1.0 |
| **EG005(ED093)T: Total Metals by ICP-AES** | | | | | | | | | |
| Lead | 7439-92-1 | 5 | mg/kg | | <5 | 20 | <5 | 24 | --- |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | | | |
| Naphthalene | 91-20-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Acenaphthylene | 208-96-8 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Acenaphthene | 83-32-9 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Fluorene | 86-73-7 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Phenanthrene | 85-01-8 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Anthracene | 120-12-7 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Fluoranthene | 206-44-0 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Pyrene | 129-00-0 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Benz[a]anthracene | 56-55-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Chrysene | 218-01-9 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Benzo[b+j]fluoranthene | 205-99-2 205-82-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Benzo[k]fluoranthene | 207-08-9 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Benzo[a]pyrene | 50-32-8 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Dibenz[a,h]anthracene | 53-70-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| Benzo[g,h,i]perylene | 191-24-2 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| ^ Sum of polycyclic aromatic hydrocarbons | --- | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| ^ Benzo(a)pyrene TEQ (zero) | --- | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | --- |
| ^ Benzo(a)pyrene TEQ (half LOR) | --- | 0.5 | mg/kg | | 0.6 | 0.6 | 0.6 | 0.6 | --- |
| ^ Benzo(a)pyrene TEQ (LOR) | --- | 0.5 | mg/kg | | 1.2 | 1.2 | 1.2 | 1.2 | --- |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | | |
| C6 - C9 Fraction | --- | 10 | mg/kg | | <10 | <10 | <10 | <10 | <10 |
| C10 - C14 Fraction | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | --- |
| C15 - C28 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | --- |
| C29 - C36 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | --- |
| ^ C10 - C36 Fraction (sum) | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | --- |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 10 | mg/kg | | <10 | <10 | <10 | <10 | <10 |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 10 | mg/kg | | <10 | <10 | <10 | <10 | <10 |

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Project: DFP

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Sample ID | SB05 0.1-0.2 | SB05 1.0-1.1 | SB06 0.5-0.6 | SB06 2.0-2.1 | Trip Blank 01 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 18-Mar-2021 00:00 | 18-Mar-2021 00:00 | 18-Mar-2021 00:00 | 18-Mar-2021 00:00 | 18-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-016 | EM2104986-018 | EM2104986-020 | EM2104986-022 | EM2104986-026 |
| | | | | | Result | Result | Result | Result | Result |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued** | | | | | | | | | |
| >C10 - C16 Fraction | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | --- |
| >C16 - C34 Fraction | --- | 100 | mg/kg | | 120 | <100 | <100 | <100 | --- |
| >C34 - C40 Fraction | --- | 100 | mg/kg | | <100 | <100 | <100 | <100 | --- |
| ^ >C10 - C40 Fraction (sum) | --- | 50 | mg/kg | | 120 | <50 | <50 | <50 | --- |
| ^ >C16 - C16 Fraction minus Naphthalene (F2) | --- | 50 | mg/kg | | <50 | <50 | <50 | <50 | --- |
| **EP080: BTEXN** | | | | | | | | | |
| Benzene | 71-43-2 | 0.2 | mg/kg | | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | 108-88-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | 100-41-4 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| meta- & para-Xylene | 108-38-3 106-42-3 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ortho-Xylene | 95-47-6 | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| ^ Sum of BTEX | --- | 0.2 | mg/kg | | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| ^ Total Xylenes | --- | 0.5 | mg/kg | | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Naphthalene | 91-20-3 | 1 | mg/kg | | <1 | <1 | <1 | <1 | <1 |
| **EP075(SIM)S: Phenolic Compound Surrogates** | | | | | | | | | |
| Phenol-d6 | 13127-88-3 | 0.5 | % | | 83.2 | 85.1 | 84.9 | 83.2 | --- |
| 2-Chlorophenol-D4 | 93951-73-6 | 0.5 | % | | 81.3 | 82.8 | 82.1 | 80.8 | --- |
| 2,4,6-Tribromophenol | 118-79-6 | 0.5 | % | | 84.2 | 74.8 | 74.2 | 85.2 | --- |
| **EP075(SIM)T: PAH Surrogates** | | | | | | | | | |
| 2-Fluorobiphenyl | 321-60-8 | 0.5 | % | | 90.8 | 92.1 | 90.6 | 90.0 | --- |
| Anthracene-d10 | 1719-06-8 | 0.5 | % | | 108 | 111 | 113 | 110 | --- |
| 4-Terphenyl-d14 | 1718-51-0 | 0.5 | % | | 105 | 106 | 104 | 104 | --- |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | | |
| 1,2-Dichloroethane-D4 | 17060-07-0 | 0.2 | % | | 79.8 | 77.7 | 72.2 | 77.6 | 78.7 |
| Toluene-D8 | 2037-26-5 | 0.2 | % | | 86.8 | 84.5 | 79.1 | 85.0 | 81.9 |
| 4-Bromofluorobenzene | 460-00-4 | 0.2 | % | | 96.2 | 96.9 | 95.7 | 97.3 | 96.4 |

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## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | Rinsate 01 | Rinsate 02 | Field 01 | Field 02 | Trip Blank 02 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 18-Mar-2021 00:00 | 22-Mar-2021 00:00 | 15-Mar-2021 00:00 | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-023 | EM2104986-024 | EM2104986-025 | EM2104986-027 | EM2104986-028 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | — |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | | | |
| Naphthalene | 91-20-3 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Acenaphthylene | 208-96-8 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Acenaphthene | 83-32-9 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Fluorene | 86-73-7 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Phenanthrene | 85-01-8 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Anthracene | 120-12-7 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Fluoranthene | 206-44-0 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Pyrene | 129-00-0 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Benz[a]anthracene | 56-55-3 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Chrysene | 218-01-9 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Benzo[b+j]fluoranthene | 205-99-2 205-82-3 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Benzo[k]fluoranthene | 207-08-9 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Benzo[e]pyrene | 50-32-8 | 0.5 | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | — |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Dibenz[a,h]anthracene | 53-70-3 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| Benzo[g,h,i]perylene | 191-24-2 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <1.0 | — |
| ^ Sum of polycyclic aromatic hydrocarbons | — | 0.5 | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | — |
| ^ Benzo[a]pyrene TEQ (zero) | — | 0.5 | µg/L | | <0.5 | <0.5 | <0.5 | <0.5 | — |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | | |
| C6 - C9 Fraction | — | 20 | µg/L | | <20 | <20 | <20 | <20 | <20 |
| C10 - C14 Fraction | — | 50 | µg/L | | <50 | <50 | <50 | <50 | — |
| C15 - C28 Fraction | — | 100 | µg/L | | <100 | <100 | <100 | <100 | — |
| C29 - C36 Fraction | — | 50 | µg/L | | <50 | <50 | <50 | <50 | — |
| ^ C10 - C36 Fraction (sum) | — | 50 | µg/L | | <50 | <50 | <50 | <50 | — |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 20 | µg/L | | <20 | <20 | <20 | <20 | <20 |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 20 | µg/L | | <20 | <20 | <20 | <20 | <20 |
| >C10 - C16 Fraction | — | 100 | µg/L | | <100 | <100 | <100 | <100 | — |
| >C16 - C34 Fraction | — | 100 | µg/L | | <100 | <100 | <100 | <100 | — |
| >C34 - C40 Fraction | — | 100 | µg/L | | <100 | <100 | <100 | <100 | — |
| ^ >C10 - C40 Fraction (sum) | — | 100 | µg/L | | <100 | <100 | <100 | <100 | — |

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## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | Rinsate 01 | Rinsate 02 | Field 01 | Field 02 | Trip Blank 02 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 18-Mar-2021 00:00 | 22-Mar-2021 00:00 | 15-Mar-2021 00:00 | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-023 | EM2104986-024 | EM2104986-025 | EM2104986-027 | EM2104986-028 |
| | | | | | Result | Result | Result | Result | Result |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued** | | | | | | | | | |
| ^ >C10 - C16 Fraction minus Naphthalene (F2) | — | 100 | µg/L | | <100 | <100 | <100 | <100 | — |
| **EP080: BTEXN** | | | | | | | | | |
| Benzene | 71-43-2 | 1 | µg/L | | <1 | <1 | <1 | <1 | <1 |
| Toluene | 108-88-3 | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| Ethylbenzene | 100-41-4 | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| meta- & para-Xylene | 108-38-3 106-42-3 | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| ortho-Xylene | 95-47-6 | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| ^ Total Xylenes | — | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| ^ Sum of BTEX | — | 1 | µg/L | | <1 | <1 | <1 | <1 | <1 |
| Naphthalene | 91-20-3 | 5 | µg/L | | <5 | <5 | <5 | <5 | <5 |
| **EP075(SIM)T: PAH Surrogates** | | | | | | | | | |
| 2-Fluorobiphenyl | 321-60-8 | 1.0 | % | | 101 | 102 | 102 | 96.4 | — |
| Anthracene-d10 | 1719-06-8 | 1.0 | % | | 84.8 | 83.4 | 82.8 | 77.6 | — |
| 4-Terphenyl-d14 | 1718-51-0 | 1.0 | % | | 73.2 | 72.7 | 70.8 | 68.7 | — |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | | |
| 1,2-Dichloroethane-D4 | 17060-07-0 | 2 | % | | 99.0 | 102 | 102 | 102 | 102 |
| Toluene-D8 | 2037-26-5 | 2 | % | | 95.9 | 96.2 | 94.4 | 94.6 | 96.1 |
| 4-Bromofluorobenzene | 460-00-4 | 2 | % | | 97.7 | 95.4 | 96.8 | 94.5 | 100 |

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Client: GEO-ENVIRONMENTAL SOLUTIONS
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## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | | PW1 | IT1 | MW11 | MW11A | MW12 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-029 | EM2104986-030 | EM2104986-031 | EM2104986-032 | EM2104986-033 |
| | | | | | Result | Result | Result | Result | Result |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | 0.002 | <0.001 |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | | | |
| Naphthalene | 91-20-3 | 1.0 | µg/L | | <1.0 | <1.0 | 75.1 | 1780 | <1.0 |
| Acenaphthylene | 208-96-8 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <2.4 | <1.0 |
| Acenaphthene | 83-32-9 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <6.0 | <1.0 |
| Fluorene | 86-73-7 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | 13.0 | <1.0 |
| Phenanthrene | 85-01-8 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | 12.3 | <1.0 |
| Anthracene | 120-12-7 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | 2.8 | <1.0 |
| Fluoranthene | 206-44-0 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <2.4 | <1.0 |
| Pyrene | 129-00-0 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | 3.3 | <1.0 |
| Benz[a]anthracene | 56-55-3 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <2.4 | <1.0 |
| Chrysene | 218-01-9 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <2.4 | <1.0 |
| Benzo[b+j]fluoranthene | 205-99-2 205-82-3 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <2.4 | <1.0 |
| Benzo[k]fluoranthene | 207-08-9 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <2.4 | <1.0 |
| Benzo[a]pyrene | 50-32-8 | 0.5 | µg/L | | <0.5 | <0.5 | <0.5 | <0.6 | <0.5 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <2.4 | <1.0 |
| Dibenz[a,h]anthracene | 53-70-3 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <2.4 | <1.0 |
| Benzo[g,h,i]perylene | 191-24-2 | 1.0 | µg/L | | <1.0 | <1.0 | <1.0 | <2.4 | <1.0 |
| ^ Sum of polycyclic aromatic hydrocarbons | --- | 0.5 | µg/L | | <0.5 | <0.5 | 75.1 | 1810 | <0.5 |
| ^ Benzo[a]pyrene TEQ (zero) | --- | 0.5 | µg/L | | <0.5 | <0.5 | <0.5 | <2.4 | <0.5 |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | | |
| C6 - C9 Fraction | --- | 20 | µg/L | | 250 | 40 | 1830 | 462000 | 260 |
| C10 - C14 Fraction | --- | 50 | µg/L | | 100 | <50 | 1830 | 101000 | <50 |
| C15 - C28 Fraction | --- | 100 | µg/L | | <100 | <100 | 160 | 2510 | <100 |
| C29 - C36 Fraction | --- | 50 | µg/L | | <50 | <50 | <50 | <140 | <50 |
| ^ C10 - C36 Fraction (sum) | --- | 50 | µg/L | | 100 | <50 | 1990 | 104000 | <50 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 20 | µg/L | | 260 | 30 | 4695 | 533000 | 230 |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 20 | µg/L | | 240 | 30 | 1810 | 344000 | 210 |
| >C10 - C16 Fraction | --- | 100 | µg/L | | 100 | <100 | 1420 | 52900 | <100 |
| >C16 - C34 Fraction | --- | 100 | µg/L | | <100 | <100 | 110 | 1530 | <100 |
| >C34 - C40 Fraction | --- | 100 | µg/L | | <100 | <100 | <100 | <140 | <100 |
| ^ >C10 - C40 Fraction (sum) | --- | 100 | µg/L | | 100 | <100 | 1530 | 54300 | <100 |

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Client: GEO-ENVIRONMENTAL SOLUTIONS
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## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | | PW1 | IT1 | MW11 | MW11A | MW12 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 |
| Compound | CAS Number | LOR | Unit | | EM2104986-029 | EM2104986-030 | EM2104986-031 | EM2104986-032 | EM2104986-033 |
| | | | | | Result | Result | Result | Result | Result |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued** | | | | | | | | | |
| ^ >C16 - C16 Fraction minus Naphthalene (F2) | --- | 100 | µg/L | | 100 | <100 | 1330 | 50500 | <100 |
| **EP080: BTEXN** | | | | | | | | | |
| Benzene | 71-43-2 | 1 | µg/L | | 20 | <1 | 3420 | 15000 | 12 |
| Toluene | 108-88-3 | 2 | µg/L | | <2 | <2 | 185 | 54500 | <2 |
| Ethylbenzene | 100-41-4 | 3 | µg/L | | <3 | <3 | 258 | 13500 | <3 |
| meta- & para-Xylene | 108-38-3 106-42-3 | 2 | µg/L | | <2 | <2 | 155 | 74400 | <2 |
| ortho-Xylene | 95-47-6 | 2 | µg/L | | <2 | <2 | 49 | 20500 | <2 |
| ^ Total Xylenes | --- | 3 | µg/L | | <3 | <3 | 202 | 94900 | <3 |
| ^ Sum of BTEX | --- | 1 | µg/L | | 20 | <1 | 3870 | 188000 | 12 |
| Naphthalene | 91-20-3 | 5 | µg/L | | <5 | <5 | 84 | 2300 | <5 |
| **EP075(SIM)S: Phenolic Compound Surrogates** | | | | | | | | | |
| Phenol-d6 | 13127-88-3 | 1.0 | % | | --- | --- | --- | 16.3 | --- |
| 2-Chlorophenol-D4 | 93951-73-6 | 1.0 | % | | --- | --- | --- | 55.6 | --- |
| 2,4,6-Tribromophenol | 118-79-6 | 1.0 | % | | --- | --- | --- | 80.7 | --- |
| **EP075(SIM)T: PAH Surrogates** | | | | | | | | | |
| 2-Fluorobiphenyl | 321-60-8 | 1.0 | % | | 102 | 98.6 | 109 | 147 | 99.7 |
| Anthracene-d10 | 1719-06-8 | 1.0 | % | | 81.3 | 76.5 | 71.8 | 97.1 | 77.3 |
| 4-Terphenyl-d14 | 1718-51-0 | 1.0 | % | | 69.8 | 65.9 | 62.2 | 94.2 | 67.8 |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | | |
| 1,2-Dichloroethane-D4 | 17060-07-0 | 2 | % | | 103 | 99.0 | 112 | 109 | 106 |
| Toluene-D8 | 2037-26-5 | 2 | % | | 96.3 | 93.8 | 109 | 89.8 | 112 |
| 4-Bromofluorobenzene | 460-00-4 | 2 | % | | 97.8 | 93.1 | 103 | 87.8 | 103 |

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Work Order: EM2104986
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | MW18 | Duplicate Water | --- | --- | --- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | --- | --- | --- |
| Compound | CAS Number | LOR | Unit | | EM2104986-034 | EM2104986-035 | --- | --- | --- |
| | | | | | Result | Result | --- | --- | --- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | --- | --- | --- |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | | | |
| Naphthalene | 91-20-3 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Acenaphthylene | 208-96-8 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Acenaphthene | 83-32-9 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Fluorene | 86-73-7 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Phenanthrene | 85-01-8 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Anthracene | 120-12-7 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Fluoranthene | 206-44-0 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Pyrene | 129-00-0 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Benz[a]anthracene | 56-55-3 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Chrysene | 218-01-9 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Benzo[b+j]fluoranthene | 205-99-2 205-82-3 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Benzo[k]fluoranthene | 207-08-9 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Benzo[a]pyrene | 50-32-8 | 0.5 | µg/L | | <0.5 | <0.5 | --- | --- | --- |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Dibenz[a,h]anthracene | 53-70-3 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| Benzo[g,h,i]perylene | 191-24-2 | 1.0 | µg/L | | <1.0 | <1.0 | --- | --- | --- |
| ^ Sum of polycyclic aromatic hydrocarbons | --- | 0.5 | µg/L | | <0.5 | <0.5 | --- | --- | --- |
| ^ Benzo[a]pyrene TEQ (zero) | --- | 0.5 | µg/L | | <0.5 | <0.5 | --- | --- | --- |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | | |
| C6 - C9 Fraction | --- | 20 | µg/L | | 60 | 270 | --- | --- | --- |
| C10 - C14 Fraction | --- | 50 | µg/L | | <50 | 160 | --- | --- | --- |
| C15 - C28 Fraction | --- | 100 | µg/L | | <100 | <100 | --- | --- | --- |
| C29 - C36 Fraction | --- | 50 | µg/L | | <50 | <50 | --- | --- | --- |
| ^ C10 - C36 Fraction (sum) | --- | 50 | µg/L | | <50 | 160 | --- | --- | --- |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 20 | µg/L | | 40 | 270 | --- | --- | --- |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 20 | µg/L | | 40 | 250 | --- | --- | --- |
| >C10 - C16 Fraction | --- | 100 | µg/L | | <100 | 110 | --- | --- | --- |
| >C16 - C34 Fraction | --- | 100 | µg/L | | <100 | <100 | --- | --- | --- |
| >C34 - C40 Fraction | --- | 100 | µg/L | | <100 | <100 | --- | --- | --- |
| ^ >C10 - C40 Fraction (sum) | --- | 100 | µg/L | | <100 | 110 | --- | --- | --- |

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Work Order: EM2104986
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | MW18 | Duplicate Water | --- | --- | --- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | --- | --- | --- |
| Compound | CAS Number | LOR | Unit | | EM2104986-034 | EM2104986-035 | --- | --- | --- |
| | | | | | Result | Result | --- | --- | --- |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued** | | | | | | | | | |
| ^ >C16 - C16 Fraction minus Naphthalene (F2) | --- | 100 | µg/L | | <100 | 110 | --- | --- | --- |
| **EP080: BTEXN** | | | | | | | | | |
| Benzene | 71-43-2 | 1 | µg/L | | 4 | 30 | --- | --- | --- |
| Toluene | 108-88-3 | 2 | µg/L | | <2 | <2 | --- | --- | --- |
| Ethylbenzene | 100-41-4 | 2 | µg/L | | <2 | <2 | --- | --- | --- |
| meta- & para-Xylene | 108-38-3 106-42-3 | 2 | µg/L | | <2 | <2 | --- | --- | --- |
| ortho-Xylene | 95-47-6 | 2 | µg/L | | <2 | <2 | --- | --- | --- |
| ^ Total Xylenes | --- | 2 | µg/L | | <2 | <2 | --- | --- | --- |
| ^ Sum of BTEX | --- | 1 | µg/L | | 4 | 30 | --- | --- | --- |
| Naphthalene | 91-20-3 | 5 | µg/L | | <5 | <5 | --- | --- | --- |
| **EP075(SIM)T: PAH Surrogates** | | | | | | | | | |
| 2-Fluorobiphenyl | 321-60-8 | 1.0 | % | | 85.6 | 96.7 | --- | --- | --- |
| Anthracene-d10 | 1719-06-8 | 1.0 | % | | 68.4 | 79.1 | --- | --- | --- |
| 4-Terphenyl-d14 | 1718-51-0 | 1.0 | % | | 61.0 | 67.9 | --- | --- | --- |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | | |
| 1,2-Dichloroethane-D4 | 17060-07-0 | 2 | % | | 105 | 97.8 | --- | --- | --- |
| Toluene-D8 | 2037-26-5 | 2 | % | | 96.8 | 95.7 | --- | --- | --- |
| 4-Bromofluorobenzene | 460-00-4 | 2 | % | | 96.7 | 93.2 | --- | --- | --- |

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Client : GEO-ENVIRONMENTAL SOLUTIONS
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## Surrogate Control Limits

| Sub-Matrix: SOIL | | Recovery Limits (%) | |
|---|---|---|---|
| Compound | CAS Number | Low | High |
| **EP075(SIM)S: Phenolic Compound Surrogates** | | | |
| Phenol-d6 | 13127-88-3 | 54 | 125 |
| 2-Chlorophenol-D4 | 93951-73-6 | 66 | 123 |
| 2,4,6-Tribromophenol | 118-79-6 | 34 | 122 |
| **EP075(SIM)T: PAH Surrogates** | | | |
| 2-Fluorobiphenyl | 321-60-8 | 61 | 125 |
| Anthracene-d10 | 1719-06-8 | 62 | 130 |
| 4-Terphenyl-d14 | 1718-51-0 | 67 | 133 |
| **EP080S: TPH(V)/BTEX Surrogates** | | | |
| 1,2-Dichloroethane-D4 | 17060-07-0 | 51 | 125 |
| Toluene-D8 | 2037-26-5 | 66 | 125 |
| 4-Bromofluorobenzene | 460-00-4 | 56 | 124 |

| Sub-Matrix: WATER | | Recovery Limits (%) | |
|---|---|---|---|
| Compound | CAS Number | Low | High |
| **EP075(SIM)S: Phenolic Compound Surrogates** | | | |
| Phenol-d6 | 13127-88-3 | 10 | 51 |
| 2-Chlorophenol-D4 | 93951-73-6 | 30 | 114 |
| 2,4,6-Tribromophenol | 118-79-6 | 28 | 133 |
| **EP075(SIM)T: PAH Surrogates** | | | |
| 2-Fluorobiphenyl | 321-60-8 | 38 | 127 |
| Anthracene-d10 | 1719-06-8 | 44 | 122 |
| 4-Terphenyl-d14 | 1718-51-0 | 44 | 124 |
| **EP080S: TPH(V)/BTEX Surrogates** | | | |
| 1,2-Dichloroethane-D4 | 17060-07-0 | 73 | 129 |
| Toluene-D8 | 2037-26-5 | 70 | 125 |
| 4-Bromofluorobenzene | 460-00-4 | 71 | 129 |

ALS Environmental

## CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| Work Order | : ES2110567 | Page | : 1 of 5 |
| Client | : GEO-ENVIRONMENTAL SOLUTIONS | Laboratory | : Environmental Division Sydney |
| Contact | : DR JOHN PAUL CUMMING | Contact | : Peter Ravlic |
| Address | : 29 KIRKSWAY PLACE BATTERY POINT TASMANIA, AUSTRALIA 7004 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : +61 03 6223 1839 | Telephone | : +6138549 9645 |
| Project | : DFP Second | Date Samples Received | : 24-Mar-2021 11:30 |
| Order number | : --- | Date Analysis Commenced | : 25-Mar-2021 |
| C-O-C number | : --- | Issue Date | : 31-Mar-2021 13:19 |
| Sampler | : SARAH JOYCE | | |
| Site | : --- | | |
| Quote number | : EN/222 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories | Position | Accreditation Category |
|---|---|---|
| Celine Conceicao | Senior Spectroscopist | Sydney Inorganics, Smithfield, NSW |
| Edwardy Fadjar | Organic Coordinator | Sydney Organics, Smithfield, NSW |

RIGHT SOLUTIONS RIGHT PARTNER

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Work Order: ES2110567
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP Second

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
* = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1,2,3-cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP090: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.

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Work Order: ES2110567
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP Second

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | TRIP BLANK 03 | ILS | --- | --- | --- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | --- | --- | --- |
| Compound | CAS Number | LOR | Unit | | ES2110567-001 | ES2110567-002 | --- | --- | --- |
| | | | | | Result | Result | --- | --- | --- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Lead | 7439-92-1 | 0.001 | mg/L | | --- | <0.001 | --- | --- | --- |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | | | |
| Naphthalene | 91-20-3 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Acenaphthylene | 208-96-8 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Acenaphthene | 83-32-9 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Fluorene | 86-73-7 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Phenanthrene | 85-01-8 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Anthracene | 120-12-7 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Fluoranthene | 206-44-0 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Pyrene | 129-00-0 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Benz(a)anthracene | 56-55-3 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Chrysene | 218-01-9 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Benzo(b+j)fluoranthene | 205-99-2 205-82-3 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Benzo(k)fluoranthene | 207-08-9 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Benzo(a)pyrene | 50-32-8 | 0.5 | µg/L | | --- | <0.5 | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Dibenz(a,h)anthracene | 53-70-3 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| Benzo(g,h,i)perylene | 191-24-2 | 1.0 | µg/L | | --- | <1.0 | --- | --- | --- |
| ^ Sum of polycyclic aromatic hydrocarbons | --- | 0.5 | µg/L | | --- | <0.5 | --- | --- | --- |
| ^ Benzo(a)pyrene TEQ (zero) | --- | 0.5 | µg/L | | --- | <0.5 | --- | --- | --- |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | | |
| C6 - C9 Fraction | --- | 20 | µg/L | | <20 | <20 | --- | --- | --- |
| C10 - C14 Fraction | --- | 50 | µg/L | | --- | <50 | --- | --- | --- |
| C15 - C28 Fraction | --- | 100 | µg/L | | --- | <100 | --- | --- | --- |
| C29 - C36 Fraction | --- | 50 | µg/L | | --- | <50 | --- | --- | --- |
| ^ C10 - C36 Fraction (sum) | --- | 50 | µg/L | | --- | <50 | --- | --- | --- |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 20 | µg/L | | <20 | <20 | --- | --- | --- |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 20 | µg/L | | <20 | <20 | --- | --- | --- |
| >C10 - C16 Fraction | --- | 100 | µg/L | | --- | <100 | --- | --- | --- |
| >C16 - C34 Fraction | --- | 100 | µg/L | | --- | <100 | --- | --- | --- |
| >C34 - C40 Fraction | --- | 100 | µg/L | | --- | <100 | --- | --- | --- |
| ^ >C10 - C40 Fraction (sum) | --- | 100 | µg/L | | --- | <100 | --- | --- | --- |

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Work Order: ES2110567
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP Second

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | TRIP BLANK 03 | ILS | --- | --- | --- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 22-Mar-2021 00:00 | 22-Mar-2021 00:00 | --- | --- | --- |
| Compound | CAS Number | LOR | Unit | | ES2110567-001 | ES2110567-002 | ---- | ---- | ---- |
| | | | | | Result | Result | --- | --- | --- |
| EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued | | | | | | | | | |
| * >C10 - C16 Fraction minus Naphthalene (F2) | --- | 100 | µg/L | | --- | <100 | --- | --- | --- |
| EP080: BTEXN | | | | | | | | | |
| Benzene | 71-43-2 | 1 | µg/L | | --- | <1 | --- | --- | --- |
| Toluene | 108-88-3 | 2 | µg/L | | --- | <2 | --- | --- | --- |
| Ethylbenzene | 100-41-4 | 2 | µg/L | | --- | <2 | --- | --- | --- |
| meta- & para-Xylene | 108-38-3 106-42-3 | 2 | µg/L | | --- | <2 | --- | --- | --- |
| ortho-Xylene | 95-47-6 | 2 | µg/L | | --- | <2 | --- | --- | --- |
| * Total Xylenes | --- | 2 | µg/L | | --- | <2 | --- | --- | --- |
| * Sum of BTEX | --- | 1 | µg/L | | --- | <1 | --- | --- | --- |
| Naphthalene | 91-20-3 | 5 | µg/L | | --- | <5 | --- | --- | --- |
| EP075(SIM)S: Phenolic Compound Surrogates | | | | | | | | | |
| Phenol-d6 | 13127-88-3 | 1.0 | % | | --- | 21.5 | --- | --- | --- |
| 2-Chlorophenol-D4 | 93951-73-6 | 1.0 | % | | --- | 45.7 | --- | --- | --- |
| 2,4,6-Tribromophenol | 118-79-6 | 1.0 | % | | --- | 60.8 | --- | --- | --- |
| EP075(SIM)T: PAH Surrogates | | | | | | | | | |
| 2-Fluorobiphenyl | 321-60-8 | 1.0 | % | | --- | 56.5 | --- | --- | --- |
| Anthracene-d10 | 1719-06-8 | 1.0 | % | | --- | 71.7 | --- | --- | --- |
| 4-Terphenyl-d14 | 1718-51-0 | 1.0 | % | | --- | 79.5 | --- | --- | --- |
| EP080S: TPH(V)/BTEX Surrogates | | | | | | | | | |
| 1,2-Dichloroethane-D4 | 17060-07-0 | 2 | % | | 104 | 90.1 | --- | --- | --- |
| Toluene-D8 | 2037-26-5 | 2 | % | | 106 | 103 | --- | --- | --- |
| 4-Bromofluorobenzene | 460-00-4 | 2 | % | | 102 | 103 | --- | --- | --- |

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Work Order: ES2110567
Client: GEO-ENVIRONMENTAL SOLUTIONS
Project: DFP Second

## Surrogate Control Limits

| Sub-Matrix: WATER | | Recovery Limits (%) | |
|---|---|---|---|
| Compound | CAS Number | Low | High |
| EP075(SIM)S: Phenolic Compound Surrogates | | | |
| Phenol-d6 | 13127-88-3 | 10 | 44 |
| 2-Chlorophenol-D4 | 93951-73-6 | 14 | 94 |
| 2,4,6-Tribromophenol | 118-79-6 | 17 | 125 |
| EP075(SIM)T: PAH Surrogates | | | |
| 2-Fluorobiphenyl | 321-60-8 | 20 | 104 |
| Anthracene-d10 | 1719-06-8 | 27 | 113 |
| 4-Terphenyl-d14 | 1718-51-0 | 32 | 112 |
| EP080S: TPH(V)/BTEX Surrogates | | | |
| 1,2-Dichloroethane-D4 | 17060-07-0 | 71 | 137 |
| Toluene-D8 | 2037-26-5 | 70 | 131 |
| 4-Bromofluorobenzene | 460-00-4 | 70 | 128 |




# *DODGES FERRY SWIM CENTRE - OLD FORCETT ROAD, DODGES FERRY*

TRAFFIC IMPACT ASSESSMENT

Hubble Traffic

March 2021

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# 1. Introduction

Luke Doerner (Nekon Pty Ltd) has engaged Hubble Traffic Consulting to prepare an independent Traffic Impact Assessment, to consider the traffic impacts of the construction of a new swim centre, located off Old Forcett Road, Dodges Ferry.

This assessment has considered the type and amount of traffic that is expected to use this swim centre (development) and the likely traffic impacts to the surrounding road network.

This report has been prepared to satisfy the requirements of Austroads, Guide to Traffic Management Part 12: Traffic Impacts of Developments, 2019. This assessment has referred to the following information and resources:

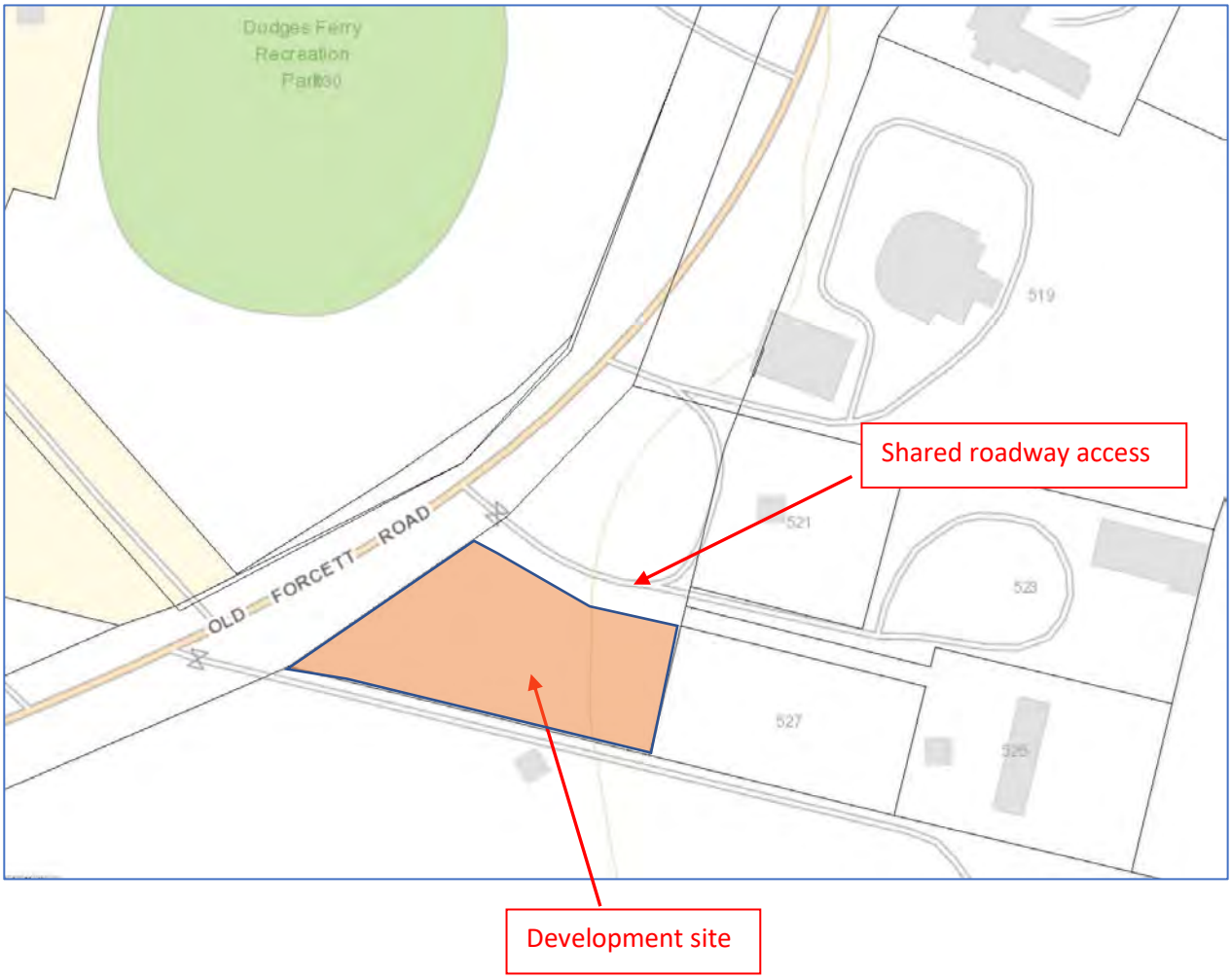
- Sorell Council Planning Scheme (planning scheme)
- Road Traffic Authority NSW (RTA) Guide to Traffic Generating Developments
- Australian Standards 2890
- Austroads series of Traffic Management and Road Design
    - Part 4: Intersection and crossings, General
    - Part 4a: Unsignalised and Signalised Intersections
    - Part 12: Traffic Impacts of Development
- Department of State Growth crash database
- Autoturn on-line vehicle swept path software
- SIDRA 8 Intersection Modelling software
- Google Earth imagery

# 2. Site Description

The development site is land at CT 40340/1000, Old Forcett Road, Dodges Ferry.

Vehicular access to the development site highlighted in orange in the diagram below, will be via an existing shared roadway that provides access to four other properties, 521, 523, 525 and 527.

2.0 Map – Extract from the List database



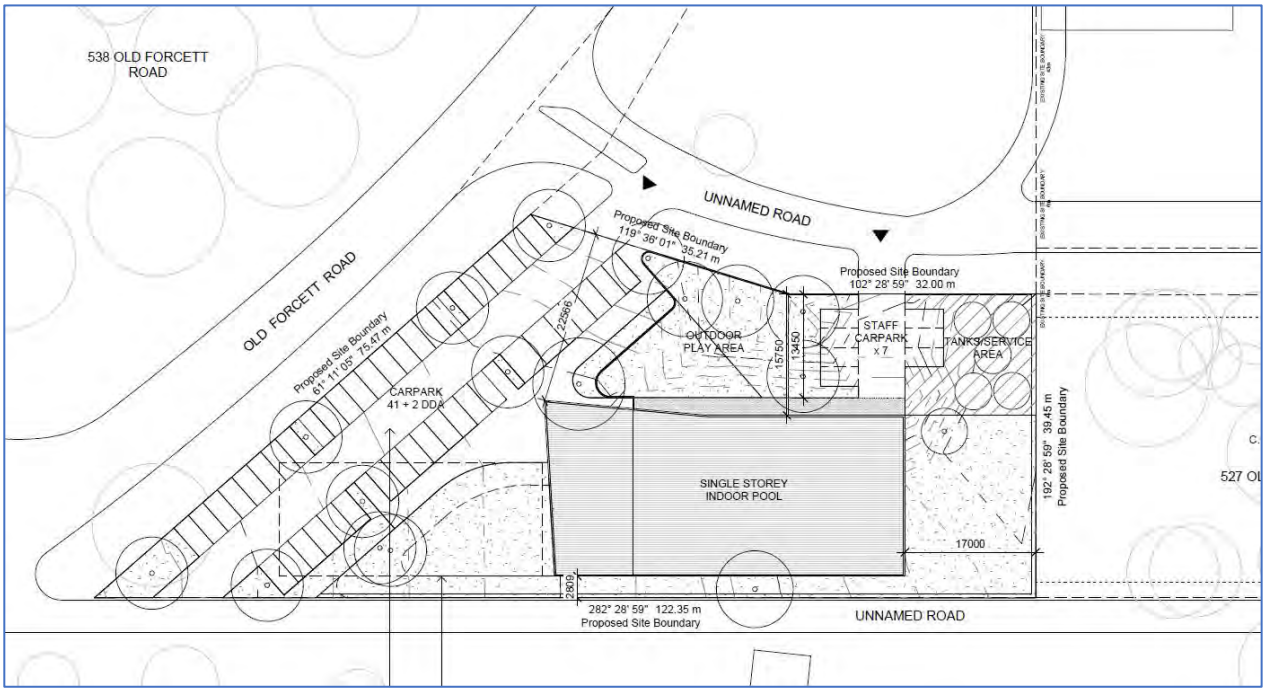
# 3. Development proposal

Although the swim centre will be privately owned, it will provide all the services that a public swimming pool would provide to the surrounding community.

The centre will be a standalone building with approximately 900 square metres of floor area.

The swim centre will have on-site parking spaces to meet the needs for staff and customers.

3.0 Diagram of Proposed layout



# 4. Trip generation at the proposed access

A trip in this report is defined as a one way vehicular movement from one point to another, excluding the return journey. Therefore, a return trip to and from a land use is counted as two trips.

To determine the number of trips likely to be generated by this development, information is usually sourced from the RTA Guide to Traffic Generating Developments. The RTA Guide does not include information on swimming centres and indicates for recreational facilities the analysis should be based on the predicted 85 percentile usage, rather than usage at capacity, while taking into account weekly and seasonal variations. The RTA Guide recommends analysis of proposed developments be based on survey data of similar developments.

## 4.1. Expected trips generated by the swim centre.

Recently a new swim centre was opened in Lauderdale; it is a standalone centre and appears to operate in a similar manner to the proposed swim centre. Therefore, the Lauderdale centre will be used to determine the likely trip generation.

Table 4.1 – Lauderdale Swim Centre vehicle survey

| Time | Vehicles arriving | Vehicles departing | Cumulative vehicles parked | Active mode in | Active mode out |
|---|---|---|---|---|---|
| Vehicles parked before 3.30pm | | | 16 | | |
| 3.30 to 3.45pm | 3 | 0 | 19 | 1 | |
| 3.45 to 4.00pm | 2 | 8 | 13 | | |
| 4.00 to 4.15pm | 7 | 1 | 19 | | |
| 4.15 to 4.30pm | 1 | 6 | 14 | | |
| 4.30 to 4.45pm | 3 | 0 | 17 | 1 | |
| 4.45 to 5.00pm | 1 | 8 | 10 | | |
| 5.00 to 5.15pm | 6 | 1 | 15 | | 1 |
| 5.15 to 5.30pm | 0 | 5 | 10 | | |
| 5.30 to 5.45pm | 3 | 0 | 13 | | |
| 5.45 to 6.00pm | 0 | 8 | 5 | | 1 |
| **Total** | **26** | **37** | | **2** | **2** |

The Lauderdale survey provided the following information:

- Total of 63 vehicle movements and four active movements (walking) within 150 minutes
- Average of one vehicle movement every 2.3 minutes
- Majority of the customers arrived and left in a private motor vehicle
- Highest parking demand of 19 vehicles at any one time
- Traffic arrived and departed in small bunches, probably associated with timing of swimming lessons
- Average generation rate of 26 trips per hour

The Lauderdale building is approximately 630 square metres in size, while the proposed Dodges Ferry building is expected to be 900 square metres. This means the new building is 40 percent larger in size. It would be reasonable to assume this new centre is capable of generating 40 percent more traffic movements.

Based on the 40 percent increase in traffic movements, the proposed Dodges Ferry Swim Centre is expected to generate 36 trips per hour, with an equal split of traffic arriving and leaving.

For assessment purposes, 36 peak hour vehicle trips will be used.

# 5. Existing traffic Conditions

All traffic accessing the development site will need to turn off and on to Old Forcett Road to utilise the shared roadway, and this section of the assessment will examine the current traffic flow and conditions.

## 5.1. Old Forcett Road

Old Forcett Road is part of the Sorell Council public road network, it extends from the Arthur Highway to Dodges Ferry. Within the surrounding local road network, Old Forcett Road performs as a collector road, designed to carry a significant volume of through traffic.

Old Forcett Road is adjacent to the development site, and has a sealed carriageway with 3.2 metres wide traffic lanes operating in both directions. The traffic lanes are supplemented with a two metre wide sealed shoulders.

The edge of the traffic lanes and road centreline are delineated with long life thermoplastic road markings, and guide posts located at the back of the shoulders delineates the alignment.

The horizontal road alignment is a sweeping curve, with the shared roadway junction located on the outside of this curve on reasonably flat terrain.

The road characteristics of Old Forcett Road is of a high standard, providing an efficient and unimpeded traffic conditions for motorists.

5.1 – Photograph of the road standard



## 5.2. Speed limit and operating speed along Old Forcett Road

Adjacent to the development site, the speed limit along Old Forcett Road is posted at 60 km/h.

This speed limit reflects the level and type of roadside activity, and the number of side streets that generate turning traffic movements. Old Forcett Road primarily runs in a south to north orientation, with the Dodges Ferry Primary School located on the western side, with two access roads to this school. While on the opposite side, there is one named side road (Okines Road) and two shared roadways that serve a number of commercial properties.

The land-use activities are set well back from the roadway, providing motorists with an open environment and excellent forward sight lines. This high road standard suggests the operating speed of vehicles is more likely to be around 70 km/h, rather than the 60 km/h posted speed limit.

For assessment purposes the operating speed of 70 km/h will be used.

## 5.3. Traffic activity along Old Forcett Road

To understand the amount of traffic using Old Forcett Road, morning and afternoon traffic surveys was undertaken on Thursday 11 March 2021.

Table 5.3 – Traffic survey of traffic using Old Forcett Road

| Time | Vehicles travelling southbound | Vehicles travelling northbound | Total two-way traffic | Busiest hour period |
|---|---|---|---|---|
| 7.30 to 7.45am | 38 | 48 | 86 | |
| 7.45 to 8.00am | 39 | 50 | 89 | |
| 8.00 to 8.15am | 34 | 78 | 112 | 607 |
| 8.15 to 8.30am | 44 | 100 | 144 | |
| 8.30 to 8.45am | 51 | 137 | 188 | |
| 8.45 to 9.00am | 85 | 78 | 163 | |
| | | | | |
| 3.30 to 3.45pm | 63 | 38 | 101 | |
| 3.45 to 4.00pm | 89 | 50 | 139 | |
| 4.00 to 4.15pm | 74 | 39 | 113 | 619 |
| 4.15 to 4.30pm | 119 | 55 | 174 | |
| 4.30 to 4.45pm | 103 | 44 | 147 | |
| 4.45pm to 5.00pm | 108 | 77 | 185 | |

Based on the traffic survey, it can be concluded that the average weekday traffic flow along Old Forcett Road is estimated at 6,000 vehicles per day.

Both the morning and afternoon peak hour traffic flow is slightly higher than 600 vehicles per hour.

The highest recorded traffic usage of 620 vehicles per hour, will be used in assessing the level of traffic performance for vehicles entering and leaving the development site, through the current shared roadway.

## 5.4. Traffic safety at the access location

The Department maintains a database of reported road crashes. A check of this database found between Okines Road and the southern school access (distance of 360 metres) there has been five crashes reported in the last five years.

All of the crashes occurred at junctions, with four rear-end crashes involving a vehicle waiting to turn into the access from Old Forcett Road. Due to the low speed limit, three of the crashes resulted in property damage and the other two in minor injury.

None of the crashes occurred at the junction where the new development will generate traffic movements.

Table 5.4 – Reported crashes

| Location | Crash Type | Severity | Date | Time |
|---|---|---|---|---|
| School northern access | Emerging | PD | Aug 2016 | 17.25pm |
| | Rear end right | PD | June 2020 | 12.30pm |
| Access to BWS | Rear end left | Minor | Nov 2017 | 17.22pm |
| | Rear end right | PD | Sep 2017 | 17.30pm |
| School southern access | Rear-end right | Minor | Aug 2019 | 9.00am |

## 5.5. Traffic activity currently using the shared laneway to the development site

The development site will access Old Forcett Road via an existing shared laneway that currently provides access to four commercial properties, which includes:

- 521 – GB Automotive (motor vehicle mechanical centre)
- 523 – Redline coaches (Bus depot)
- 525 – Closed, previously Concept Excavations (property currently for sale)
- 527 – Vacant land

A traffic survey of traffic using this shared laneway was undertaken on 11 March 2021 and found an infrequent rate of traffic movements.

| Time | Vehicles travelling in | Vehicles travelling out | Total two-way traffic |
|---|---|---|---|
| 7.30 to 7.45am | 0 | 1 | 1 |
| 7.45 to 8.00am | 0 | 0 | 0 |
| 8.00 to 8.15am | 0 | 1 | 1 |
| 8.15 to 8.30am | 1 | 0 | 1 |
| 8.30 to 8.45am | 1 | 0 | 1 |
| 8.45 to 9.00am | 3 | 1 | 4 |
| **Total** | **5** | **3** | **8** |
| 3.30 to 3.45pm | 2 | 3 | 5 |
| 3.45 to 4.00pm | 1 | 3 | 4 |
| 4.00 to 4.15pm | 2 | 1 | 3 |
| 4.15 to 4.30pm | 1 | 2 | 3 |
| 4.30 to 4.45pm | 2 | 2 | 4 |
| 4.45 to 5.00pm | 2 | 3 | 5 |
| **Total** | **10** | **14** | **24** |

## 5.6. Shared laneway to the development site junction arrangement

The existing shared laneway intersects Old Forcett Road at 90 degrees and extends in a southeast direction to the property boundary of four commercial properties. The laneway is short in length, is sealed at approximately six metres wide; caters for two-way traffic movements; and has large radius on each of the corners to accommodate the swept path of large turning vehicles.

There is no significant gradient, and the laneway provides a good level of accessibility to the commercial properties.

5.6 Photograph of the shared laneway



For vehicles turning right into the shared laneway from Old Forcett Road, there is no marked turning facility. However the two meter wide sealed shoulder allows a stationary right turning vehicle to be passed on the left, at a reduce travel speed, with sufficient sealed road width allowing a Basic Auxiliary Right (BAR) turning treatment to operate.



# 6. Impact from traffic generated by this development.

As determined in section 4 of this assessment, this development has the potential to generate up to 36 additional trips per hour when the development is operating. All trips would involve vehicles using Old Forcett Road.

## 6.1. Additional traffic movements operating on Old Forcett Road

The highest two-way traffic flow operating along the Old Forcett Road is 620 vehicles per hour. An additional 36 trips generated by this new use, represents a six percent increase in vehicle trips.

Old Forcett Road operates as a collector road within the surrounding road network, and with the capacity of a collector road being 900 vehicles per hour, per direction. The increase in traffic movement along Old Forcett Road will mean the peak hour traffic flow is expected to operate around 36 percent of the road capacity and this represents a good level of service for motorists.

The increase in traffic flow generated by this development, is not expected to have any adverse efficiency impact to the traffic flow along the Old Forcett Road.

## 6.2. Shared laneway junction to the development site

As indicated by the recent traffic survey, the current commercial properties generate a low volume of vehicles in the peak periods, with the survey finding in the afternoon peak period (90 minutes) 24 vehicle trips occurred.

It is important to acknowledge that two of the four properties using this shared laneway were either vacant or closed, so the current traffic movements represent an inaccurate number of traffic movements that this laneway could generate when the properties are fully occupied.

Using the RTA Guide to Traffic Generating Developments, commercial properties such as a Road Transport Terminal or Warehouse can generate between 0.5 to one peak hour trip per 100 square metres of floor space. With the property at 525 being vacant and having buildings with a floor area of 3,400 square metres, it has the potential to generate 21 peak hour trips when operating. Similarly, the vacant property could also generate similar traffic movements.

Overall, the existing four properties has the potential to generate some 60 peak hour trips, and this volume will be used in the traffic modelling. To determine the existing level of junction performance, SIDRA 8 Intersection Modelling Software has been used.

Based on 60 traffic movements generated by the shared laneway, traffic modelling indicates this shared laneway junction with Old Forcett Road will perform at the highest level of traffic efficiency for a give way control, with the modelling results shown in table 6.2.

Degree of Saturation (DOS) of 0.196 means the junction is operating around 20% of its capacity, and the average delays for vehicles leaving the shared laneway are insignificant.

Table 6.2 – Existing junction traffic modelling

| Approach | Lane | Total Vehicles | DOS | Average delay | LOS | Queue |
|---|---|---|---|---|---|---|
| Laneway | Right out | 716 | 0.196 | 11.4 seconds | B | 1.6m |
| | Left out | | | 7.7 seconds | A | 1.6m |
| Southern | Through | | | 0.2 seconds | A | 0 |
| | Right in | | | 8.3 seconds | A | 1.7m |
| Northern | Through | | | 0 seconds | A | 0 |
| | Left | | | 6 seconds | A | 0 |

The additional traffic movements of 36 vehicles per hour estimated to be generated by this development was assigned to the shared laneway junction and remodelled. The additional traffic movements represented no real change in the current level of traffic performance and the results of the modelling are shown in table 6.2A.

Table 6.2A – New development traffic modelling

| Approach | Lane | Total Vehicles | DOS | Average delay | LOS | Queue |
|---|---|---|---|---|---|---|
| Laneway | Right out | 749 | 0.21 | 11.8 seconds | B | 2.6m |
| | Left out | | | 7.8 Seconds | A | 2.9m |
| Southern | Through | | | 0.3 Seconds | A | 0 |
| | Right in | | | 8.4 seconds | A | 2.9m |
| Northern | Through | | | 0 Seconds | A | 0 |
| | Left | | | 6 seconds | A | 0 |

To be confident that additional traffic movements generated by the new development will not cause any adverse traffic efficiency issues, sensitivity testing of the junction performance was conducted using traffic modelling. Two scenarios were modelled, the first with the new development generation rate doubling from 36 to 72 traffic movements per hour, and a second of allowing for ten years of incremental traffic growth of two percent per year.

Under the first scenario, the traffic modelling indicates no significant deterioration of the junction performance with 72 vehicle movements per hour. The delay for motorists leaving the laneway increase slightly, with the average queue length extending from 2.6 to 3.6 metres. Otherwise, there was no adverse impact to level of traffic efficiency for Old Forcett Road motorists.

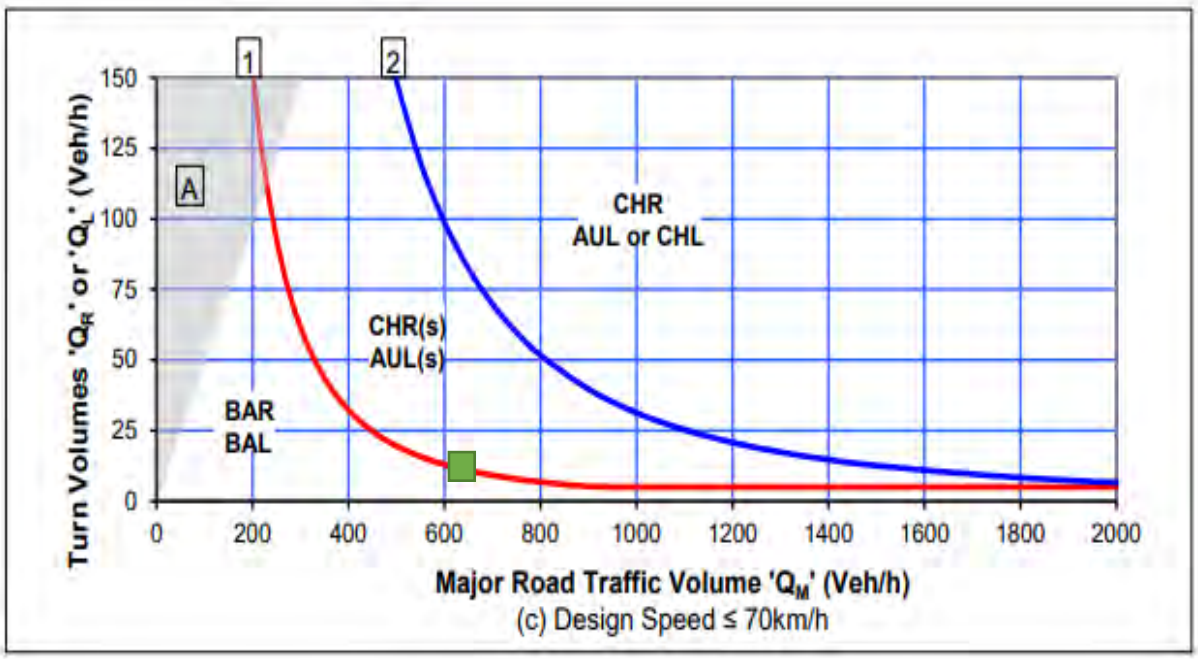
The modelling for ten year incremental traffic growth of two percent per year, and development generation rate of 72 vehicles per hour, found the junction will continue to provide a high level of traffic efficiency for users. Motorists turning right from the shared laneway will incur a slightly longer delay of 15.3 seconds and the expected queue length could grow to 5.3 metres.

Overall, the traffic modelling has clearly demonstrated that traffic generated by the new Swim Centre is not expected to cause any adverse traffic efficiency. Also, the delays for motorists leaving the shared laneway are expected to be minimal and this will not create any adverse safety outcomes.

## 6.3. Turning treatments on Old Forcett Road

With the development creating additional right turn movements off Old Forcett Road, the type of turning treatment must be considered. Austroads provides guidance on turning treatments, which is based on the number of vehicles turning and the number of vehicles travelling on the roadway.

Diagram 6.3 – Austroads warrant on turning treatments for low speed environments




The current layout of the shared laneway with the two metre wide sealed shoulder means the junction currently operates as a Basic Auxiliary Right (BAR) treatment, where stationery right turning vehicles can be passed on the left using the sealed shoulder.

The above Austroads warrant indicates the current BAR treatment is expected to be suitable to cater for the increase in right turning movements generated by the new development.

Maintaining the BAR turning treatment at the shared laneway is consistent with the treatments operating at nearby junctions.

## 6.4. Safe Intersection Sight Distance

It is important that motorists leaving the shared roadway has suitable sight distance to enter and leave Old Forcett Road in a safe manner, without impacting other motorists.

The planning scheme table E5.1 prescribes the Safe Intersection Sight Distance (SISD) and for 60 km/h speed environment the required SISD is 105 metres.

As mentioned earlier, although the speed limit is posted at 60 km/h, the open environment and high road standard suggests a slightly higher operating would be safe, and operating speeds up to 70 km/h could be expected. The SISD for 70 km/h is 130 metres.

The available sight distance for a driver leaving the shared laneway exceeds 250 metres in both directions and exceeds the SISD requirement for both 60 and 70 km/h speed environments.

Photograph 6.4 – View for drivers looking north.



Photograph 6.4A – View for drivers looking south.

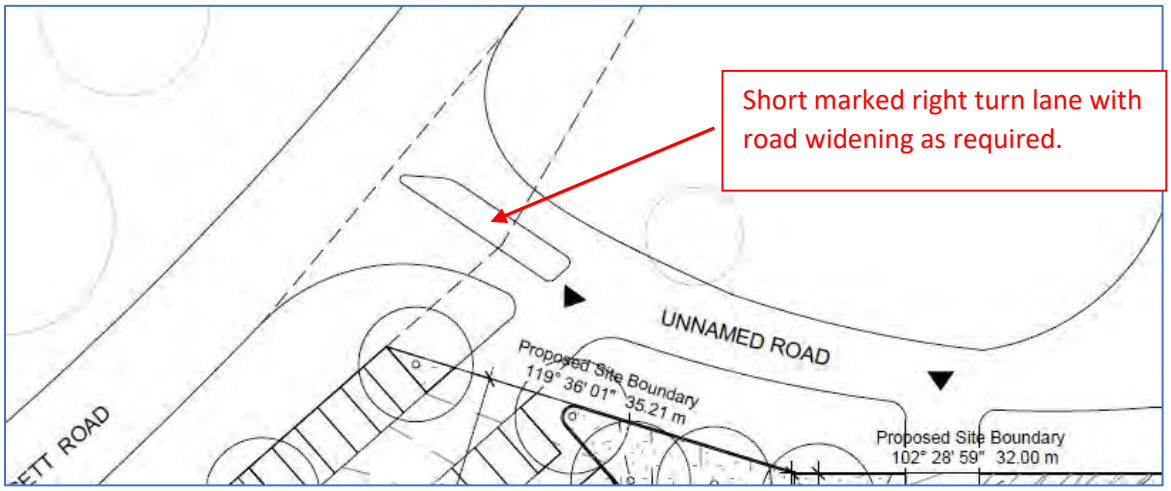


## 6.5. Queuing risk of vehicles entering the development site

The access to the development car park is expected to be located within close proximity of the Old Forcett Road, and it is important that right turning vehicles waiting to turn into the car park do not cause following vehicles to queue back onto the Old Forcett Road.

The simplest solution to prevent vehicle queuing back to the Old Forcett Road is to widen the shared roadway and mark a short right turn lane, so through vehicles to other properties can passed a stationary vehicle on the left.

Diagram 6.5 – Proposed development car park access with short marked right turn lane




## 6.6. Changes to the shared laneway intersecting Old Forcett Road

The current junction layout is suitable to accommodate the new development without any improvements, the junction allows for two-way traffic movements and the large corner radius provides sufficient road pavement to cater for large vehicles without lane encroachment.

# 7. On-site parking demand

The planning scheme table E6.1 specifies the number of parking spaces required for various user type facilities, under sports and recreation, a swimming pool requires 5.6 spaces per 100 square metres of the site. It is assumed that site means the building size containing the swimming pool.

A building of 900 square metres, requires 50 on-site parking spaces, to cater for both staff and customers.

To validate this number of on-site parking spaces, a parking demand survey was conducted at the Lauderdale Swim Centre. With the Lauderdale building size being 630 square metres, the required number of parking spaces is calculated at 35, and the facility had this number of parking spaces.

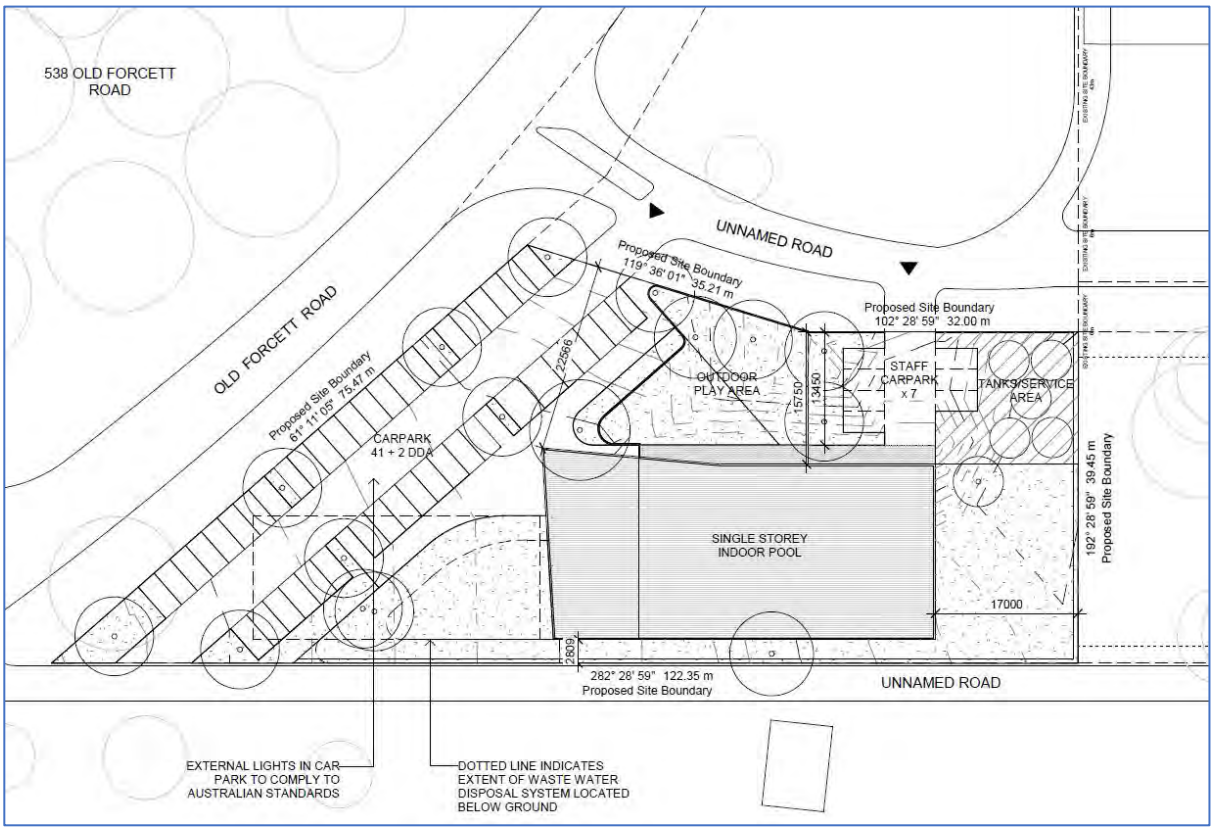
The parking demand survey found the cumulative number of vehicles parked at any one time was 19 vehicles (table 4.1), indicating the parking supply of 35 was more than suitable for the level of activity.

The development proposal will provide 50 on-site parking spaces, and this is expected to meet the reasonable demand generated by the development, and prevent overflow parking occurring outside of the development site.

# 8. Internal car park layout

The new on-site parking facility will be considered as a greenfield site, and will be designed to comply with the Australian Standards 2890 part 1: Off-street car parking and will consist of the following attributes:

- User class 3A, short term, high turnover parking spaces.
- Ninety degree angled parking spaces to be 2.6 metres wide and 5.4 metres long.
- Parking aisle to be a minimum of six metres wide.
- Allowance for two-way traffic movements.
- Access width to the shared laneway to be a minimum of six metres wide.
- Gradient of the parking spaces is expected to be less than five percent.
- Walkways provided to connect parking spaces with the entrance to the building.
- Parking spaces to be sealed or paved with hard all weather surface materials, and parking spaces marked.
- Appropriate landscaping to reduce visual impact to passing traffic.
- At the end of the parking aisle, a minimum of an additional one metre road pavement will be provided to aid vehicle manoeuvrability.
- The car park and pathways will be appropriately illuminated for security and surveillance purposes.
- Two disable parking spaces will be located in close proximity of the building entrance.
- Bicycle frames will be provided.




The development will have two accesses to separate customers parking with staff parking.

## 8.1. Manoeuvrability into and out of the parking spaces

To demonstrate that vehicles can manoeuvre into and out of the parking spaces easily, Autoturn on-line vehicle swept path software has been used for a B85 vehicle.

Diagram 8.1 – Vehicle reversing from the last customer parking space.

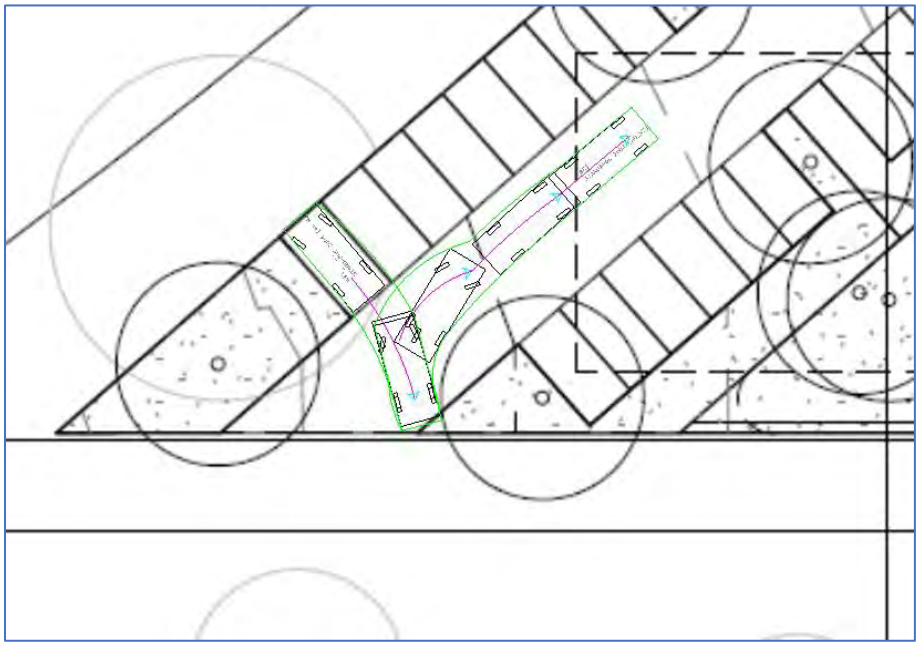
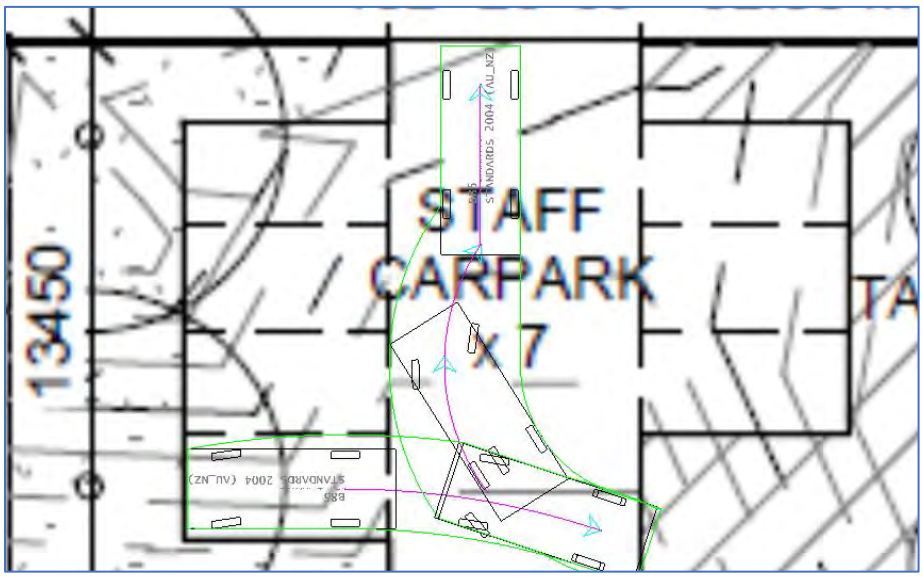


Diagram 8.1A – Vehicle reversing from the last staff parking space.



# 9. Planning scheme

## 9.1. E5.0 Road and Railway Assets Code

E5.5.1 Existing road accesses and junction

This development will intensify traffic movements using the existing shared laneway, by more than 20 percent or 40 vehicle movements per day and therefore must be considered under the performance criteria P3, as the speed limit is 60 km/h.

| Performance criteria | Assessment |
|---|---|
| To ensure that the safety of road and rail infrastructure is not reduced by the creation of new accesses and junctions or increased use of existing accesses and junctions. | |
| a) the increase in traffic caused by the use; | The development of the swim centre will generate additional traffic movements using the Old Forcett Road, with the number of traffic movements expected to be 36 during the peak periods. There is sufficient spare traffic capacity on Old Forcett Road to absorb this increase and current motorists are not expected to be adversely impacted by the new use. |
| b) The nature of the traffic generated by the use; | Light passenger vehicles associated with rural-urban living is expected to be the main vehicle type using this access, these vehicles have good manoeuvrability and are compatible with vehicles operating on the surrounding road network. |
| c) The nature and efficiency of the access or the junction; | Access to the development site will be via an existing shared laneway that is infrequently used and traffic modelling of the increase in traffic movements indicates no adverse safety or transport efficiency issues is expected. The junction is currently operating at the highest level of traffic service for a give way control, and this will not deteriorate with the new development, even allowing for incremental traffic growth over the next ten years. |
| d) The nature and category of the road; | Old Forcett Road within the surrounding street network operates as a collector road. The road characteristics are of a high standard and suitable to accommodate additional traffic movements, as the current traffic flow only occupies 34 percent of the road capacity. |
| e) The speed limit and traffic flow of the road; | The speed limit along Old Forcett Road is posted at 60 km/h and reflects the current level of roadside development and the frequency of side junctions that generate turning traffic movements. The roadside development is well set back from the roadway and this offers excellent forward sight distance to motorists. This reduced speed limit indicates to motorists the need to be aware that vehicles are constantly entering and leaving the roadway, and with the new development using an existing junction, the impact of this new development to current motorists is considered negligible. |
| f) Any alternative access to a road; | While the development site has direct access to the Old Forcett Road, the most practical access arrangement is using the existing shared laneway junction. |

| | |
|---|---|
| g) The need for the use; | The development will provide a new use to the surrounding community that does not exist at the moment. Will eliminate the need for vehicles to travel outside the community seeking this type of use. This use provides a significant benefit to the Sorell municipality. |
| h) Any traffic impact assessment; and | An independent Traffic Impact Assessment found no reason for this access not to proceed as designed. |
| i) Any written advice from the road authority. | Aware of none. |

E5.6.4 Sight Distance at Accesses, Junction and Level Crossings

The development site will utilise an existing shared laneway junction that intersects Old Forcett Road, and available sight distance for motorists using this junction is in excess of 250 metres in all directions.

The planning scheme Safe Intersection Sight Distance for an operating speed of 70 km/h is 130 metres. Therefore, the available sight distance meets the acceptable solution under the planning scheme.

This means drivers accessing the new development will have sufficient sight distance to enter and leave the Old Forcett Road in a safe manner, without causing any adverse traffic impact to existing road users.

## 9.2. E6.0 Parking and Access Code

E6.6.1 Number of parking spaces

The planning scheme specifies that any new use must provide parking spaces that meet the reasonable demand, to prevent overflow of parking on to the public road network. Table E6.1 provides parking requirements for various development use, for a swimming pool not attached to a dwelling, the required number of parking spaces is based on 5.6 spaces per 100 square metres of the site. It is assumed that site means the building size that contains the swimming pool.

The proposed swim centre building is 900 square metres, and this equates for the need of 50 on-site parking spaces for staff and customers.

With the development proposal providing 50 on-site parking spaces, this complies with the acceptable solution under the planning scheme.

E6.6.2 Number of accessible parking spaces

The development proposal will include two accessible parking spaces, this complies with table B1 in the Australian Standards 2890 part 6: Off-street parking for people with disabilities, and complies with the acceptable solution under the planning scheme.

The two accessible spaces will be located in close proximity to the building entrance and a walkway with compliant gradient will be provided.

E6.6.3 Number of motorcycle parking spaces

The planning scheme specifies that any new use must provide motorcycle parking spaces where the number of on-site parking spaces exceeds 19 spaces. With 50 spaces being provided, two motorcycle parking spaces should be provided.

The development will provide for two motorcycle parking spaces and this will comply with the acceptable solution.

E6.6.4 number of bicycle parking spaces and type of bicycle facilities

According to table E6.4, this type of development is not expected to provide any bicycle parking facilities. However, due to its location being within reasonable distance from residential properties, the low speed limit of 60 km/h operating on Old Forcett Road and the wide sealed shoulders, it would be reasonable to expect bicycles could be used as a travel mode. The development proposal will provide a bicycle frame to enable bicycles to be secured on-site.

## 9.3. E6.7 Development standards

| Development standards | | Comment |
|---|---|---|
| 6.7.1 | Number of vehicular accesses; | The development site will create two accesses to the existing shared laneway, one access for on-site customer parking, while the other access will be for staff parking. Segregation of the different parking use is considered appropriate, and the two access is expected to operate safely and not impact traffic efficiency of the current shared laneway. |
| 6.7.2 | Design of the vehicular accesses; | All vehicular accesses will be designed to comply with Austroads Guide to Road Design where applicable and the Australian Standards 2890 part 1. |
| 6.7.3 | Vehicles passing along an access; | Not applicable, as all internal roadways will accommodate two-way traffic flow. |
| 6.7.4 | On-site turning; | All vehicles will be able to enter and leave the development site in a forward driving position. |
| 6.7.5 | Layout of parking areas; | Designed to conform with AS 2890 part 1. |

| | | |
|---|---|---|
| 6.7.6 | Surface of parking areas | All on-site parking areas will be surfaced with a hard wearing surface and each parking space will be clearly marked. |
| 6.7.7 | Lightning of parking areas; | Appropriate security and surveillance lighting of the car park and walkways will be provided. |
| 6.7.8 | Landscaping of parking areas; | The on-site parking spaces will be supplemented with appropriate landscaping to reduce the visual impact to motorists travelling on Old Forcett Road. |
| 6.7.9 | Designed of motorcycle parking spaces; | Motorcycle spaces will be designed to meet AS 2980. |
| 6.7.10 | Design of bicycle facilities; | A bicycle frame will be provided and designed to meet AS 2980. |
| 6.7.11 | Bicycle end of trip facilities; | Not required under table E6.2. |
| 6.7.12 | Siting of car parking; | The car parking spaces will be located adjacent to the road frontage, be segregated from the swimming centre by walkway and the layout is expected to provide safe and convenient level of service for all users. |
| 6.7.13 | Facilities for commercial vehicles; and | Commercial facilities are not considered necessary for this type of use. |
| 6.7.14 | Access to roads. | All accesses will be designed to operate safely and efficiently. |

# 10. Conclusion

From a traffic engineering and road safety perspective, traffic generated by this development use is not expected to create any adverse safety, amenity, or transport efficiency problems, as:

- the amount of traffic generated is considered low, and there if sufficient capacity along Old Forcett Road to absorb the extra traffic movements,
- the development will utilise an existing shared laneway to provide vehicular access to and from the Old Forcett Road; this roadway has sufficient capacity to cater for the additional traffic without impacting current, and future commercial properties using this roadway,
- the current informal BAR treatment on Old Forcett Road at the existing shared laneway junction is expected to be suitable for the increase in traffic movements,
- the existing shared laneway junction with Old Forcett Road is considered suitable to cater for the increase in traffic movements; and the available sight distance at this junction ensure motorists can enter and leave without adversely impacting other road users,
- there will be more than sufficient on-site parking spaces to meet the reasonable demand without causing any overflow parking outside of the development site,
- the existing shared laneway will provide safe and efficient traffic movements to and from the development site.

This Traffic Impact Assessment found no reasons for this development not to proceed.

LEGEND

- Power Pole
- Telstra Pit
- Service Pit Unk
- Boundary Peg
- Survey Mark
- Monitoring Well
- Property Boundary
- Fence
- Drain
- Electric Line Overhead

0 4.0 8.0 12.0 16.0 20.0 metres

SCALE - 1 : 200

OLD FORCETT ROAD

C.T.40340/1000
7164m²

C.T.51598/1
2810m²

C.T.133712/3
2954m²

Possible New Lot Area
3652m²

Petrol / Garage Workshop

Roof

Photo 1

Spk

End of Water Pipe

End of Water Pipe

Headwall Covered over

Disused Water Tank

Shed

irregular post & wire fence ± 50 yrs

post & wire fence ± 50 yrs

post & wire fence ± 50 yrs

POSSIBLE BOUNDARY

POSSIBLE BOUNDARY

POSSIBLE BOUNDARY

RIGHT OF WAY 'X'

RIGHT OF WAY 'Y' (P

RIGHT OF WAY 'Z' (P

DRAINAGE EASEMENT 2.00 WIDE

PHOTO 1 - UNKNOWN SERVICE PIT



NOTES:

This plan and associated digital model is prepared for Luke Doerner from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose.

The title boundaries as shown on this plan were not marked at the time of the survey and have been determined by plan dimensions only and not by field survey. No measurements or offsets are to be derived between the features on this plan and the boundary layer. The relationship between the features in this model and the boundary layers cannot be used for any set out purposes or to confirm the position of the title boundaries on site.
Due to the nature of the title boundary information, if any structures are designed on or near a boundary we would recommend a re-mark survey be completed and lodged with the Land Titles Office to support the boundary definition.

Services shown have been located where visible by field survey. Services denoted as being "Per DBYD only" are approximate and for illustrative purposes only. Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

This note forms an integral part of the Plan/Data. Any reproduction of this plan/model without this note attached will render the information shown invalid.

| REV | AMENDMENTS | DRAWN | DATE | APPR. |
|---|---|---|---|---|
| E | | | | |
| D | | | | |
| C | | | | |
| B | | | | |
| A | | | | |

ROGERSON & BIRCH SURVEYORS
UNIT 1, 2 KENNEDY DRIVE
CAMBRIDGE 7170
PHONE: (03)6248 5898
EMAIL: admin@rbsurveyors.com
WEB: www.rbsurveyors.com

# Contour & Detail Plan

FOR: LUKE DOERNER

LOCATION: 527 OLD FORCETT ROAD
DODGES FERRY

| | | |
|---|---|---|
| Date: 01-05-2020 | Contour interval: 0.25m | Reference: DOERL01 12381-01 |
| Drawn: AH | Scale: 1:200 (A1) | Horizontal Datum: MGA |
| Approved: AB | C.T. Reference: 40340/1000 | Vertical Datum: AHD |

DIAL BEFORE YOU DIG www.1100.com.au
The Essential First Step.

This plan has been prepared only for the purpose of obtaining preliminary subdivsional approval from the local authority and is subject to that approval.

All measurements and areas are subject to the final survey.

Base image by TASMAP (www.tasmap.tas.gov.au), © State of Tasmania
Base data from the LIST (www.thelist.tas.gov.au), © State of Tasmania

OLD FORCETT ROAD

30.24
10.00
43.00
53.58
88.09
122.35
94.44
39.45

Road
C.T.40340/1000
7164m²

C.T.51598/1
No.521 Old Forcett Road

C.T.133712/1
No.523 Old Forcett Road

6.00 RIGHT OF WAY 'X' (PRIVATE) & DRAINAGE EASEMENT 6.00 WIDE
6.00 RIGHT OF WAY 'Y' (PRIVATE) & DRAINAGE EASEMENT 6.00 WIDE
RIGHT OF WAY 'Z' (PRIVATE) 3.00 WIDE

C.T.133712/2
No.525 Old Forcett Road

Disused Water Tank

C.T.133712/3
No.527 Old Forcett Road

**Existing Title**

| REV | AMENDMENTS | DRAWN | DATE | APPR. |
|---|---|---|---|---|
| E | | | | |
| D | | | | |
| C | | | | |
| B | | | | |
| A | | | | |

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UNIT 1, 2 KENNEDY DRIVE
CAMBRIDGE 7170
PHONE: (03)6248 5898
EMAIL: admin@rbsurveyors.com
WEB: www.rbsurveyors.com

| | |
|---|---|
| OWNER: | SORELL COUNCIL |
| TITLE REFERENCE: | C.T.40340/1000 |
| LOCATION: | OLD FORCETT ROAD |
| | **DODGES FERRY** |

# Proposed Subdivision

| | |
|---|---|
| Date: 15-3-2021 | Reference: DOERL01 12381-10 |
| Scale: 1:500 (A3) | Municipality: SORELL |

This plan has been prepared only for the purpose of obtaining preliminary subdivsional approval from the local authority and is subject to that approval.

All measurements and areas are subject to the final survey.

Base image by TASMAP (www.tasmap.tas.gov.au), © State of Tasmania
Base data from the LIST (www.thelist.tas.gov.au), © State of Tasmania

OLD FORCETT ROAD

Road

**2**
2985m²

**1**
4177m²

30.24
10.00
43.00
53.58
12.62
35.19
75.47
32.00
122.35
39.45

**C.T.51598/1**
No.521 Old Forcett Road

**C.T.133712/1**
No.523 Old Forcett Road

6.00 RIGHT OF WAY 'X' (PRIVATE) & DRAINAGE EASEMENT 6.00 WIDE
6.00 RIGHT OF WAY 'Y' (PRIVATE) & DRAINAGE EASEMENT 6.00 WIDE
RIGHT OF WAY 'Z' (PRIVATE) 3.00 WIDE

**C.T.133712/2**
No.525 Old Forcett Road

**C.T.133712/3**
No.527 Old Forcett Road

## Resultant lots

| REV | AMENDMENTS | DRAWN | DATE | APPR. |
|---|---|---|---|---|
| E | | | | |
| D | | | | |
| C | | | | |
| B | | | | |
| A | | | | |

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UNIT 1, 2 KENNEDY DRIVE
CAMBRIDGE 7170
PHONE: (03)6248 5898
EMAIL: admin@rbsurveyors.com
WEB: www.rbsurveyors.com

OWNER: SORELL COUNCIL
TITLE REFERENCE: C.T.40340/1000
LOCATION: OLD FORCETT ROAD
**DODGES FERRY**

# Proposed Subdivision

Date: 15-3-2021
Reference: DOERL01 12381-10
Scale: 1:500 (A3)
Municipality: SORELL

# ON-SITE WASTEWATER ASSESSMENT

***Proposed Swimming Centre***

***Dodges Ferry***

***June 2021***

GES

GEO-ENVIRONMENTAL

SOLUTIONS

Disclaimer: The author does not warrant the information contained in this document is free from errors or omissions. The author shall not in any way be liable for any loss, damage or injury suffered by the User consequent upon, or incidental to, the existence of errors in the information.

*Geo-Environmental Solutions P/L 29 Kirksway Place, Battery Point 7004. Ph 6223 1839*

## Introduction

**Client:** Luke Doener
**Date of inspection:** 12/6/21
**Location:** Lot 1000 Old Forcett Rd, Dodges Ferry (CT 40340/1000)
**Land description:** Approx. 7000m$^2$ lot
**Building type:** Proposed swimming centre
**Investigation:** AMS PowerProbe
**Inspected by:** A. Plummer

## Background Information

**Map:** Mineral Resources Tasmania, Carlton Sheet 1:25 000
**Rock type:** Quaternary sand deposits overlying Triassic sandstone
**Soil depth:** Approx. 1.2 – 2.4m
**Planning overlay:** Bushfire Prone Area
**Local meteorology:** Annual rainfall approx. 550 mm
**Local services:** Tank water with onsite wastewater disposal

## Site Conditions

**Slope and aspect:** Approx. 3% slope to the South West
**Site drainage:** Well drained
**Vegetation:** Mixed grass sp
**Weather conditions:** Cloudy, approx. 10mm rainfall received in preceding 7 days.
**Ground surface:** Sandy surface conditions

## Investigation

A number of excavations were completed to identify the distribution of, and variation in soil materials on the site. Representative excavations were taken at the approximate locations indicated on the site plan and were chosen for testing and classification according to AS1547-2012 (see profile summaries).

## Profile Summaries

| Hole 1 Depth (m) | Hole 2 Depth (m) | Horizon | Description |
|---|---|---|---|
| 0.00 – 0.20 | 0.00 – 0.30 | A1 | Grey **SAND (SP)**, single grained, dry, loose consistency, clear boundary to |
| 0.20 – 0.50 | 0.30 – 0.60 | A2 | Pale Grey **SILTY SAND (SM)**, single grained, dry, medium dense consistency, clear boundary to |
| 0.50 – 1.0 | 0.60 – 1.40 | B2 | Pale Yellowish Brown and Grey **SANDY CLAY (CL)**, slightly moist, very stiff consistency, gradual boundary to |
| 1.0 – 1.20 | 1.40 – 2.40 | BC | Yellowish Brown **CLAYEY SILT (SM)**, dry, medium dense to dense consistency, grading to extremely weathered rock, refusal on assumed bedrock. |

## Soil Profile Notes

The soils on the site have developed from Triassic sediments and consist of sands overlying clayey sand subsoils. The soil has high permeability but low nutrient retention capability for onsite wastewater disposal.

## Wastewater Classification & Recommendations

According to AS1547-2012 (on-site waste-water management) the natural soil is classified as **Sandy Loam (category 2)**. Due to the limited soil depth onsite, any wastewater application will need to involve secondary treatment of effluent. It is proposed to achieve this via a commercial packaged treatment system (e.g. AWTS such as Econocylce, Envirocycle, Ozzikleen etc) with effluent applied through subsurface irrigation. A Design Irrigation Rate (DIR) of 5mm/day has therefore been applied.

The proposed swimming centre has a calculated maximum wastewater loading of 600L/day based upon the following projected occupancy and loading figures.

- Estimated staff – 5 @ 20L/day
- Estimated public – approximately 160@50L/day
- Estimated loading 8100L/day

- It is recommended that allowance be made for contingency in the system design for a hydraulic capacity of up to 10KL/day and BOD treatment capacity of 2.5kg/day.

It is worth noting that the capacity of the system is based upon peak occupancy 7 days per week and as such should be viewed as a current conservative estimate of actual average daily loadings. The loading for the public includes allowance fuse of showers and toilets on site plus limited food service for packed food drinks and coffees. Whilst there are no plans for hot food cooking and service on site a small commercial grease trap (i.e. 500L) is recommended on the kitchen outlet (unless sufficient additional primary retention is available in the system).

Using the DIR of 5mm/day, an irrigation area of at 2000m$^2$ would be required for up to 10KL/day of flows. This may be installed as subsurface irrigation under grass or other landscape vegetation. A diversion drain will be required upslope of the application area and a 100% reserve area will need to be set aside and kept free from development for any future wastewater requirements. If space is to be conserved on site, then an absorption bed design could be utilised, and a DLR of 40L/m$^2$/day and an absorption area of 250m$^2$ would be appropriate. Due to the sand overlying sandy clays any absorption system would require careful design to ensure adequate soil absorption and a semi-raised design with additional topsoil would be recommended.

The following setback distances are required to comply with both E23 of the Sorell Interim Planning Scheme 2015 and Building Act 2016:

| | |
|---|---|
| Upslope or level buildings: | 3m |
| Downslope buildings: | 2.5m |
| Upslope or level boundaries: | 1.5m |
| Downslope boundaries: | 3.5m |
| Downslope surface water: | 25m |

Compliance with Building Act 2016 Guidelines for On-site Wastewater Management Systems is outlined in the attached table. Compliance with E23 of the Sorell Interim Planning Scheme 2015 is demonstrated below.

**A1** *Horizontal separation distance from a building to a land application area must comply with one of the following:*

| | |
|---|---|
| (a) be no less than 6m; | Non-compliance |
| (b) be no less than;<br>(i) 2m from an upslope or level building;<br>(ii) if primary treated effluent be no less than 4m plus 1m for every degree of average gradient from a downslope building;<br>(iii) if secondary treated effluent and subsurface application, no less than 2m plus 0.25m for every degree of average gradient from a down slope building. | <br>Complies<br><br><br><br>Complies<br>2.5m required |

**A2** *Horizontal separation distance from downslope surface water to a land application area must comply with any of the following:*

| | |
|---|---|
| (a) be no less than 100m; | |
| (b) if the site is within a high rainfall area or the site soil category is 4, 5 or 6, be no less than the following;<br>(i) if primary treated effluent standard or surface application, 50m plus 7m for every degree of average gradient from downslope surface water;<br>(ii) if secondary treated effluent standard and subsurface application, 50m plus 2m for every degree of average gradient from down slope surface water. | N/A |
| (c) if the site is not within a high rainfall area or the site soil category is not 4, 5 or 6, be no less than the following;<br>(i) if primary treated effluent 15m plus 7m for every degree of average gradient from downslope surface water;<br>(ii) if secondary treated effluent and subsurface application, 15m plus 2m for every degree of average gradient from down slope surface water. | <br><br><br><br>Complies<br>25m required |

**A3** *Horizontal separation distance from a property boundary to a land application area must comply with either of the following:*

| | |
|---|---|
| (a) be no less than 40m from a property boundary; | Non-compliance |
| (b) be no less than:<br>(i) 1.5m from an upslope or level property boundary; and<br>(ii) if primary treated effluent 2m for every degree of average gradient from a downslope property boundary; or<br>(iii) if secondary treated effluent and subsurface application, 1.5m plus 1m for every degree of average gradient from a downslope property boundary. | <br>Complies<br><br><br>Complies<br>3.5m required |

**A4**

| | |
|---|---|
| Horizontal separation distance from a downslope bore, well or similar water supply to a land application area must be no less than 50m. | Complies |

**A5**

| | |
|---|---|
| Vertical separation distance between groundwater and a land application area must be no less than 1.5m. | Complies |

**P6** *Vertical separation distance between a limiting layer and a land application area must satisfy all of the following:*

| | |
|---|---|
| (a) effluent must be no less than secondary treated effluent standard and applied through a subsurface land application system; | Complies |
| (b) vertical separation distance must be no less than 0.5m, (whether 'in ground' or by use of a raised bed). | Complies |

**A7** *The arrangement of a land application area must comply with both of the following:*

| | |
|---|---|
| (a) not include areas beneath buildings, driveways or other hard stand areas; | Complies |
| (b) have a minimum horizontal dimension of 3m. | Complies |

## Conclusions

The final wastewater system layout and commercial system design must be certified with a form 35 and/or form 55 prior to application for building and plumbing permits. The system sizing information in this report can be utilised as the basis for the commercial system design, and the site and soil evaluation with appropriate setbacks utilised to complete the final site plans. It must be noted that the system does not include any allowance for pool backwash or other storm water entering the system, and this must be managed separately.

It is recommended GES be notified on any variation to the site conditions or wastewater loading as outlined in this report.



Dr John Paul Cumming B.Agr.Sc (hons) PhD CPSS GAICD
*Environmental and Engineering Soil Scientist*

**GES P/L**

Land suitability and system sizing for on-site wastewater management

Trench 3.0 (Australian Institute of Environmental Health)

# Assessment Report

## Site assessment for on-site waste water disposal

| | | | |
|---|---|---|---|
| Assessment for | Luke Doerner | Assess. Date | 18-Jun-21 |
| | | Ref. No. | |
| Assessed site(s) | Lot 1000 Old Forcett Road | Site(s) inspected | 12-Jun-21 |
| Local authority | Sorell | Assessed by | John Paul Cumming |

This report summarises wastewater volumes, climatic inputs for the site, soil characteristics and sustem sizing and design issues. Site Capability and Environmental sensitivity issues are reported separately, where 'Alert' columns flag factors with high (A) or very high (AA) limitations which probably require special consideration for system design(s). Blank spaces on this page indicate data have not been entered into TRENCH.

**Wastewater Characteristics**

Wastewater volume (L/day) used for this assessment = 8,100 (using a method independent of the no. of bedrooms)
Septic tank wastewater volume (L/day) = 2,100
Sullage volume (L/day) = 6,000
Total nitrogen (kg/year) generated by wastewater = 22.4
Total phosphorus (kg/year) generated by wastewater = 16.3

**Climatic assumptions for site** (Evapotranspiration calculated using the crop factor method)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean rainfall (mm) | 41 | 36 | 36 | 45 | 36 | 29 | 46 | 47 | 40 | 48 | 44 | 56 |
| Adopted rainfall (R, mm) | 41 | 36 | 36 | 45 | 36 | 29 | 46 | 47 | 40 | 48 | 44 | 56 |
| Retained rain (Rr, mm) | 37 | 32 | 32 | 41 | 32 | 26 | 41 | 42 | 36 | 43 | 40 | 50 |
| Max. daily temp. (deg. C) | | | | | | | | | | | | |
| Evapotrans (ET, mm) | 130 | 110 | 91 | 63 | 42 | 29 | 32 | 42 | 63 | 84 | 105 | 126 |
| Evapotr. less rain (mm) | **93** | **78** | **59** | **23** | **10** | **3** | **-10** | **0** | **27** | **41** | **65** | **76** |

Annual evapotranspiration less retained rain (mm) = 463

**Soil characterisitics**

Texture = Sandy Loam Category = 2 Thick. (m) = 1.4
Adopted permeability (m/day) = 3 Adopted LTAR (L/sq m/day) = 5 Min depth (m) to water = 5

**Proposed disposal and treatment methods**

| | |
|---|---|
| Proportion of wastewater to be retained on site: | All wastewater will be disposed of on the site |
| The preferred method of on-site primary treatment: | In a package treatment plant |
| The preferred method of on-site secondary treatment: | In-ground |
| The preferred type of in-ground secondary treatment: | None |
| The preferred type of above-ground secondary treatment: | Trickle irrigation |
| Site modifications or specific designs: | Not needed |

**Suggested dimensions for on-site secondary treatment system**

| | |
|---|---|
| Total length (m) = | 200 |
| Width (m) = | 10 |
| Depth (m) = | 0.15 |
| Total disposal area (sq m) required = | 2000 |
| comprising a Primary Area (sq m) of: | 2,000 |
| and a Secondary (backup) Area (sq m) of: | |

Sufficient area is available on site

To enter comments, click on the line below 'Comments'. (This yellow-shaded box and the buttons on this page will not be printed.)

Comments

The calculated DIR for secondary treated effluent is 5mm/day requiring an irrigation area of at least 2000m2. Therefore the system will have the capacity to cope with predicted climatic and loading events.

**GES P/L**

Land suitability and system sizing for on-site wastewater management

Trench 3.0 (Australian Institute of Environmental Health)

# Site Capability Report

## Site assessment for on-site waste water disposal

| | | | |
|---|---|---|---|
| Assessment for | Luke Doerner | Assess. Date | 18-Jun-21 |
| | | Ref. No. | |
| Assessed site(s) | Lot 1000 Old Forcett Road | Site(s) inspected | 12-Jun-21 |
| Local authority | Sorell | Assessed by | John Paul Cumming |

This report summarises data relating to the physical capability of the assessed site(s) to accept wastewater. Environmental sensitivity and system design issues are reported separately. The 'Alert' column flags factors with high (A) or very high (AA) site limitations which probably require special consideration in site acceptability or for system design(s). Blank spaces indicate data have not been entered into TRENCH.

| Alert | Factor | Units | Value | Confid level | Limitation Trench | Limitation Amended | Remarks |
|---|---|---|---|---|---|---|---|
| | Expected design area | sq m | 3,000 | V. high | Very low | Moderate | |
| | Density of disposal systems | /sq km | 10 | Mod. | Very low | | |
| | Slope angle | degrees | 2 | High | Very low | | |
| | Slope form | Straight simple | | High | Low | | |
| | Surface drainage | Mod. good | | High | Low | | |
| | Flood potential | Site floods <1:100 yrs | | High | Very low | | |
| | Heavy rain events | Infrequent | | High | Moderate | | |
| AA | Aspect (Southern hemi.) | Faces S | | V. high | Very high | | |
| | Frequency of strong winds | Common | | High | Low | | |
| | Wastewater volume | L/day | 8,100 | High | Very high | Moderate | Other factors lessen impact |
| | SAR of septic tank effluent | | 1.7 | High | Low | | |
| | SAR of sullage | | 2.6 | High | Moderate | | |
| | Soil thickness | m | 1.4 | V. high | Very low | | |
| | Depth to bedrock | m | 2.4 | V. high | Very low | | |
| | Surface rock outcrop | % | 0 | V. high | Very low | | |
| | Cobbles in soil | % | 0 | V. high | Very low | | |
| | Soil pH | | 5.5 | High | Low | | |
| | Soil bulk density | gm/cub. cm | 1.4 | High | Very low | | |
| | Soil dispersion | Emerson No. | 8 | V. high | Very low | | |
| | Adopted permeability | m/day | 3 | Mod. | Very high | Moderate | Other factors lessen impact |
| | Long Term Accept. Rate | L/day/sq m | 5 | High | Moderate | No change | |

To enter comments, click on the line below 'Comments' . (This yellow-shaded box and the buttons on this page will not be printed.)

Comments

The site has the capability to accept onsite wastewater.

**GES P/L**

Land suitability and system sizing for on-site wastewater management

Trench 3.0 (Australian Institute of Environmental Health)

# Environmental Sensitivity Report

## Site assessment for on-site waste water disposal

| | | | |
|---|---|---|---|
| Assessment for | Luke Doerner | Assess. Date | 18-Jun-21 |
| | | Ref. No. | |
| Assessed site(s) | Lot 1000 Old Forcett Road | Site(s) inspected | 12-Jun-21 |
| Local authority | Sorell | Assessed by | John Paul Cumming |

This report summarises data relating to the environmental sensitivity of the assessed site(s) in relation to applied wastewater. Physica capability and system design issues are reported separately. The 'Alert' column flags factors with high (A) or very high (AA) limitations which probably require special consideration in site acceptability or for system design(s). Blank spaces indicate data have not been entered into TRENCH.

| Alert | Factor | Units | Value | Confid level | Limitation Trench | Limitation Amended | Remarks |
|---|---|---|---|---|---|---|---|
| A | Cation exchange capacity | mmol/100g | 45 | High | High | | |
| A | Phos. adsorp. capacity | kg/cub m | 0.4 | High | High | | |
| | Annual rainfall excess | mm | -463 | High | Very low | | |
| | Min. depth to water table | m | 5 | High | Very low | | |
| AA | Annual nutrient load | kg | 38.8 | High | Very high | | |
| | G'water environ. value | Agric non-sensit | | V. high | Low | | |
| | Min. separation dist. required | m | 3 | High | Very low | | |
| | Risk to adjacent bores | Very low | | V. high | Very low | | |
| | Surf. water env. value | Agric non-sensit | | V. high | Low | | |
| | Dist. to nearest surface water | m | 200 | V. high | Moderate | | |
| | Dist. to nearest other feature | m | 50 | V. high | Moderate | No change | |
| | Risk of slope instability | Very low | | V. high | Very low | | |
| | Distance to landslip | m | 500 | V. high | Very low | | |

To enter comments, click on the line below 'Comments'. (This yellow-shaded box and the buttons on this page will not be printed.)

Comments

Demonstration of wastewater system compliance to *Building Act 2016 Guidelines for On-site Wastewater Disposal*

| **Acceptable Solutions** | **Performance Criteria** | **Compliance** |
|---|---|---|
| A1<br>Horizontal separation distance from a building to a land application area must comply with one of the following:<br>a) be no less than 6m; or<br>b) be no less than:<br>(i) 3m from an upslope building or level building;<br>(ii) If primary treated effluent to be no less than 4m plus 1m for every degree of average gradient from a downslope building;<br>(iii) If secondary treated effluent and subsurface application, no less than 2m plus 0.25m for every degree of average gradient from a downslope building. | P1<br>a) The land application area is located so that<br>(i) the risk of wastewater reducing the bearing capacity of a building's foundations is acceptably low.; and<br>(ii) is setback a sufficient distance from a downslope excavation around or under a building to prevent inadequately treated wastewater seeping out of that excavation | Complies with A1 (b) (i)<br>Land application area will be located with a minimum separation distance of 3m from an upslope or level building. |
| A2<br>Horizontal separation distance from downslope surface water to a land application area must comply with (a) or (b)<br>(a) be no less than 100m; or<br>(b) be no less than the following:<br>(i) if primary treated effluent 15m plus 7m for every degree of average gradient to downslope surface water; or<br>(ii) if secondary treated effluent and subsurface application, 15m plus 2m for every degree of average gradient to down slope surface water. | P2<br>Horizontal separation distance from downslope surface water to a land application area must comply with all of the following:<br>a) Setbacks must be consistent with AS/NZS 1547 Appendix R;<br>b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable. | Complies with A2 (b) (ii)<br>Land application area will be located with a minimum separation distance of 25m of downslope surface water |

| | | |
|---|---|---|
| A3<br><br>Horizontal separation distance from a property boundary to a land application area must comply with either of the following:<br><br>(a) be no less than 40m from a property boundary; or<br><br>(b) be no less than:<br><br>(i) 1.5m from an upslope or level property boundary; and<br><br>(ii) If primary treated effluent 2m for every degree of average gradient from a downslope property boundary; or<br><br>(iii) If secondary treated effluent and subsurface application, 1.5m plus 1m for every degree of average gradient from a downslope property boundary. | P3<br><br>Horizontal separation distance from a property boundary to a land application area must comply with all of the following:<br><br>(a) Setback must be consistent with AS/NZS 1547 Appendix R; and<br><br>(b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable. | Complies with A3 (b) (i)<br>Land application area will be located with a minimum separation distance of 1.5m from an upslope or level property boundary<br><br>Complies with A3 (b) (iii)<br>Land application area will be located with a minimum separation distance of 3.5m of downslope property boundary |
| A4<br><br>Horizontal separation distance from a downslope bore, well or similar water supply to a land application area must be no less than 50m and not be within the zone of influence of the bore whether up or down gradient. | P4<br><br>Horizontal separation distance from a downslope bore, well or similar water supply to a land application area must comply with all of the following:<br><br>(a) Setback must be consistent with AS/NZS 1547 Appendix R; and<br><br>(b) A risk assessment completed in accordance with Appendix A of AS/NZS 1547 demonstrates that the risk is acceptable | Complies with A4<br>No bore or well identified within 50m |

| | | |
|---|---|---|
| A5<br>Vertical separation distance between groundwater and a land application area must be no less than:<br>(a) 1.5m if primary treated effluent; or<br>(b) 0.6m if secondary treated effluent | P5<br>Vertical separation distance between groundwater and a land application area must comply with the following:<br>(a) Setback must be consistent with AS/NZS 1547 Appendix R; and<br>(b) A risk assessment completed in accordance with Appendix A of AS/NZS 1547 that demonstrates that the risk is acceptable | Complies with A5 (b)<br>No groundwater encountered |
| A6<br>Vertical separation distance between a limiting layer and a land application area must be no less than:<br>(a) 1.5m if primary treated effluent; or<br>(b) 0.5m if secondary treated effluent | P6<br>Vertical setback must be consistent with AS/NZS1547 Appendix R. | Complies with A6 (b) |
| A7<br>nil | P7<br>A wastewater treatment unit must be located a sufficient distance from buildings or neighbouring properties so that emissions (odour, noise or aerosols) from the unit do not create an environmental nuisance to the residents of those properties | Complies |

# AS1547:2012 – Loading Certificate – AWTS Design

This loading certificate sets out the design criteria and the limitations associated with use of the system.

**Site Address:** Lot 1000 Old Forcett Rd, Dodges Ferry

**System Capacity:** 10KL and 2.5Kg BOD per day

**Summary of Design Criteria**

**DIR:** 40mm/day.

**Irrigation area:** Modified raised bed - 250m$^2$

**Reserve area location /use:** Not assigned – more than 100% available

**Water saving features fitted:** Standard fixtures

**Allowable variation from design flows:** 1 event @ 200% daily loading per quarter

**Typical loading change consequences:** Expected to be minimal due to use of AWTS and large land area

**Overloading consequences:** Continued overloading may cause hydraulic failure of the irrigation area and require upgrading/extension of the area. Risk considered acceptable due to monitoring through quarterly maintenance reports.

**Underloading consequences:** Lower than expected flows will have minimal consequences on system operation unless the house has long periods of non occupation. Under such circumstances additional maintenance of the system may be required. Long term under loading of the system may also result in vegetation die off in the irrigation areas and additional watering may be required. Risk considered acceptable due to monitoring through quarterly maintenance reports.

**Lack of maintenance / monitoring consequences:** Issues of underloading/overloading and condition of the irrigation area require monitoring and maintenance, if not completed system failure may result in unacceptable health and environmental risks. Monitoring and regulation by the permit authority required to ensure compliance.

**Other considerations:** Owners/occupiers must be made aware of the operational requirements and limitations of the system by the installer/maintenance contractor.

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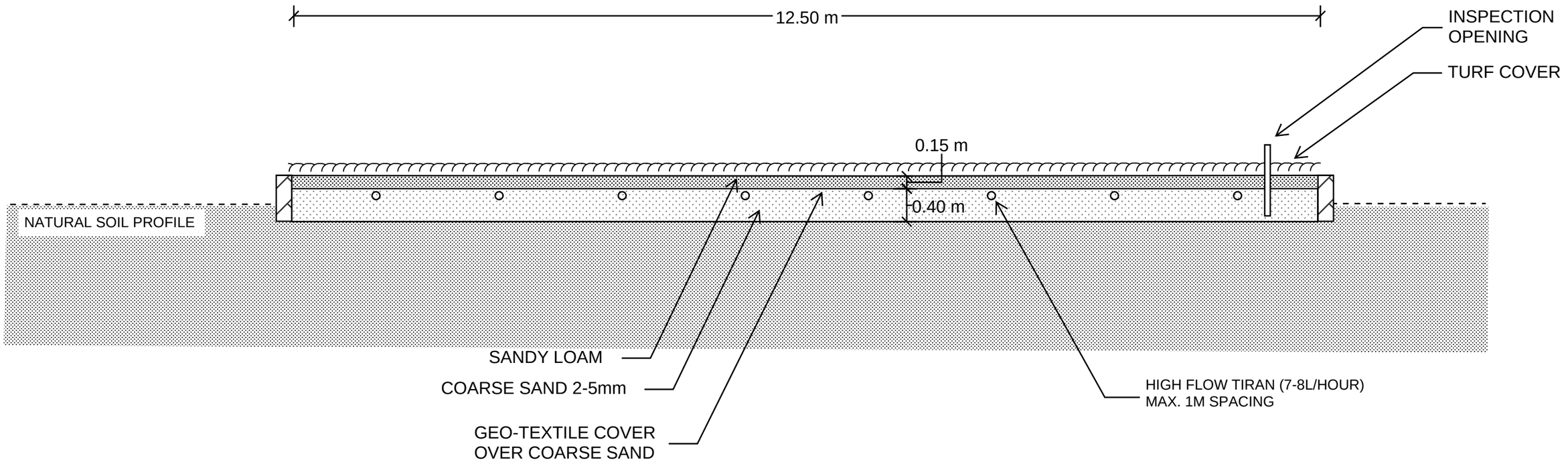
SOLUTIONS
29 Kirksway Place, Battery Point
T| 62231839 E| office@geosolutions.net.au




| | | | | | |
|---|---|---|---|---|---|
| Do not scale from these drawings. Dimensions to take precedence over scale. | | | | On-site Wastewater Cross-Section | Sheet 1 of 2 |

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29 Kirksway Place, Battery Point
T| 6223 1839 E| office@geosolutions.net.au

**Design notes:**

1.Absorption bed dimensions of up to 20m long by 0.60m deep by 12.5m wide.

2. Base of bed to be excavated level min. 200mm into natural soils and smearing and compaction avoided.

3. Lower 450mm of bed to be filled with 2-5mm coarse sand

4. Geotextile or filter cloth to be placed over the coarse sand to prevent clogging of the pipes and aggregate

5. Poly pressure lines (High flow Tiran pipes) to be used and remainder of the bed backfilled with suitable sandy loam

6. Manufacturer's recommendations for spacing of lateral irrigation lines should be followed (eg Netafim Unibioline Tiran with 7-8L/min flow) with max spacing distance of 1m

7. Final finished surface with sandy loam from on site to be 150mm above natural surface to allow for settlement with turf cover or mulch with appropriate vegetation (i.e native grasses and small shrubs at 1 plant per $1m^2$)

8. The turf or vegetation is an essential component of the system and must be maintained with regular mowing and or trimming as appropriate

9. Cut-off drain recommended up slope of large areas which may be subject to surface water flows

10. Dependant upon treatment system a 200µm filter may be installed at the pumping chamber outlet, but a 100-120µm inline disc filter should be installed prior to discharge into the irrigation area

11. A vacuum breaker valve must be installed at the highest point of each absorption zone in a marked and protected valve control box

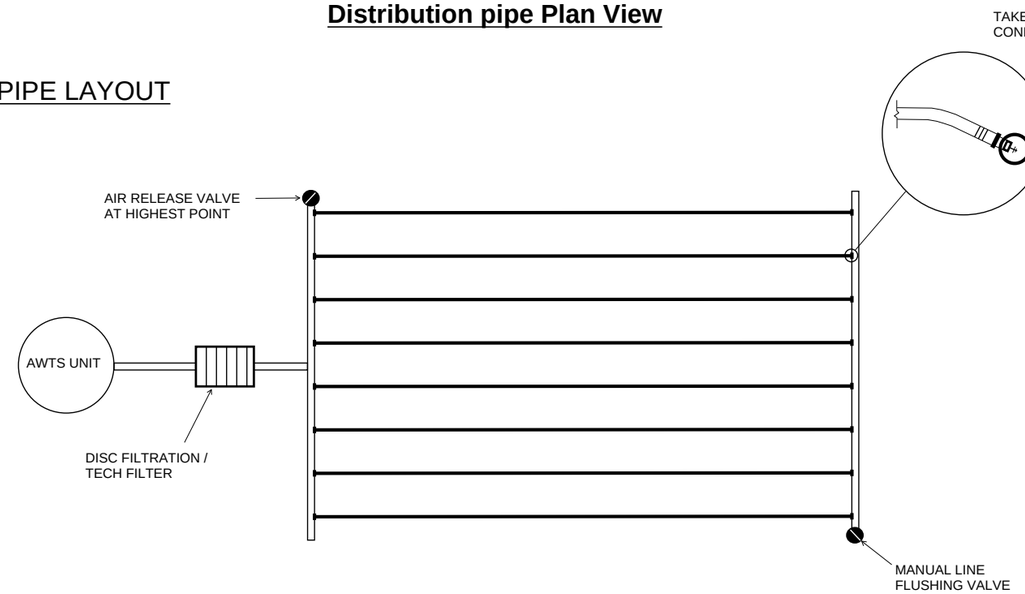
12. A flush line must be installed at the lowest point/bottom of each absorption area with a return valve for flushing back into the treatment chamber of the system, (not into the primary chamber as it may effect the performance of the microbial community) or to a dedicated absorption trench

13 The minimum irrigation pumping capacity should be equivalent to 120kpa (i.e. 12m of head) at the highest point of the irrigation area (a gauge should be placed at the vacuum breaker) - therefore pump size can be match on site to the irrigation pipe size and design.

14.All works on site to comply with AS3500 and Tasmanian Plumbing code.

**Distribution pipe Plan View**

BED PLAN PIPE LAYOUT




| | | | | | |
|---|---|---|---|---|---|
| Do not scale from these drawings. Dimensions to take precedence over scale. | | | | On-site Wastewater Design Notes | Sheet 2 of 2 |

538 OLD FORCETT ROAD

521 OLD FORCETT ROAD

C.T.51598/1

2810m²

OLD FORCETT ROAD

UNNAMED ROAD

Proposed Site Boundary
119° 36' 01" 35.21 m

Proposed Site Boundary
102° 28' 59" 32.00 m

Proposed Site Boundary
61° 11' 05" 75.47 m

22566

OUTDOOR PLAY AREA

15750

13450

STAFF CARPARK x 6

TANKS/SERVICE AREA

CARPARK
42 + 2 DDA

SINGLE STOREY INDOOR POOL

reserve area

min 2.5m

17000

min 3.5m

2809

282° 28' 59" 122.35 m
Proposed Site Boundary

192° 28' 59" 39.45 m
Proposed Site Boundary

C.T.133712/3

2954m²

527 OLD FORCETT ROAD

cut off drain upslope of absorption area

EXISTING SITE BOUNDARY 43m

EXISTING SITE BOUNDARY 53m

EXISTING SITE BOUNDARY 6m

EXISTING SITE BOUNDARY 52.63m

EXISTING SITE BOUNDARY 75m

EXISTING SITE BOUNDARY 6m

EXISTING SITE BOUNDARY 74.99m

EXISTING SITE BOUNDARY 74.94m

UNNAMED ROAD

EXTERNAL LIGHTS IN CAR PARK TO COMPLY TO AUSTRALIAN STANDARDS

DOTTED LINE INDICATES EXTENT OF WASTE WATER DISPOSAL SYSTEM LOCATED BELOW GROUND

**Wastewater system:**

Commercial AWTS unit

Modified raised bed
200m² (eg 20m x 12.5m)
plus reserve area

Refer to GES report

Min 1.5 up slope & side boundaries
Min 3.5m down slope boundary
Min 2.5m building

GES GEO-ENVIRONMENTAL SOLUTIONS

NAAU
36 Cobden St
North Melbourne VIC 3051
+61 3 8609 1008
www.naaustudio.com
hello@naaustudio.com

DODGES FERRY POOL

Proposed Site & Context Plan

Scale 1 : 500 @A3
17/03/21

AllUrbanPlanning PTY LTD

13 October 2021

John Molnar
Senior Planner
Sorell Council
PO Box 126
SORELL 7172

Dear John

**FURTHER INFORMATION DA 2021 / 114 – 1 - SWIMMING POOL AT LOT 1000 OLD FORCETT ROAD, DODGES FERRY (CT 1000/40340)**

I refer to your request for further information 26 July regarding the above and respond in relation to each point as follows:

**Environmental Health**

1. Demonstrate Compliance with E23.8.1– On-Site Wastewater Management Code of the Sorell Interim Planning Scheme 2015 by providing a plan indicating the location of the wastewater land application area which is consistent with the Onsite Wastewater Assessment report.

The attached amended site plan includes an alternate on-site waste water treatment system recommended by GES that includes wastewater treatment tanks and a 250m$^2$ below ground absorption bed area.

2. Demonstrating that the proposed pool and associated building design is consistent with the recommendations in Clause 15 of the Environmental Site Assessment Report.

The accompanying amended architectural drawings include sections that confirm that the proposed building and pool excavation are consistent with the recommendations contained within Section 15 of the GES ESA report, April 2021. Specifically:

- The floor level of the building is designed above ground level on fill
- the proposed excavation does not exceed 2.5m below ground surface level
- an impermeable membrane will be provided below the building to mitigate indoor vapor risk

**Plumbing**

3. Please provide a stormwater (SW) drainage plan to show rainwater tanks including the overflow method from rainwater tanks to approved SW system.

The proposed stormwater drainage proposal is shown on Aldanmark's attached drawings.

4. Please provide a SW drainage plan to show a stormwater filtration system to ensure all stormwater leaving the site meets the acceptable stormwater quality and quantity targets in the table E7.1 of the Sorell Interim Planning Scheme 2015, as follows:

    - 80% reduction in the average annual load of total suspended solids;
    - 45% reduction in the average annual load of total phosphorus;
    - 45% reduction in the average annual load of total nitrogen.

The proposed water filtration concept for the pool including dosing tanks has been prepared by ASC Engineers and is attached.

**Planning**

5. Please provide details / plan of the proposed external lighting.

The accompanying ASC Engineering drawings confirm that the carpark will include external lighting to comply with Australian Standards.

6. Please provide details of any outdoor storage area including garbage bins. What is intended for the "tanks service area"?

The amended site plan shows a wheelie bin storage area adjacent to staff carpark and proposed water storage and waste water treatment tanks.

7. Please provide details of any proposed cut and or fill including the range of depth for the pool.

The attached section drawings show the proposed cut and fill relative to natural ground level.

8. Please provide specific details of is intended for the "roof top service area" which is referenced on plan named "Proposed roof plan"

The amended plans confirm that there is no rooftop plant. Plant areas are to be included within the basement and internal mezzanine area as shown on the architectural drawings and ASC Engineering drawings.

9. Provide further details for the proposed signage. Confirm that the proposal is limited to one sign as shown on Western elevation. If so provide more details as to whether illuminated, colours, lettering. If other signage proposed then provide details.

The proposed signage details are shown on the amended plans. A new 5.9m x 1m non illuminated wall sign is proposed on the western side of the proposed fence adjacent to the carpark. A 600mm (H) x 1.5m (W) backlit logo is proposed at the top of the northern elevation of the building.

Both signs are best described as Wall Signs under the Signs Code and are Discretionary in the Utilities Zone under Table E17.3.

The signs directly relate to the swim school use and do not involve flashing lights or illumination within 30m of the closest residential use on the opposite side of Old Forcett Road. The signage therefore complies with A2,A3 and A4 of the Use Standards for Signs under E17.6.1.

The proposed discretionary signs are to be assessed under E17.7.1 P1. In my assessment the proposed signs satisfy these performance criteria in that their design is integrated into the design of the swim school building, wont dominate the building or streetscape, will be of high quality materials, will not repeat the message or impact on the amenity of nearby properties.

For similar reasons the two different wall signs satisfy P2 of E17.7.1.

The signs will not obscure or resemble a statutory sign and comply with A3 and A4 of E17.7.1

Having regard to the above the signs are considered acceptable under the Signs Code.

10. Please provide more details as to the proposed mechanical equipment for the pool and in particular noise emissions. You have stated in your response to clause 28.3.2 Noise *"Subject to appropriate installation of the mechanical equipment for the pool, the proposed use will not involve significant noise emissions and will not exceed these limits"*. More details are required.

The accompanying ASC Engineering drawings detail the proposed mechanical plant concept for the pool. These areas are to be enclosed within (and under the building) to avoid amenity impacts to sensitive uses.

**Engineering**

11. Provide an updated car parking plan as per the Sorell Interim Planning Scheme 2015 ("the scheme") showing the following:
    a. E6.6.2 – location of the 2 required accessibility parking spaces;
    b. E6.6.3 and E6.7.9 – location of the 2 required motorcycle parking spaces;
    c. E6.6.4 and E6.7.10 – location of the bicycle rack as recommended by the TIA;
    d. E6.7.6 – dimensions of the parking spaces and vehicular circulation areas.

The amended site plan shows:

a) 2 DDA accessible carparking spaces
b) 2 motorcycle spaces
c) 5 bike racks adjacent to the pedestrian entry ramp
d) Dimensioned carparking spaces and vehicular circulation areas

12. Provide details of a lighting design, including location and type of lights provided, that is compliant with AS1158.1:2005 and E6.7.7 of the scheme.

The ASC Engineering plans show the proposed carpark lighting concept to comply with Australian Standards.

13. Provide details on the proposed stormwater drainage for the access roadway – showing any required culverts or roadside table drains on the site plan as per E6.7.2 and E6.7.14 of the scheme.

The Aldanmark drawings show the proposed stormwater design

I would be pleased to discuss as necessary.

Yours sincerely



Frazer Read
**Principal**
All Urban Planning Pty Ltd

# DODGES FERRY POOL
## DEVELOPMENT APPLICATION PERMIT SET
## OCTOBER 2021

Southern Beaches Learn to Swim

| ID | DRAWING | REV. |
|---|---|---|
| 00 | Cover Sheet | |
| 01 | Existing Site & Context Plan | |
| 02 | Proposed Site & Context Plan | |
| 10 | Proposed Ground Level Plan | |
| 11 | Proposed Roof Plan | |
| 12 | Proposed Plant Rooms | |
| 14 | Proposed Landscape Plan | |
| 20 | Proposed Elevations | |
| 25 | Proposed Sections | |
| 30 | Proposed Material Palette | |
| 40 | Signage Details | |

DEVELOPMENT AREA SUMMARY

| ITEM | AREA | % OF SITE AREA |
|---|---|---|
| SITE AREA | 535 m² | |
| SITE COVER | 61 m² | CALCULATE |
| GARDEN AREA | 225 m² | |

538 OLD FORCETT ROAD

OLD FORCETT ROAD

UNNAMED ROAD

521 OLD FORCETT ROAD

C.T.51598/1

2810m²

EXISTING SITE BOUNDARY 43m

EXISTING SITE BOUNDARY 53m

EXISTING SITE BOUNDARY 6m

EXISTING SITE BOUNDARY 52.63m

EXISTING SITE BOUNDARY 75m

EXISTING SITE BOUNDARY 6m

EXISTING SITE BOUNDARY 74.99m

C.T.133712/3

2954m²

527 OLD FORCETT ROAD

EXISTING SITE BOUNDARY 74.94m

UNNAMED ROAD

RED DOTTED LINES INDICATES EXISTING TREES TO BE DEMOLISHED

LOT 1 CARLTON RIVER ROAD

NAAU
36 Cobden St
North Melbourne VIC 3051

+61 3 8609 1008
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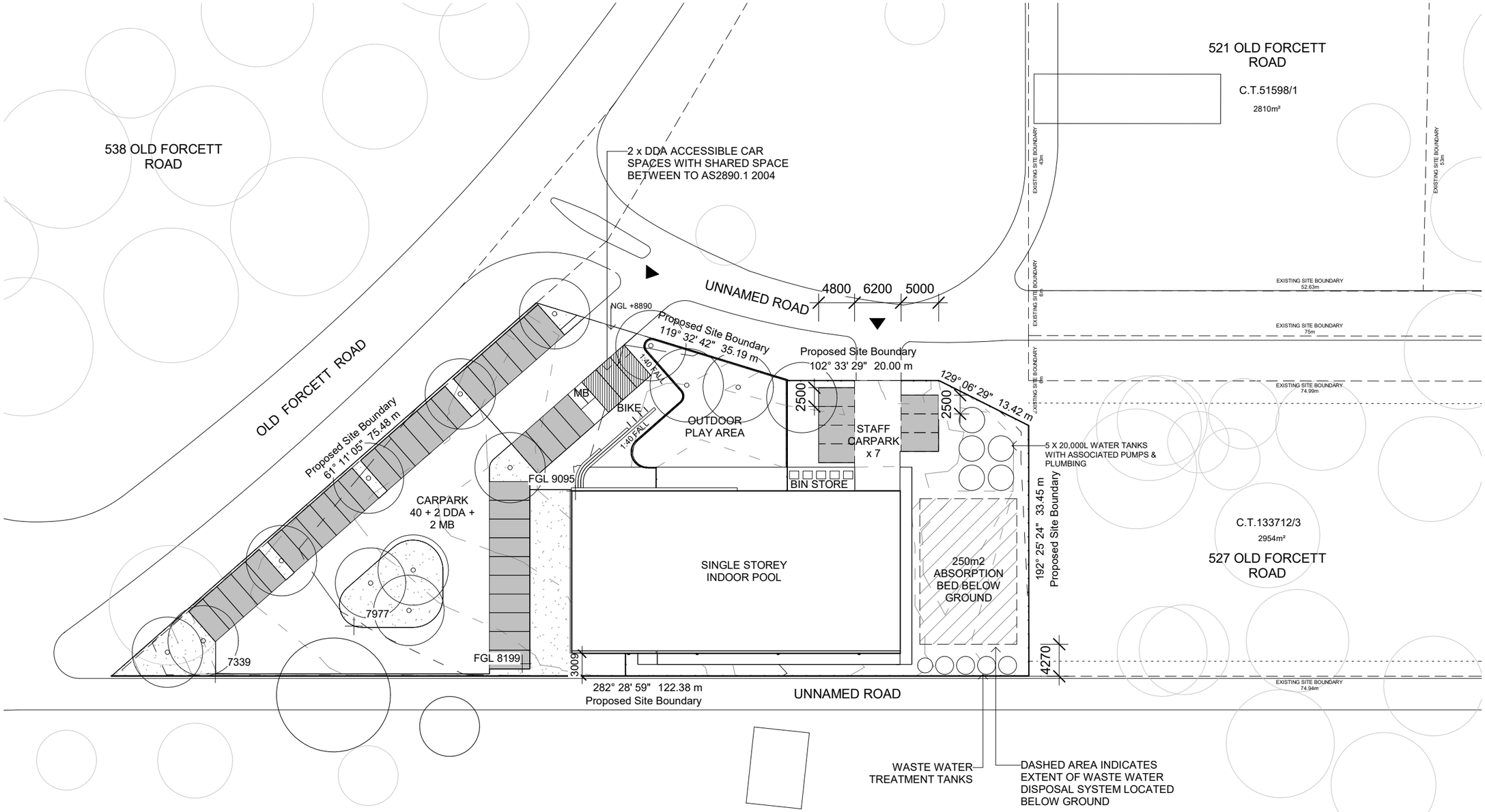
Existing Site & Context Plan

Scale 1:500 @ A3
10/10/21

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NAAU
36 Cobden St
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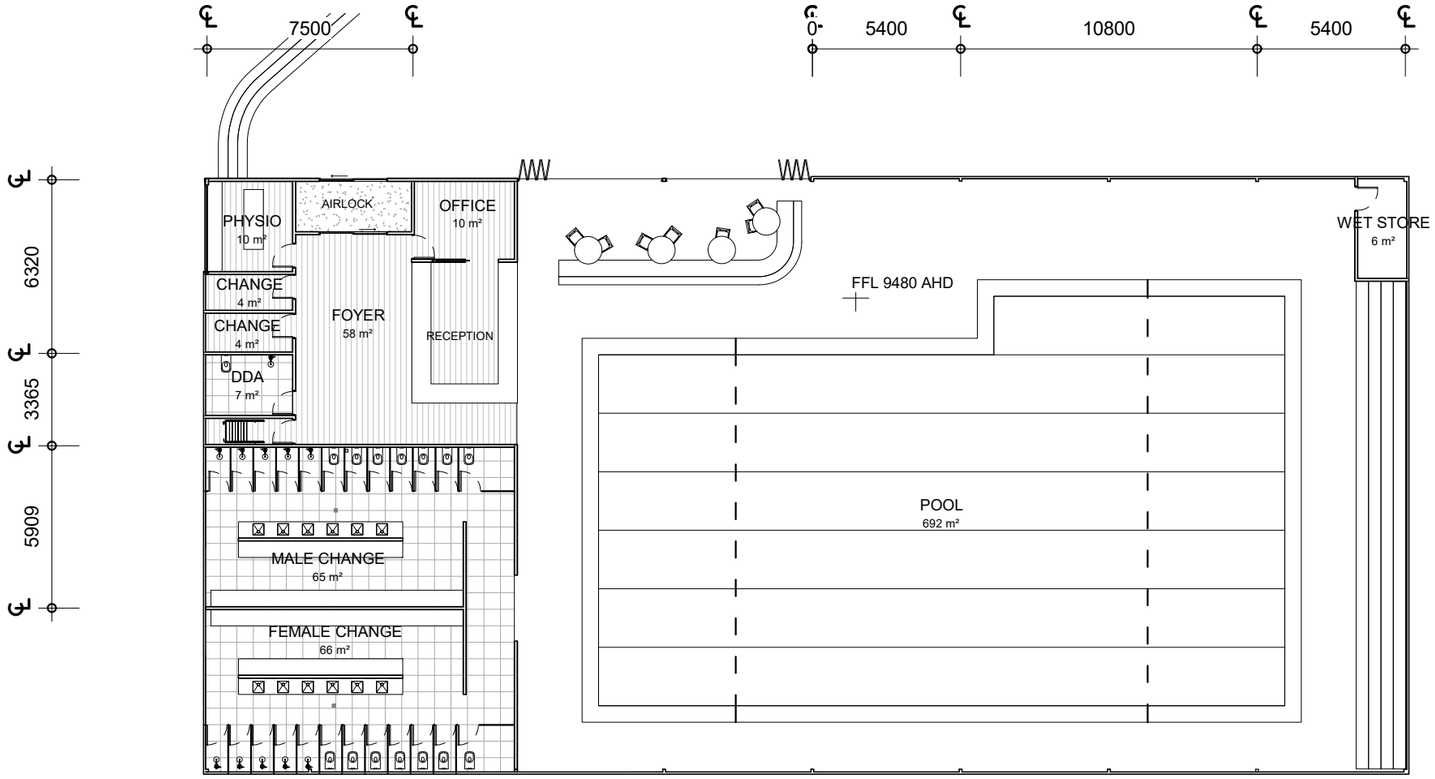
Proposed Site & Context Plan

Scale 1 :500 @ A3
10/10/21

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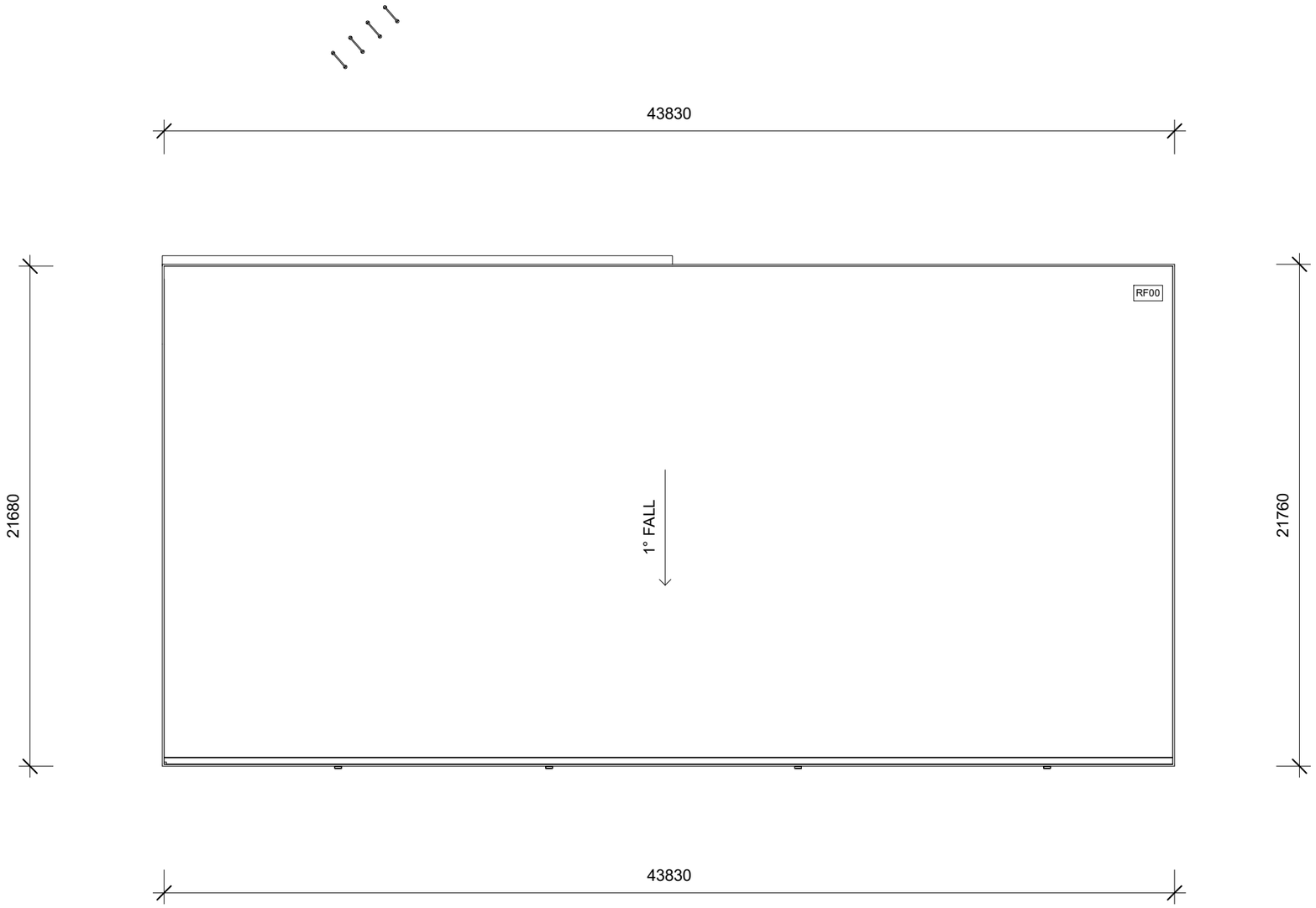
Proposed Ground Level Plan

Scale 1:200 @ A3
10/10/21

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Proposed Roof Plan

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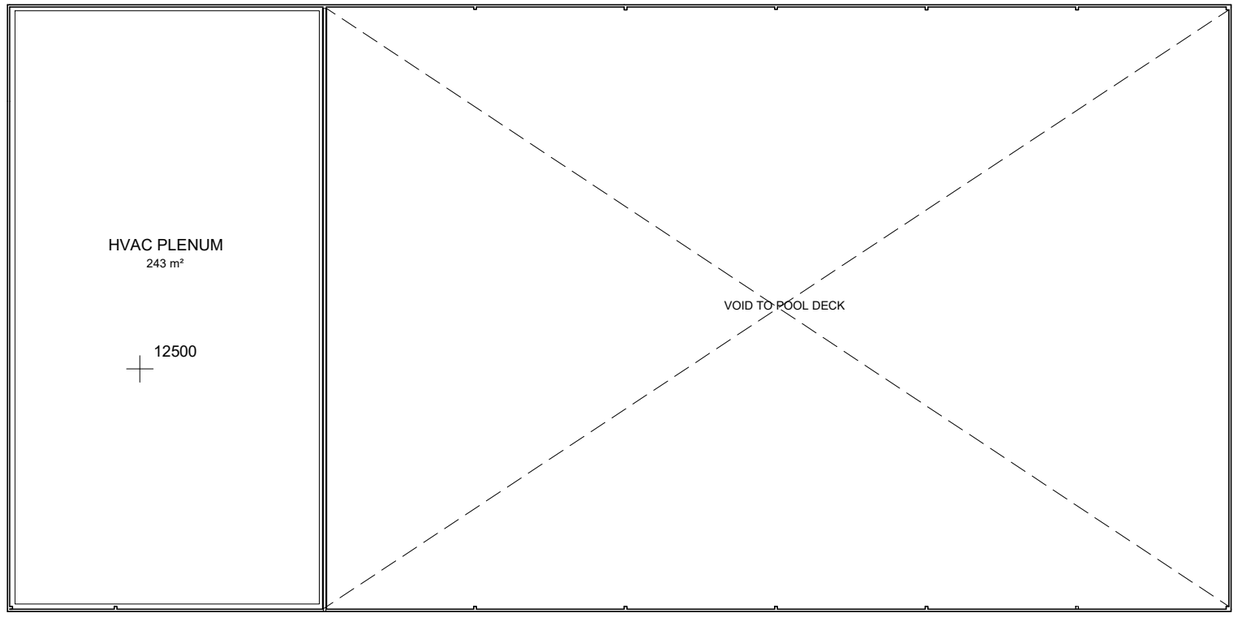
10/10/21




BASEMENT (PLANT)
1 : 200




MEZANINE (PLANT)
1 : 200

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Proposed Plant Rooms

Scale 1:200 @ A3
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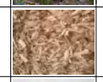
## PLANT SPECIES & LANDSCAPE SCHEDULE

| ID | IMAGE | DESCRIPTION |
|---|---|---|
| PS01 |  | BARBER'S GUM<br>*EUCALYPTUS BARBERI* |
| PS02 |  | CANDLEBARK<br>*EUCALYPTUS RUBIDA* |
| PS03 |  | EASTERN SILVER GUM<br>*EUCALYPTUS CORDATA* |
| PS04 |  | KANGAROO GRASS<br>*THEMEDA AUSTRALIS* |
| PS05 |  | LONG HAIR PLUME GRASS<br>*DICHELACHNE CRINITA* |
| LS01 |  | PLAYGROUND MULCH |
| LS02 |  | WALLABY GRASS<br>*RYTIDOSPERMA CAESPITOSUM* |
| LS03 |  | TURF |
| LS04 |  | CONCRETE |
| LS05 |  | ASPHALT |
| FE01 |  | FENCE |




NAAU
36 Cobden St
North Melbourne VIC 3051

+61 3 8609 1008
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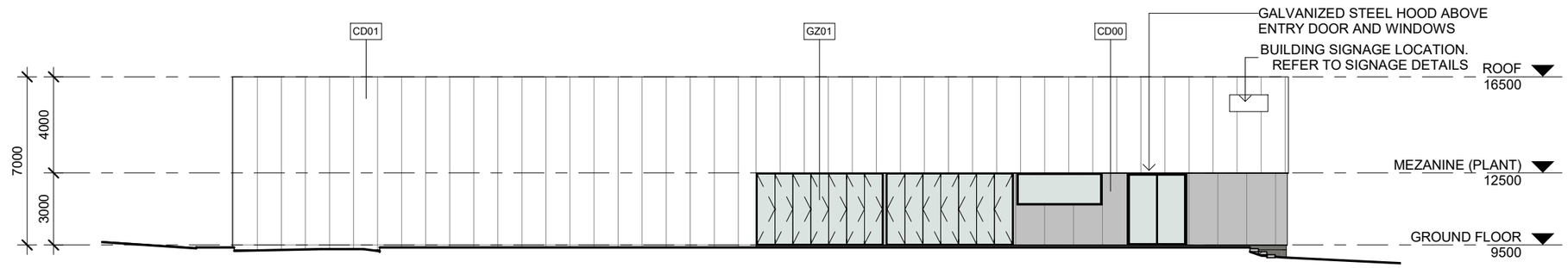
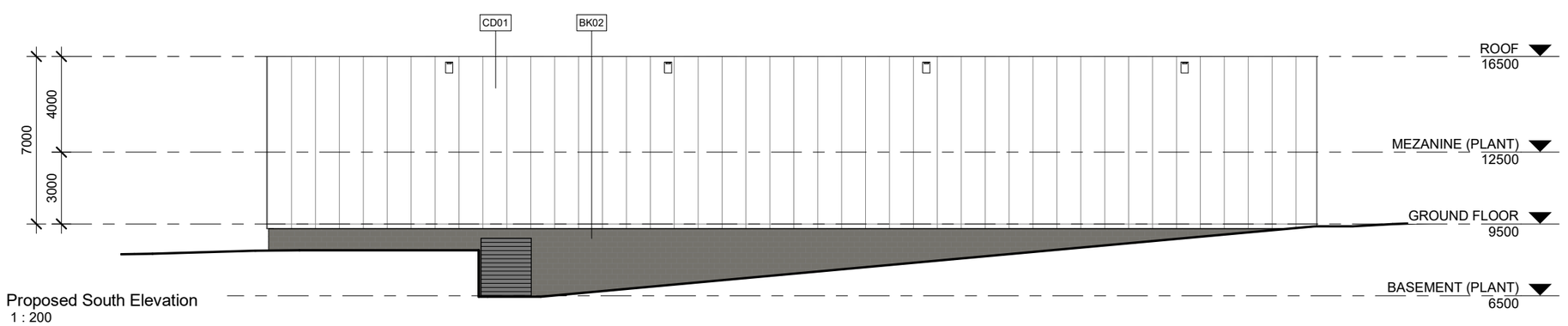
Proposed Landscape Plan

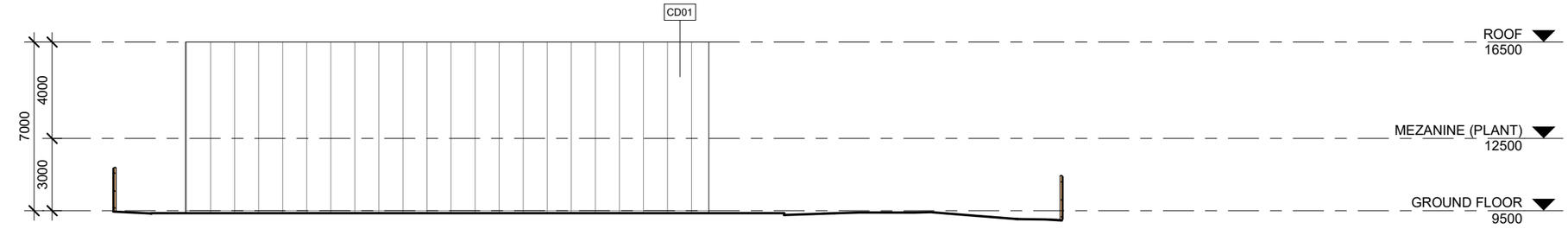
Scale 1:300@A3
17/03/21



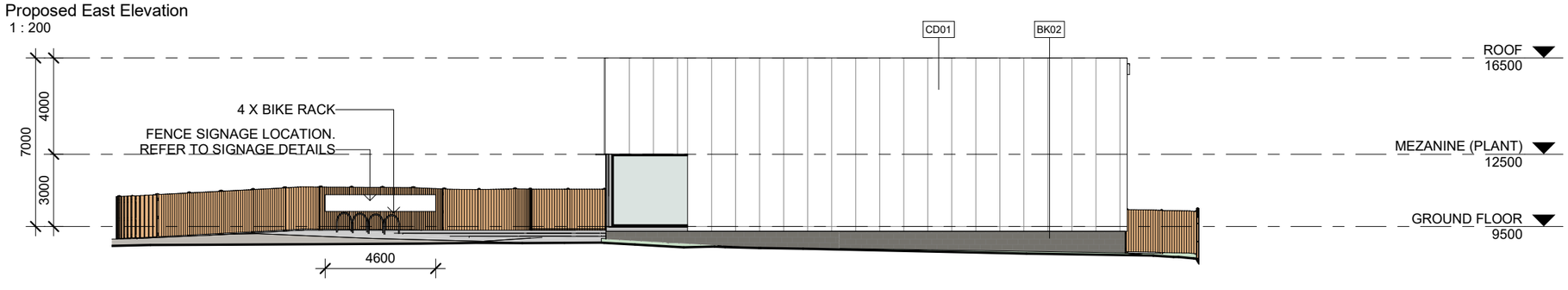

Proposed North Elevation
1 : 200




Proposed South Elevation
1 : 200




Proposed East Elevation
1 : 200




Proposed West Elevation
1 : 200

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36 Cobden St
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+61 3 8609 1008
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Proposed Elevations

Scale 1 :200 @ A3
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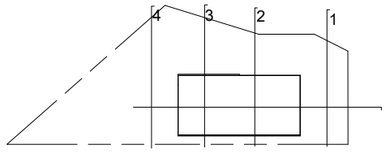
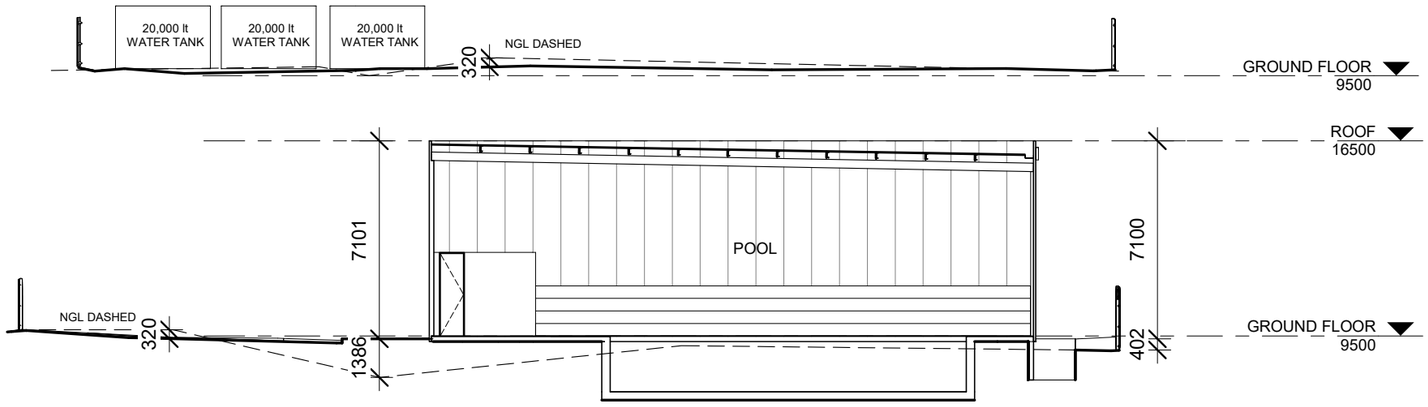



Cross Section 1
1 : 200




Cross Section 2
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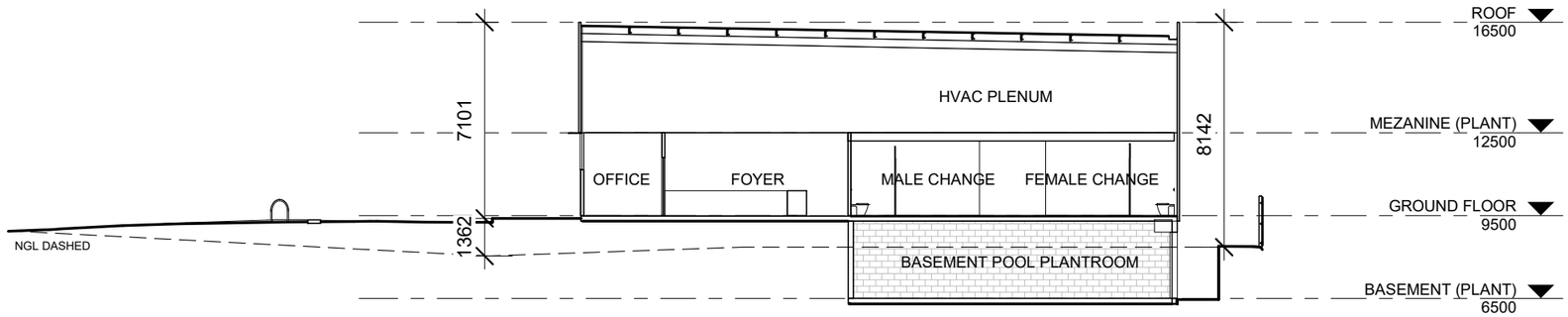
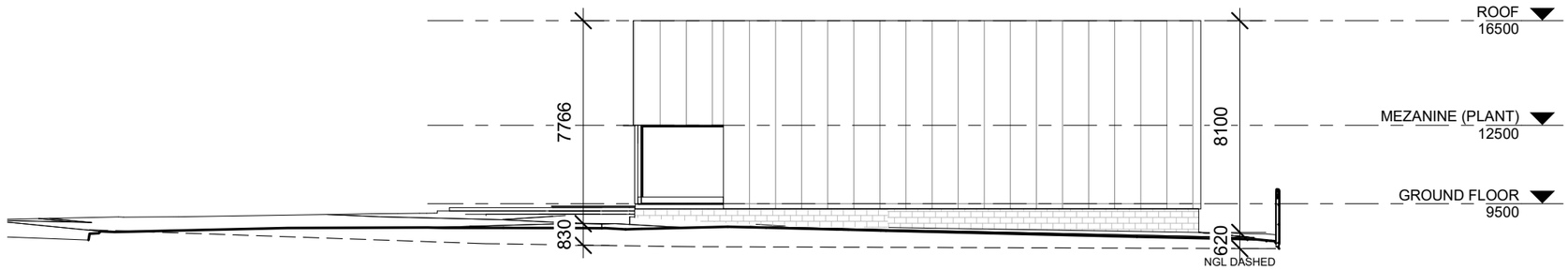
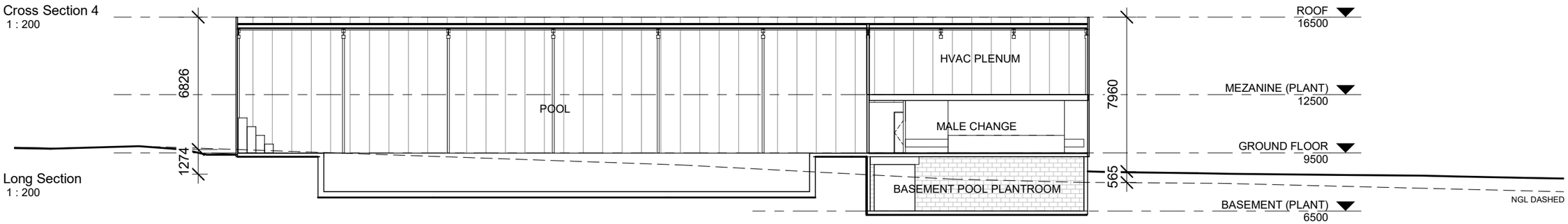



Cross Section 3
1 : 200




Cross Section 4
1 : 200




Long Section
1 : 200

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Proposed Sections

Scale As indicated
@ A3
10/10/21



**CD00**
PANELISED SHEET METAL
CLADDING, ZINCALUME FINISH



**CD01**
DANPALON POLYCARBONATE
INSULATED PANEL CLADDING



**RF00**
KLIPLOCK SHEET METAL
ROOFING, ZINCALUME FINISH



**GZ01**
CLEAR ANODISED ALUMINIUM
WINDOW FRAMES



**BK02**
CONCRETE BLOCKWORK



**LS04**
CONCRETE



**LS05**
ASPHALT

NAAU
36 Cobden St
North Melbourne VIC 3051

+61 3 8609 1008
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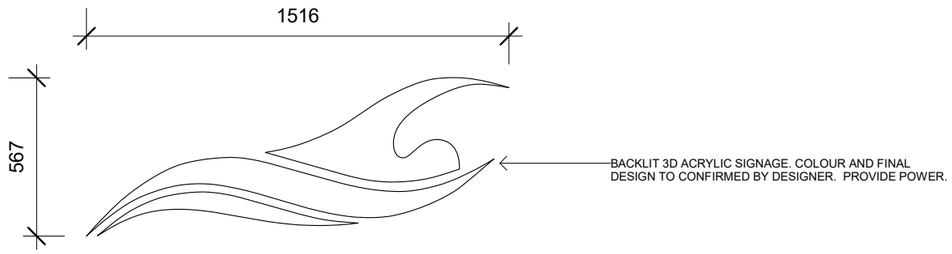
Proposed Material Palette

Scale @ A3
10/10/21




Building Signage Details




Fence Signage Details

NAAU
36 Cobden St
North Melbourne VIC 3051

+61 3 8609 1008
www.naaustudio.com
hello@naaustudio.com

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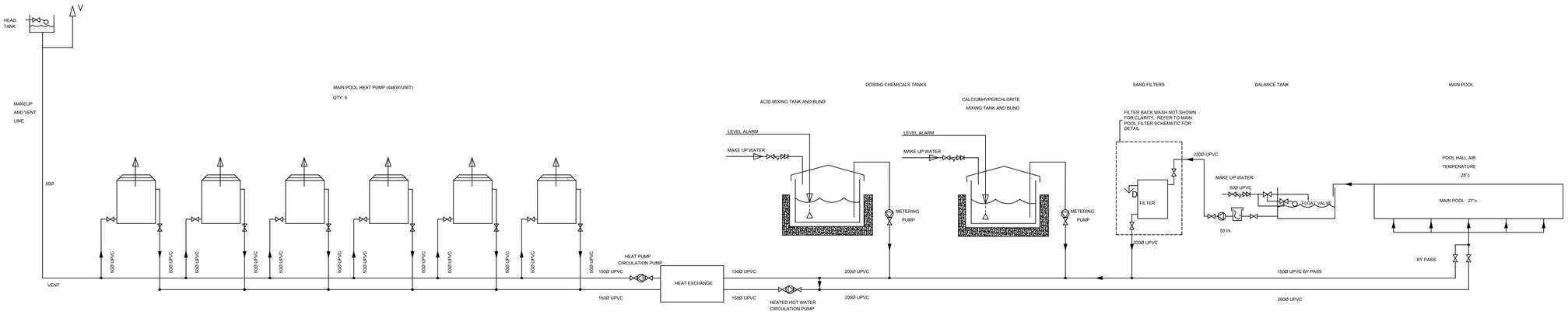
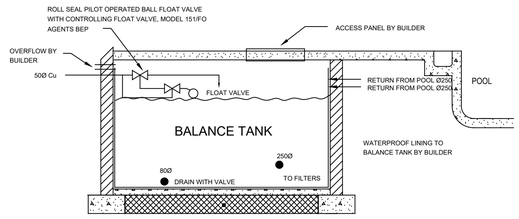
Signage Details

Scale 1:20 @ A3
10/10/21

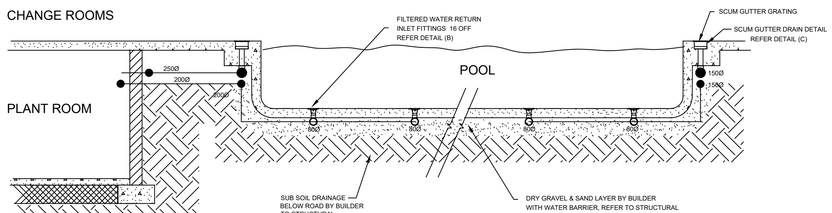



## HYDRAULIC SERVICES
HEATED WATER SCHEMATIC
NTS

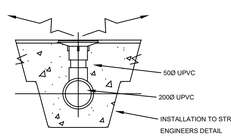



NOTE : DIRECT DISCHARGE FROM MAKEUP VALVE AWAY FROM CONTROLLING FLOAT VALVE

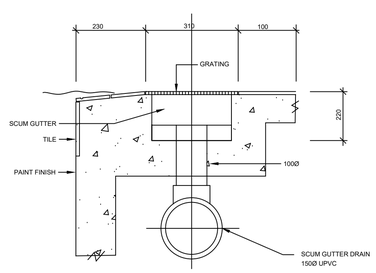
## SECTION B - B
BALANCE TANK SECTION
NTS



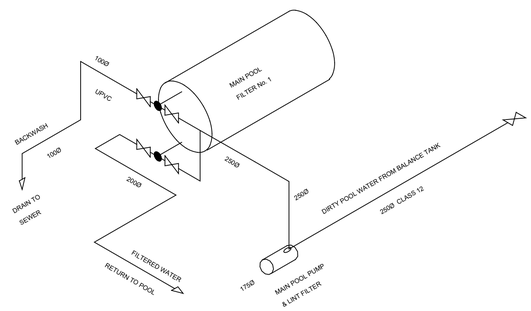

## SECTION A - A
SECTION THROUGH POOL
NTS




## FLOOR INLET FITTING DETAIL (B)
( STA-RITE 8417-0000 ABS PLASTIC - WHITE )
NTS




## SCUM GUTTER DRAIN
CONNECTIONS DETAIL (C)
NTS




## MAIN POOL FILTER
SCHEMATIC DIAGRAM
NTS

0 1 2 3 4 5 10
GRAPHIC SCALE: 1:100

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| P3 | PRELIMINARY | 24/09/21 | |
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| P1 | PRELIMINARY | 08/04/21 | |

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| CHECKED: | DAS |
| DESIGN: | DAS |
| DESIGN CHECK: | - |

Andrew Sutherland Consulting Engineers
11 Morrison Street, Hobart, TAS, 7000
+613 6224 2424
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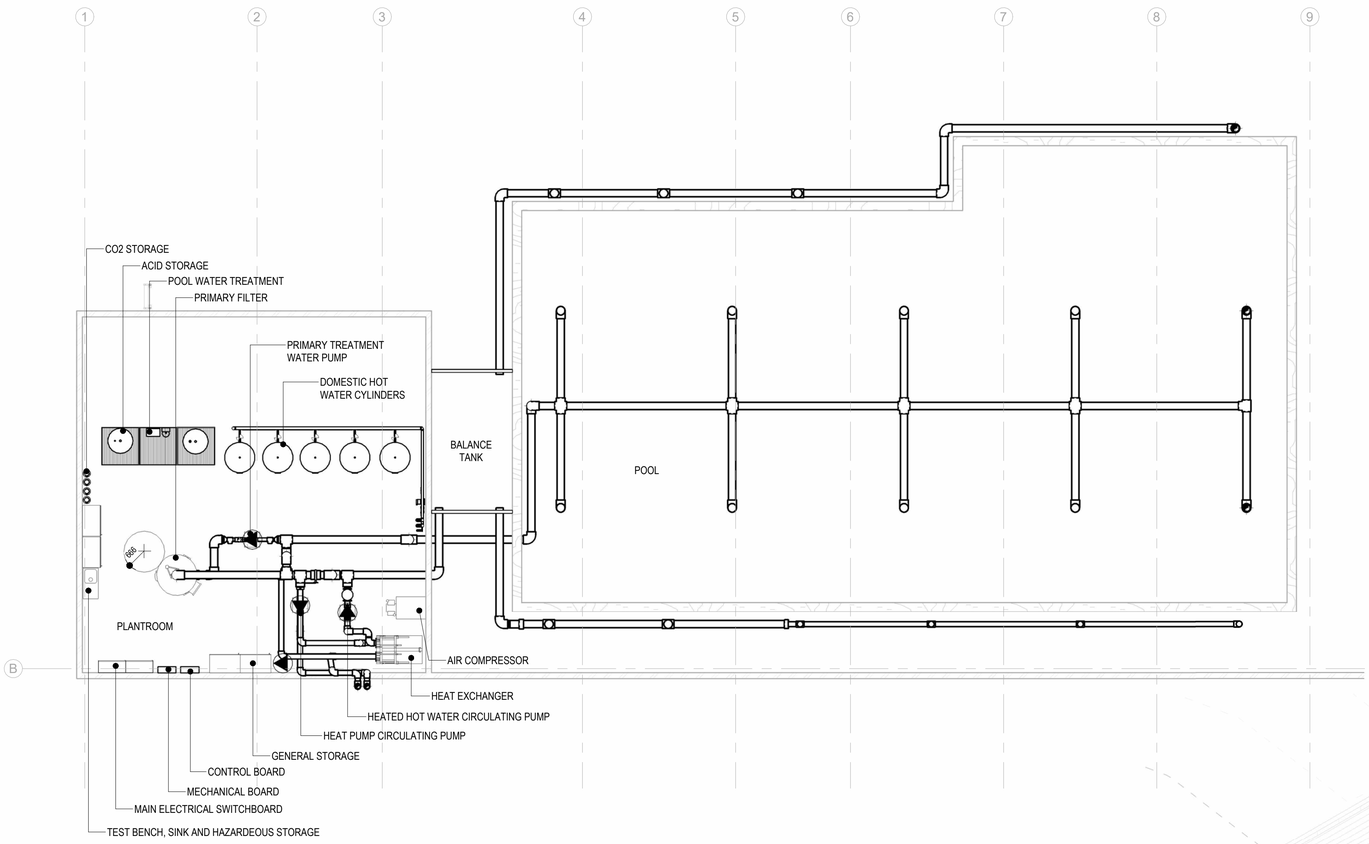
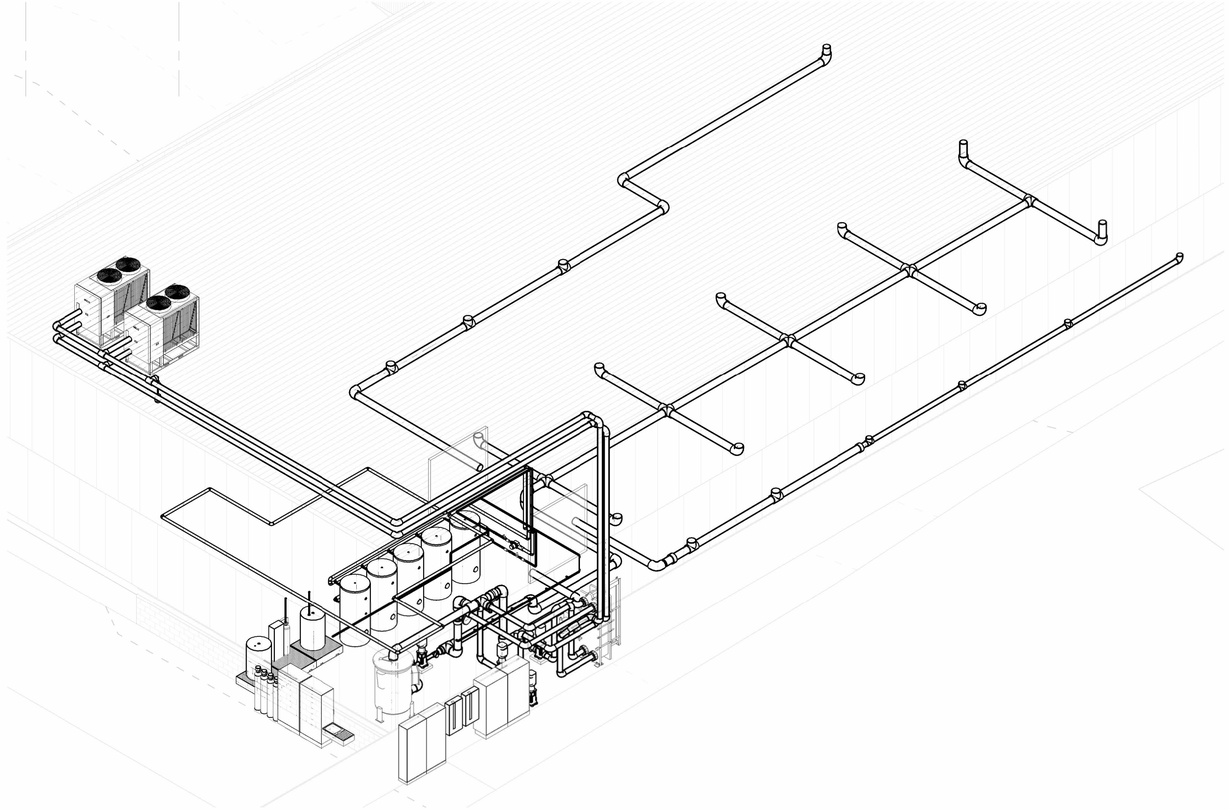
| | | | | |
|---|---|---|---|---|
| Client: Luke Doerner | Project Name: Southern Beaches Swin Centre | | Sheet: HYDRAULIC SERVICES POOL WATER SCHEMATICS AND DETAILS | NORTH POINT |
| Address: Old Forcett Road Dodges Ferry TAS 7173 | Issue: PRELIMINARY | Project No: 02221 | Sheet No: H01 / REV No: P3 / Scale: 1:100 / Size: A1 | |




PLANTROOM
1 : 100



2 ISOMETRIC DIAGRAM

0 1 2 3 4 5
GRAPHIC SCALE: 1:50

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| DRAWN: | SL |
| CHECKED: | MJB |
| DESIGN: | MJB |
| DESIGN CHECK: | DAS |

APPROVAL

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11 Morrison Street, Hobart, TAS, 7000
+613 6224 2424
office@asceng.com.au
www.asceng.com.au
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| | | | | | | |
|---|---|---|---|---|---|---|
| Client: LUKE DOERNER | Project Name: SOUTHERN BEACHES LEARN TO SWIM CENTRE | | Sheet: HYDRAULIC SERVICES PLANT ROOM PLAN | | | |
| Address: OLD FORCETT ROAD DODGES FERRY TAS 7173 | Issue: PRELIMINARY | Project No: 02221 | Sheet No: H02 | REV No: P3 | Scale: 1 : 100 | Size: A1 |

NORTH POINT
N W E S

# LUKE DOERNER
# SOUTHERN BEACHES SWIM CENTRE
## ELECTRICAL SERVICES
## COVER PAGE AND SCOPE OF WORK

**SITE VISIT AND QUOTATION**

THE CONTRACTOR, BY SUBMITTING A QUOTATION, SHALL BE DEEMED TO HAVE VISITED THE SITE TO DETERMINE FOR THEMSELVES THE EXTEND OF WORK THAT WILL APPLY DURING THE CONTRACT PERIOD. NO VARIATION WILL BE ALLOWED THROUGH THE CONTRACTORS FAILURE TO INSPECT ALL AVAILABLE DOCUMENT & THE BUILDING SITE & ASCERTAIN FOR THEMSELVES THE EXTENT OF WORK THAT WILL APPLY THROUGHOUT THE CONTRACT PERIOD. THE ELECTRICAL SERVICES LAYOUT IS NOTIONAL AND THE ACCURACY OF THIS INFORMATION SHALL BE DETERMINED BY SITE INSPECTION OR BY OTHER MEANS AS REQUIRED PRIOR TO TENDERING.

**CODES AND STANDARDS**

NOT WITHSTANDING THAT STATED HEREIN, THE ENTIRE ELECTRICAL SERVICES INSTALLATION SHALL FULLY COMPLY WITH THE REGULATIONS OF THE FOLLOWING AUTHORITIES:

- NATIONAL CONSTRUCTION CODE (NCC),
- OCCUPATIONAL HEALTH AND SAFETY ORGANISATION
- ALL RELEVANT LOCAL AUSTRALIAN STANDARDS AND ALL AMENDMENTS TO THOSE STANDARDS, INCLUDING BUT NOT LIMITED TO AS/NZS3000, AS3008, AS11801 & AS1158

**GENERAL NOTES**

1. LOCATION OF ALL SERVICES ARE ONLY DIAGRAMMATIC. FINAL EQUIPMENT AND SERVICES LOCATION TO BE CONFIRMED WITH THE ENGINEER AND CLIENT.
2. CONFIRM EQUIPMENT SELECTION WITH CLIENT PRIOR TO COMMENCING WORK AND ORDERING EQUIPMENT.
3. ALL POWER WIRING SHALL BE PVC/PVC CABLE MINIMUM. 2.5mm² PROTECTED BY MINIMUM 16A RCD AS APPROPRIATE FOR THE CABLE SIZE AND ALL LIGHTING CIRCUIT CABLING PVC/PVC MINIMUM - 1.5mm².
4. ALL WIRING SHALL BE CONCEALED UNLESS OTHERWISE SPECIFIED.
5. SEAL ALL PENETRATIONS INTO OR FROM AREA OF WORKS.
6. NO SERVICES MAY BE SUSPENDED FROM OTHER SERVICES (E.G. MECHANICAL DUCTS, HYDRAULIC PIPES). WHERE REQUIRED, A METAL BRACKET SHALL BE INSTALLED AROUND THE DUCT FOR LUMINAIRES TO BE SUSPENDED FROM.
7. OBTAIN ALL NECESSARY APPROVALS FOR THE WORKS PRIOR TO COMMENCEMENT AND PAY ALL FEES REQUIRED. ALLOW FOR AND COORDINATE STAGING OF THE WORKS, OUT OF NORMAL HOURS WORK AND POWER INTERRUPTIONS TO THE PROJECT.
8. LIGHTING CIRCUITING - TOTAL LOAD PER FINAL CIRCUIT PROTECTED BY 16A CIRCUIT BREAKER 2.5mm² + E CABLING SHALL BE 2500VA, OR MAX NUMBER OF POINTS PER FINAL SUB-CIRCUIT DESCRIBED IN AS3000. ALL CIRCUITS ARE TO BE RCD PROTECTED.
9. BUILDING PENETRATIONS. SEAL ALL PENETRATIONS TO BCA C3.15 AND AS 3000 REQUIREMENTS.
10. ALL CABLING WITHIN THE CABLING SPACE SHALL BE NEATLY CLIPPED TO CABLE TRAY / CATENARY.
11. POWER & LUMINAIRE WIRING TO BE TPS CABLE IN CEILING SPACE, FLOOR SPACE OR CONCEALED IN THE BUILDING STRUCTURE UNLESS OTHERWISE DETAILED. ALL POWER & LUMINAIRE WIRING TO BE INSTALLED ON A CATENARY SUPPORT SYSTEM AND ATTACHED WITH TRIMMED CABLE TIES.

**SCOPE OF WORKS**

THE SCOPE OF THE WORKS INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

**POWER**

1. SUPPLY AND INSTALLATION OF FINAL SUB-CIRCUIT CABLING DISTRIBUTION FOR LIGHTING AND POWER FROM SWITCHBOARD, INCLUDING ACCESSORIES SUCH AS SWITCHES, POWER OUTLETS, LOCAL ISOLATORS ETC.
2. PROVISIONS OF NEW GENERAL PURPOSE AND SPECIAL PURPOSE POWER SYSTEMS INCLUDING POWER SUB CIRCUITS, POWER OUTLETS, RCD'S, CABLES, CABLE SUPPORTS, ACCESSORIES AND CONNECTIONS.
3. THE ELECTRICAL CONTRACTOR SHALL CONFIRM THE FINISH AND COLOUR OF ALL POWER /DATA OUTLETS WITH THE ARCHITECT PRIOR TO ORDERING. IN GENERAL, GPOS AND SWITCHES FACE PLATE TO BE WHITE ON PLASTER BOARD AND BLACK ON TIMBER WALL.
4. POWER, DATA, AND SWITCH OUTLETS SHALL BE STANDARD CLIPSAL ICONIC PRO SERIES.
5. TRAFFOLYTE LABELING OF ISOLATORS WITH CIRCUIT NUMBERS AND SWITCHBOARD. CONFIRM LABELING SCHEME WITH CONSULTANT PRIOR TO INSTALLATION.
6. PROVISIONS FOR CABLE SUPPORTS INCLUDING CATENARY WIRE, CLAMPS AND FASTENERS.
7. PROVIDE TYPE LEGEND IN SWITCHBOARD.
8. PROVIDE SUBMAIN MAP AT THE MAIN SWITCHBOARD.
9. TESTING AND COMMISSIONING.
10. MAINTENANCE MANUALS AND AS-BUILT DRAWINGS.
11. PROVISION OF 12 MONTHS MAINTENANCE AND WARRANTY.
12. LIAISE WITH ALL OTHER TRADE CONTRACTORS TO ENSURE THE ELECTRICAL INSTALLATION IS PLANNED AND INSTALLED IN A WELL COORDINATED MANNER.

**ELECTRICAL SERVICES:**

1. INSTALL LUMINAIRES AS DOCUMENTED. ALLOW FOR STAGED INSTALLATION. EXACT LOCATION OF THE LUMINAIRES TO BE DETERMINE ON FINAL SITE DESIGN.
2. PROVIDE CONDUIT FOR ALL CABLE RUN. ALLOW TO CONCEAL ALL CONDUITS, WHERE THE CONDUITS ARE EXPOSED TO WEATHER OR EXTERNAL, ALLOW TO PAINT THE CONDUIT TO MATCH BUILDING.
3. INSTALL NEW PE CELL FOR ALL EXTERNAL LIGHT ACTIVATION INCLUDING EXISTING PATHWAY LIGHTINGS.
4. PROVIDE NEW DYNALITE GATEWAY FOR CONTROLLING THE LIGHT FITTINGS. ALLOW FOR CIRCUIT BREAKER, DATA POINT AND ENCLOSURE FOR CONTROLLER.
5. PROVIDE WORK PROGRAM FOR APPROVAL PRIOR TO ANY INSTALLATION.

**LIGHTING CONTROL NOTES**

1. CARPARK LUMINAIRES TO BE 7 DAYS 24 HOURS TIMER CONTROL. CARPARK LIGHTING TO BE ACTIVATED BY PE CELL AND AUTOMATICALLY SWITCHED OFF AT THE NOMINAL TIME OF 9.30PM (TPC).
2. BUILDING AND PLAYGROUND TO BE ACTIVATED BY DYNALITE KEYPAD.
3. EXTERNAL LIGHTING SURROUNDING THE REAR OF THE BUILDING TO BE ACTIVATED BY MOTION SENSOR WITH SWITCHED OVERIDE.

**ASSOCIATED WORKS**

BY BUILDER

1. PROVISION OF ACCESS TO CEILING SPACE, WALLS & PROVISION OF CUPBOARDS & EQUIPMENT NOGGINS.
2. TRENCHING WITH CONDUIT AND CIVIL WORK FOR CABLE RUN FOR EXTERNAL LIGHTING.
3. CREATING GROUND CAVITY FOR SERVICES RUN.
4. PATCHING AND SEALING OF PENETRATIONS.
5. DISPOSAL OF REFUSE AND CONTAMINANTS.
6. PROVISION OF TEMPORARY PROTECTION TO ALL WALLS, PANELS, CEILINGS, FLOORS, DOORS, AND FITTINGS DURING CONSTRUCTION.

**WORKMANSHIP**

ALL WORKMANSHIP SHALL BE OF A HIGH STANDARD THROUGHOUT AS ACCEPTED BY THE RESPECTIVE SPECIALIST TRADES. WHERE THE ENGINEER CONSIDERS WORKMANSHIP IS NOT CONSISTENT WITH GOOD TRADE PRACTICE OR STANDARDS, OR THAT ANY PLANT IS INFERIOR OR DEFICIENT IN QUALITY TO THAT SPECIFIED, NOTWITHSTANDING THAT A PROGRESS PAYMENT MAY HAVE BEEN MADE IN RESPECT THEREOF, THE ENGINEER MAY GIVE NOTICE IN WRITING SETTING FORTH THE DEFECT OR DEFICIENCY AND SUCH REFUSAL SHALL BE CONCLUSIVE. REJECTED WORK OR MATERIALS SHALL BE REMOVED FROM THE SITE WITHIN 24 HOURS OF SUCH REJECTION. DEFECTIVE WORK SHALL BE RECONSTRUCTED TO CONFORM TO THE SPECIFIED REQUIREMENTS AT NO COST TO THE PROJECT.

**CLEANING**

THE SITE SHALL BE KEPT CLEAN AND TIDY THROUGHOUT THE COURSE OF THE WORK AND ALL RUBBISH SHALL BE REMOVED REGULARLY PRIOR TO PRACTICAL COMPLETION. AT THE CONCLUSION OF THE WORK, ALL DEBRIS AND RUBBISH SHALL BE CLEARED AWAY AND REMOVED FROM THE SITE AND THE COMPLETED INSTALLATION SHALL BE LEFT THOROUGHLY CLEAN.

**WARRANTY**

THE COMPLETE WORKS SHALL BE WARRANTED AGAINST DEFECTIVE WORKMANSHIP AND MATERIALS (FAIR WEAR AND TEAR EXCEPTED). DURING THE WHOLE OF THE WARRANTY PERIOD (TWELVE MONTHS AFTER PRACTICAL COMPLETION) WARRANTY AND BREAKDOWN MAINTENANCE IN CONNECTION WITH WORK OF THIS CONTRACT SHALL BE PERFORMED WITHOUT COST.

**COMPLIANCE CERTIFICATE**

ISSUE A CERTIFICATE OF ELECTRICAL SAFETY.

**LOCATIONS**

THE LOCATIONS OF ALL OUTLETS, LUMINAIRES AND EQUIPMENT ARE INDICATIVE ONLY. CONFIRM THE LOCATIONS OF ALL ITEMS PRIOR TO INSTALLATION.

LIGHT SWITCHES SHALL BE MOUNTED 1000mm ABOVE FLOOR LEVEL UNLESS NOTED OTHERWISE. CO-ORDINATE THE INSTALLATION AND ALIGNMENT OF OUTLETS ON SITE WITH EACH OTHER AND WITH OTHER SERVICES.

**TESTING AND COMMISSIONING**

CARRY OUT TESTS REQUIRED BY REGULATORY AUTHORITIES AND TESTS NECESSARY TO DEMONSTRATE COMPLIANCE WITH THE PERFORMANCE OF THE SPECIFICATION AND DRAWINGS

**OPERATION AND MAINTENANCE NOTES**

1. PROVISIONS FOR AS-INSTALLED DRAWINGS REFLECTING THE INSTALLED CONDITIONS INCLUSIVE OF LIGHTING AND POWER LAYOUTS SHOWING CIRCUITING AND SWITCHING.
2. PROVISIONS FOR ALL TEST RESULTS TO BE DISPLAYED NEATLY WITHIN THE MANUAL. PROVISIONS TO INCLUDE A NEW EMERGENCY TEST LOG BOOK TO BE PLACED WITHIN THE NEW DISTRIBUTION BOARD.
3. PROVISIONS FOR THE MAINTENANCE PROCEDURES REQUIRED INCLUSIVE OF DETAILED STEP BY STEP INSTRUCTIONS AND THE REQUIRED FREQUENCY.
4. DATA SHEETS AND DESCRIPTIONS OF ALL PRODUCTS USED. DETAILS TO INCLUDE SUPPLIER CONTACT DETAILS.
5. DETAILS OF THE CONSULTANT, HEAD CONTRACTOR, ELECTRICAL SUB-CONTRACTOR AND PROJECT MANAGER INCLUSIVE OF COMPANY NAMES AND CONTACT DETAILS.
6. RCD TEST RESULTS, COMMUNICATION CATEGORY 6A TEST RESULTS, CERTIFICATE OF ELECTRICAL SAFETY, CERTIFICATE OF COMPLIANCE WITH AS3000, AS2293, AS3080 AND AS3084.

**NOMINATED CONTRACTOR**

BUILDER: CONSTRUCTION3

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DESIGN: TL

Andrew Sutherland Consulting Engineers
11 Morrison Street, Hobart, TAS, 7000
+613 6224 2424
office@asceng.com.au
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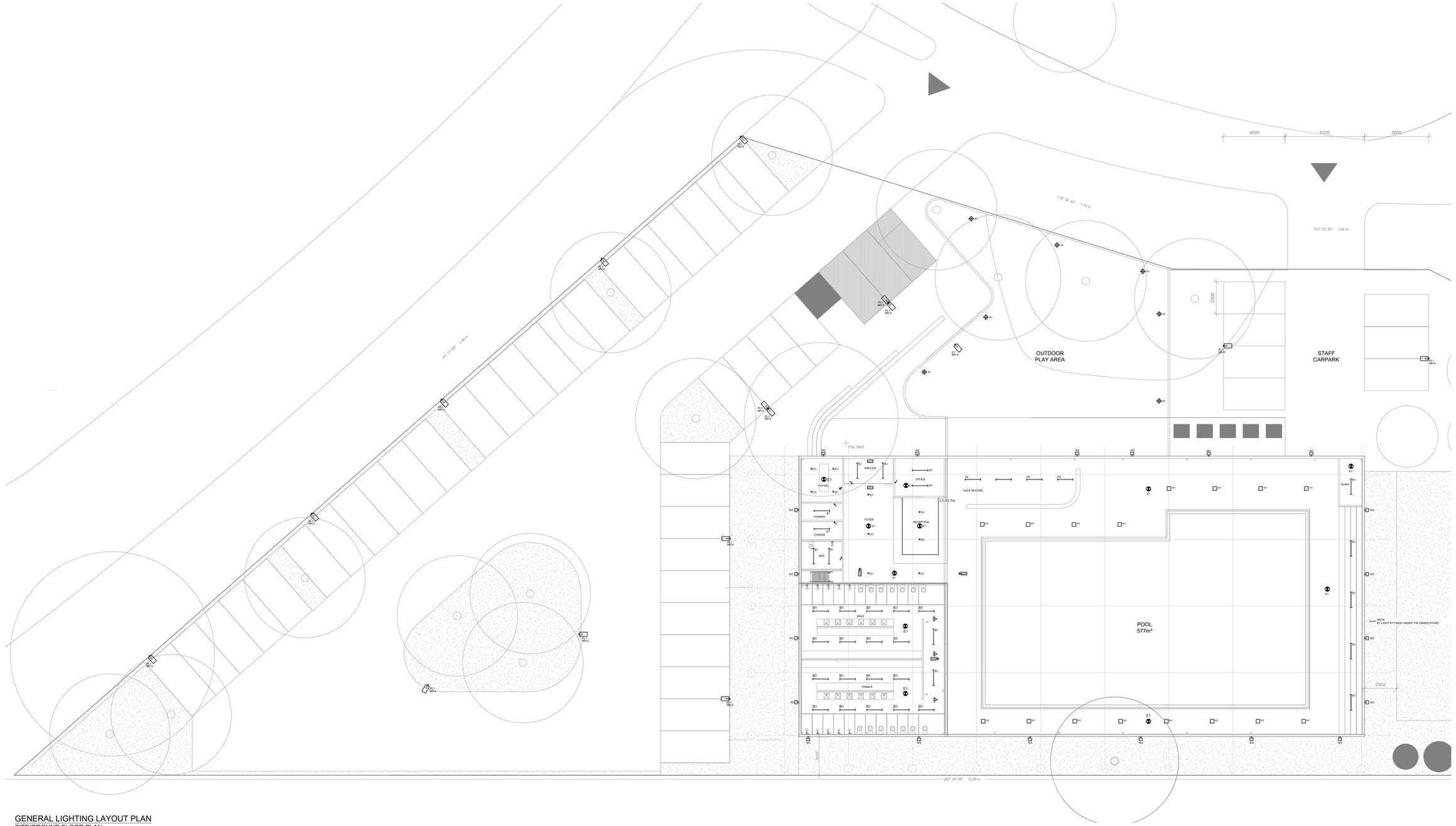
Client: Luke Doerner
Project Name: Southern Beaches Swin Centre
Address: Old Forcett Road, Dodges Ferry TAS 7173
Issue: PRELIMINARY
Project No: 02221
Sheet: ELECTRICAL SERVICES COVER PAGE & SCOPE OF WORKS
Sheet No: E00
REV No: P3
Scale: 1:100
Size: A1
NORTH POINT




# GENERAL LIGHTING LAYOUT PLAN

## SITE/GROUND FLOOR PLAN

1:100

**LIGHTING SCHEDULE**

| | | | |
|---|---|---|---|
| B1 | EAGLE LIGHTING | DENSUS LED | EL-DENL-2101-000 |
| D1 | DOWNLIGHT | UNIOS | MIRAGE M160, IP54 |
| E1 | CLEVERTRONIC | LIFELIGHT | CLIFE-SM-WP |
| E2 | CLEVERTRONIC | WEATHERPROOF | CWELED |
| H1 | PRACHT | QUADRONIUS | 84822001 |
| H2 | NORKA | ERFURT LED EXTREME | M1200 |
| L1 | XERO LIGHTING | XTI 2.0 SQUARE IP66 | 1826.67LM/m |
| P1 | PLAYGROUND LIGHTING | IP RATED | TBC ON FINAL PLAYGROUND LAYOUT |
| PL1 | WEEF | VFL500 12/24W S65 | 108-2308 |
| W1 | WEEF | OLV334 | 132-0641 |
| W2 | WEEF | OLV334 | 132-8361 |
| W3 | LIGMAN | LEEDS | |

**GENERAL NOTES**

CARPARK AND PEDESTRIAN LIGHTING TO AS1158
SWIMMING POOL LIGHTING TO AS2560
OBTRUSIVE LIGHTING PREVENTION TO AS4282

REFER 02221 E00 FOR FURTHER DETAIL

0 1 2 3 4 5 10

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**Andrew Sutherland Consulting Engineers**
11 Morrison Street, Hobart, TAS, 7000
+613 6224 2424
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Project Name: Southern Beaches Swin Centre

Address: Old Forcett Road, Dodges Ferry TAS 7173

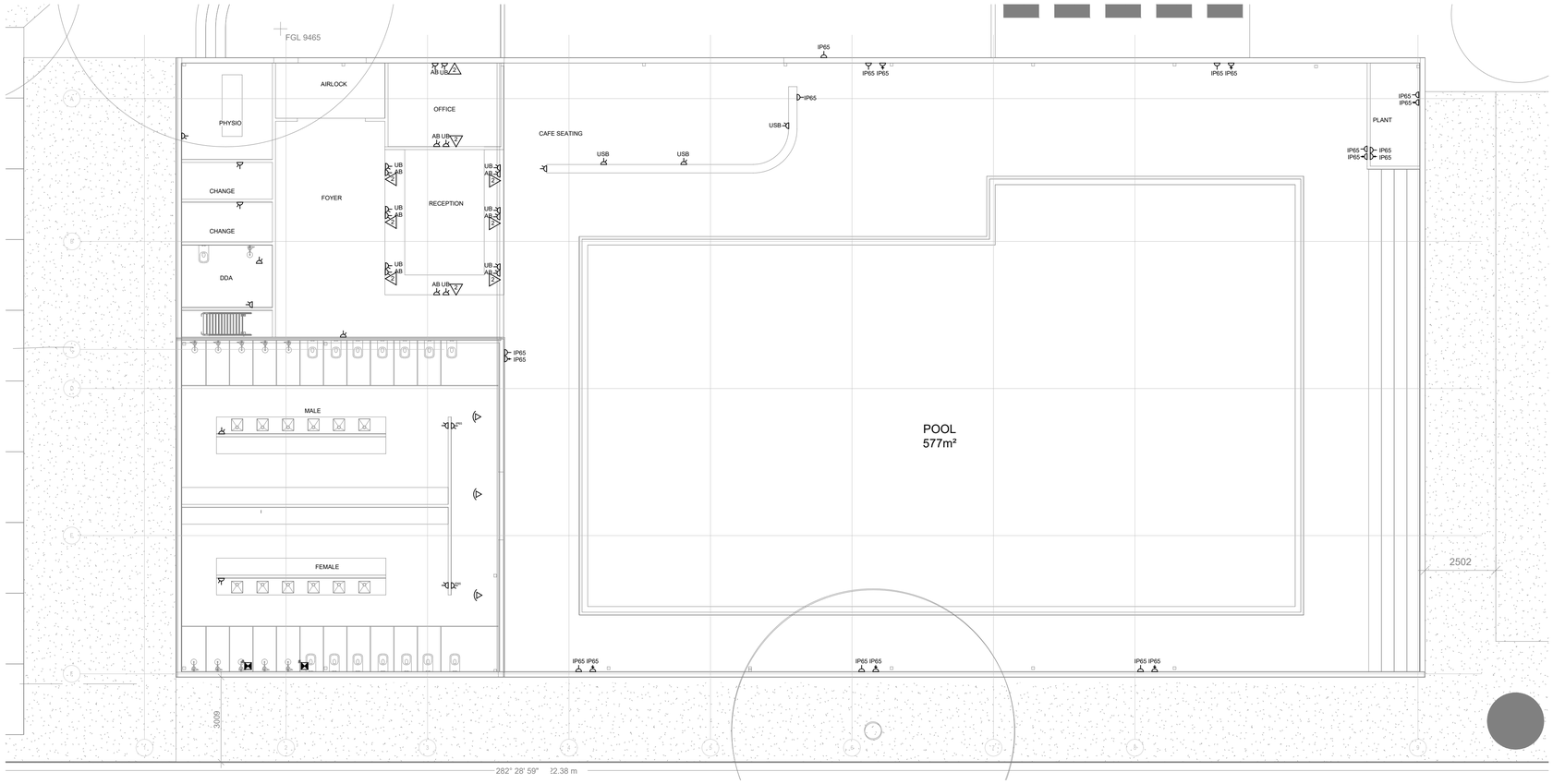
Issue: FOR APPROVAL

Project No: 02221

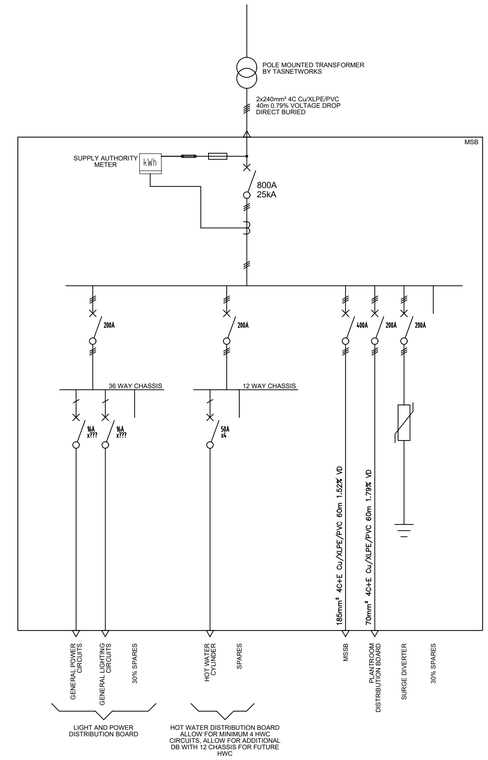
Sheet: ELECTRICAL SERVICES LIGHTING LAYOUT

Sheet No: E01 | REV No: P3 | Scale: 1:100 | Size: A1

NORTH POINT




GENERAL POWER AND COMM
GROUND FLOOR PLAN
1:100




PELECTRICAL SERVICES
TYPICAL POWER SCHEMATIC

**GENERAL NOTES**

REFER 02221 E00 FOR FURTHER DETAIL

ALLOW FOR FIRE DETECTOR WITHIN IN PLANTROOM. INTERLOCK ALARM SIGNAL WITH AIR HANDLING UNIT SHUT DOWN.

ALLOW FOR COMMS RACK. POSITION OF RACK TBC.

0 1 2 3 4 5 10
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Address: Old Forcett Road, Dodges Ferry TAS 7173
Project Name: Southern Beaches Swin Centre
Issue: FOR APPROVAL
Project No: 02221
Sheet: ELECTRICAL SERVICES GENERAL POWER AND COMM LAYOUT
Sheet No: E02
REV No: P3
Scale: 1:100
Size: A1
NORTH POINT

CODES AND STANDARDS

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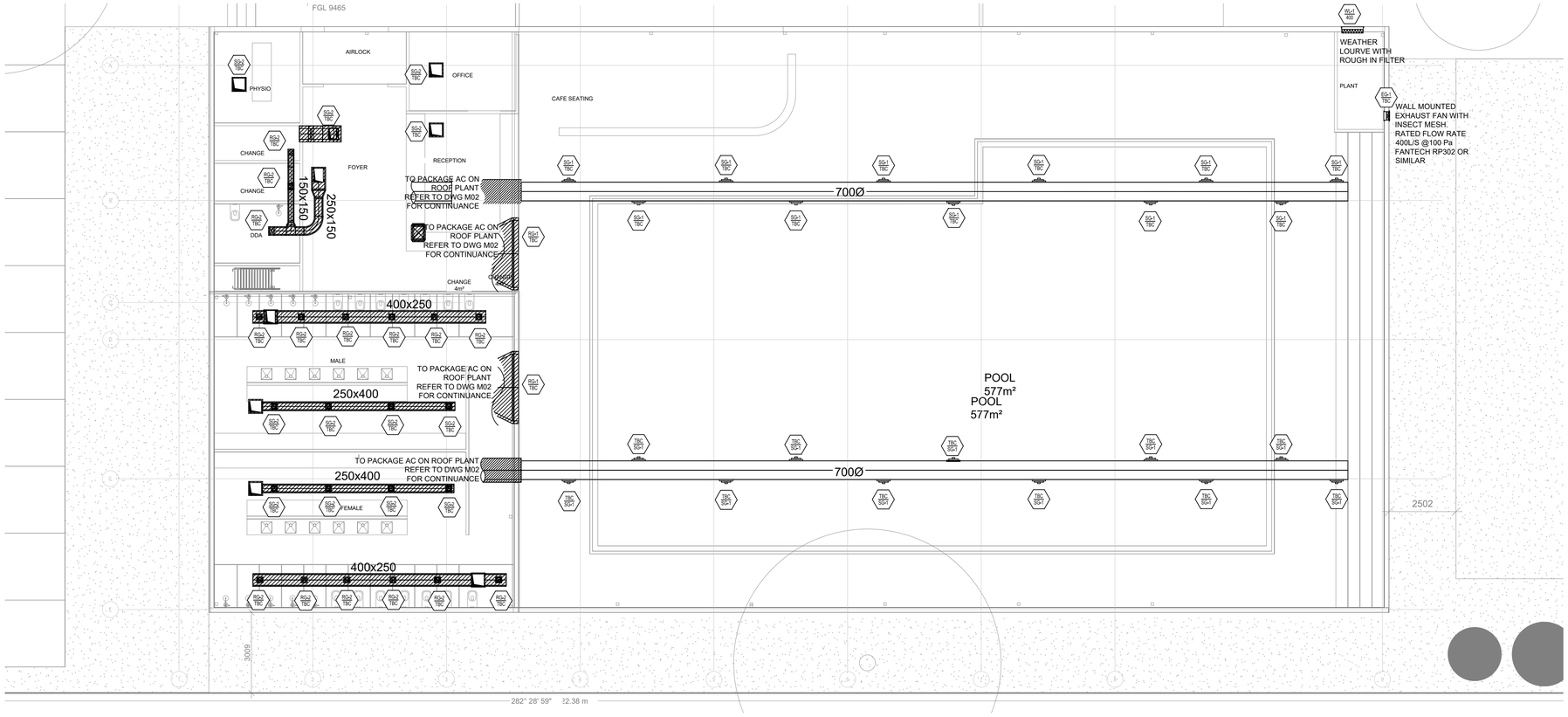
- ALL RELEVANT LOCAL AUSTRALIAN STANDARDS AND ALL AMENDMENTS TO THOSE STANDARDS, INCLUDING BUT NOT LIMITED TO AS/NZS3000, AS/NZS 1668
- SORELL INTERIM PLANNING SCHEME 2015,

GENERAL NOTES

1. THE DRAWINGS ARE ONLY SCHEMATIC. CONTRACTOR TO FINISH THE FINAL DESIGN AND SELECTION OF EQUIPMENT TO COMPLY WITH RELEVANT AUSTRALIA STANDARD AND NCC.
2. LOCATION OF ALL SERVICES ARE ONLY DIAGRAMMATIC. FINAL EQUIPMENT AND SERVICES LOCATION TO BE CONFIRMED WITH THE ARCHITECT, MECHANICAL ENGINEER AND PRINCIPLE.
3. PROVIDE CONSTRUCTION DRAWINGS AND EQUIPMENT SELECTION FOR APPROVAL PRIOR TO COMMENCING WORK AND ORDERING EQUIPMENT.




GROUND FLOOR PLAN
MECHANICAL SERVICES
1:100

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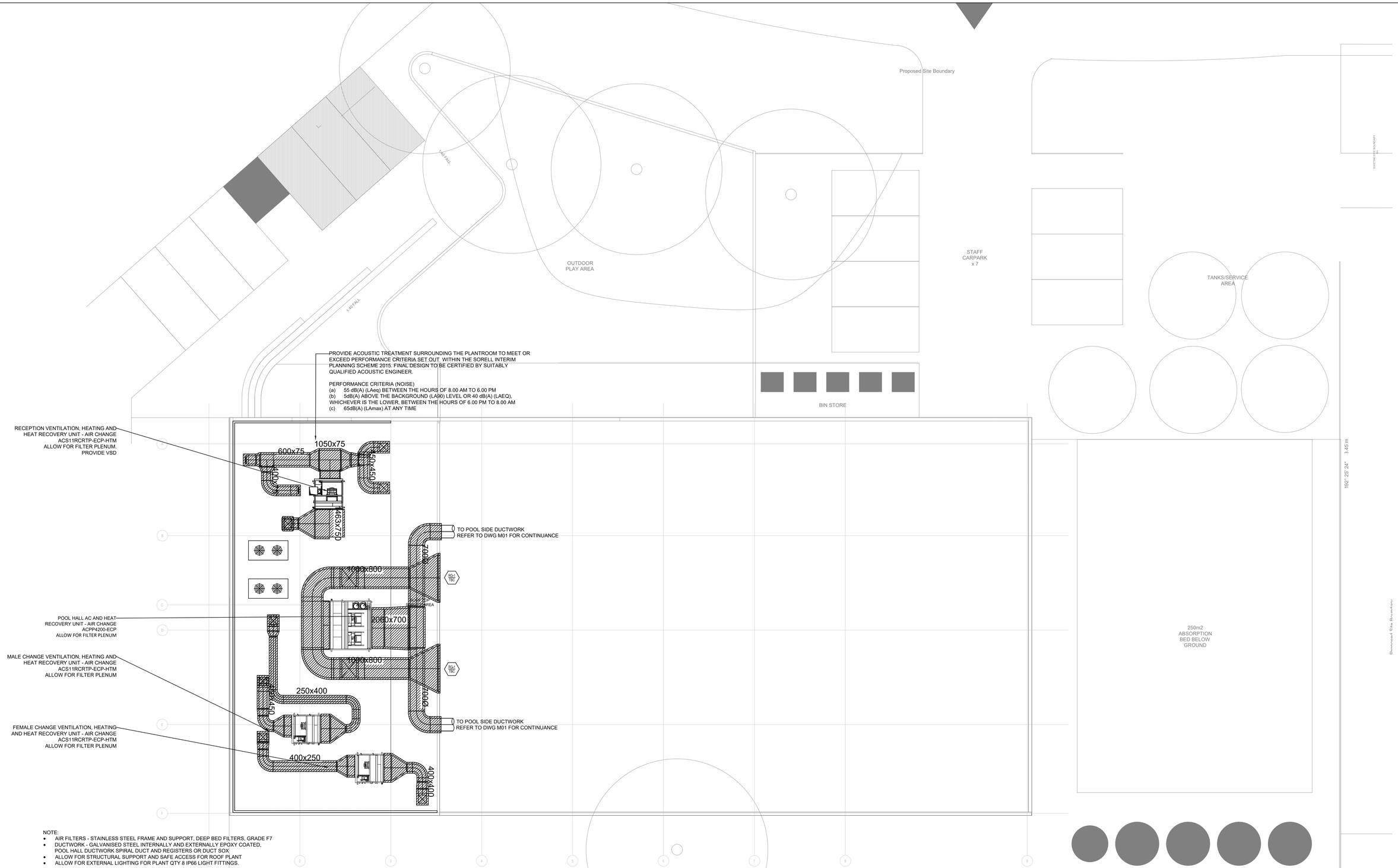
| Address: | Old Forcett Road<br>Dodges Ferry TAS 7173 | Issue: | PRELIMINARY |
| | | Project No: | 02221 |

| Sheet: | MECHANICAL SERVICES<br>VENTILATION AND DUCTWORK LAYOUT | | | |
|---|---|---|---|---|
| Sheet No: | REV No: | Scale: | Size: | NORTH POINT |
| M01 | P3 | 1:100 | A1 | |




NOTE:
- AIR FILTERS - STAINLESS STEEL FRAME AND SUPPORT, DEEP BED FILTERS, GRADE F7
- DUCTWORK - GALVANISED STEEL INTERNALLY AND EXTERNALLY EPOXY COATED, POOL HALL DUCTWORK SPIRAL DUCT AND REGISTERS OR DUCT SOX
- ALLOW FOR STRUCTURAL SUPPORT AND SAFE ACCESS FOR ROOF PLANT
- ALLOW FOR EXTERNAL LIGHTING FOR PLANT QTY 8 IP66 LIGHT FITTINGS.

## ROOF PLAN
MECHANICAL SERVICES
1:100

0 1 2 3 4 5 10
GRAPHIC SCALE: 1:100

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PRELIMINARY
NOT FOR CONSTRUCTION

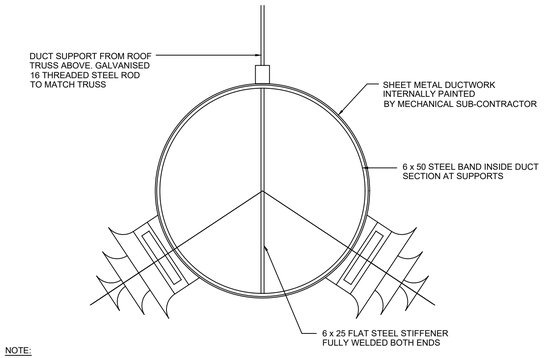
| REV. | DESCRIPTION | DATE |
|---|---|---|
| P3 | PRELIMINARY | 24/09/21 |
| P2 | PRELIMINARY | 02/09/21 |
| P1 | PRELIMINARY | 08/04/21 |

DRAWN: MJB
CHECKED: DAS
DESIGN: DAS
DESIGN CHECK: -
APPROVAL

Andrew Sutherland Consulting Engineers
11 Morrison Street, Hobart, TAS, 7000
+613 6224 2424
office@asceng.com.au
www.asceng.com.au
REGISTERED Building Practitioner

BEWARE OF UNDERGROUND SERVICES
DIAL BEFORE YOU DIG www.1100.com.au
The location of underground services are approximate only and their exact location should be proven on site by the relevant authorities. No guarantee is given that all services are shown.

Client: Luke Doerner
Project Name: Southern Beaches Swin Centre
Address: Old Forcett Road, Dodges Ferry TAS 7173
Issue: PRELIMINARY
Project No: 02221
Sheet: MECHANICAL SERVICES ROOF PLANT LAYOUT
Sheet No: M02
REV No: P3
Scale: 1:100
Size: A1
NORTH POINT

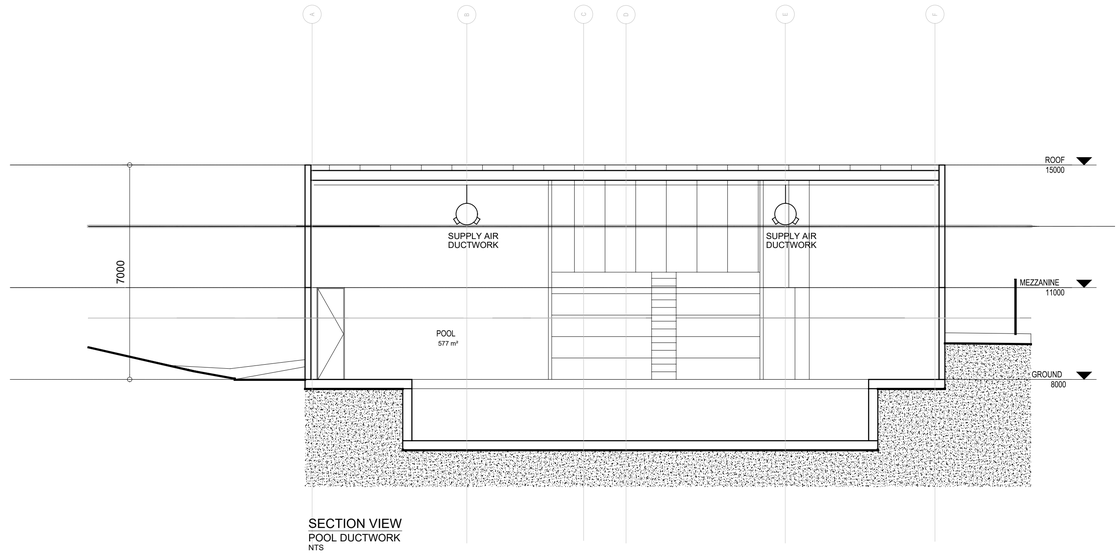



NOTE:

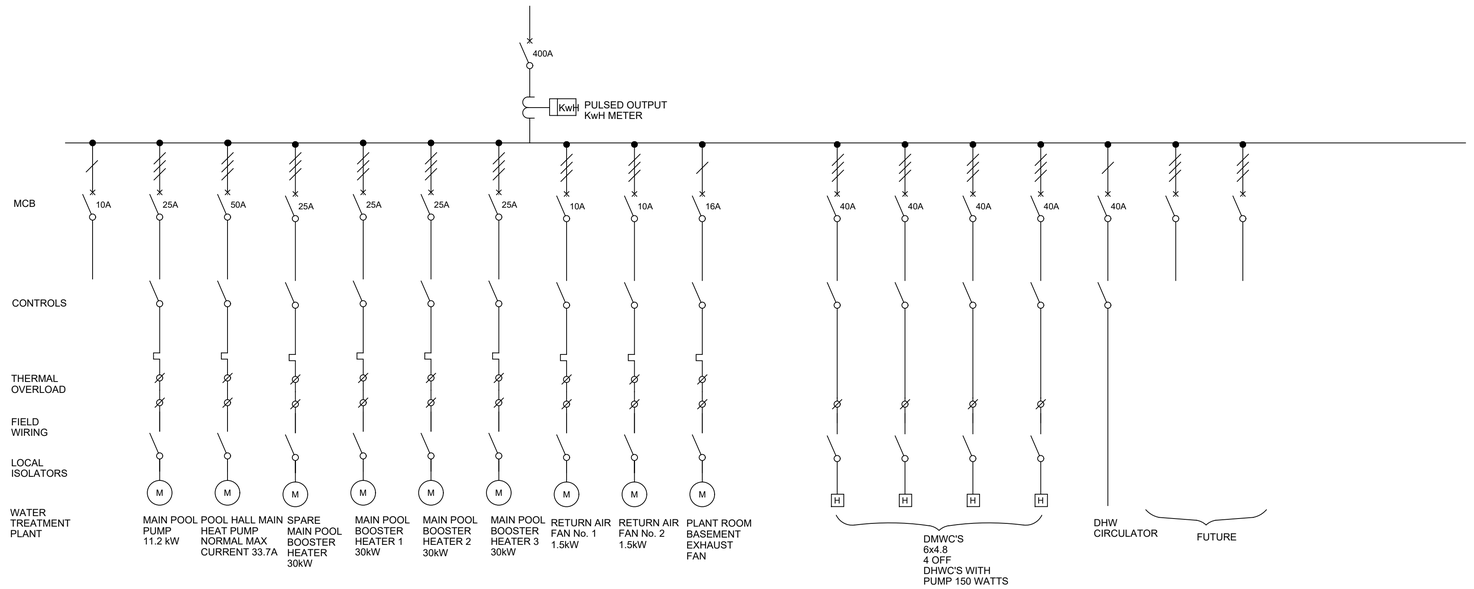
JET TYPE DIFFUSERS 300Ø
WITH VOLUME CONTROL DEVICES

DUCTWORK, SUPPORT, ACCESSORIES
AND EXTERNAL PAINTING BY BUILDER.

## DUCT SUPPORT
DETAIL A
NTS




## SECTION VIEW
POOL DUCTWORK
NTS




THESE MAY BE SERVED DIRECTLY FROM THE MAIN SWITCH BOARD. CO-ORDINATE WITH BUILDERS ELECTRICAL SUB-CONTRACTOR.

## MECHANICAL SERVICES DISTRIBUTION BOARD MSSB1

## LEGEND

- CFS UNIT
- LOAD BREAK ISOLATOR
- LOCAL ISOLATOR
- CIRCUIT BREAKER
- THERMAL OVERLOAD
- AMMETER
- SELECTOR SWITCH
- THERMAL OVERLOAD CONTACT FIELD TERMINAL
- KILOWATT HOUR METER
- FIELD CABLING
- CURRENT TRANSFORMER
- SWITCHBOARD
- REMOTE CONTROLLER

## NOTE:

TOILET EXHAUST FAN TO BE SUPPLIED FROM LOCAL L&P DISTRIBUTION BOARDS BY MECHANICAL SUB CONTRACTOR.

0 1 2 3 4 5 10
GRAPHIC SCALE: 1:100

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| | |
|---|---|
| DRAWN: | MJB |
| CHECKED: | DAS |
| DESIGN: | DAS |
| DESIGN CHECK: | - |
| APPROVAL | |

Andrew Sutherland Consulting Engineers
11 Morrison Street, Hobart, TAS, 7000
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| | | | | | | |
|---|---|---|---|---|---|---|
| Client: Luke Doerner | Project Name: Southern Beaches Swin Centre | | Sheet: MECHANICAL SERVICES SECTION, DETAIL & MSSB | | | |
| Address: Old Forcett Road Dodges Ferry TAS 7173 | Issue: PRELIMINARY | Project No: 02221 | Sheet No: M03 | REV No: P3 | Scale: 1:100 | Size: A1 |

NORTH POINT