



CITY OF HOBART

SUPPORTING INFORMATION

CITY PLANNING COMMITTEE MEETING

OPEN PORTION OF THE MEETING

MONDAY, 14 AUGUST 2017

AT 5.00 PM

VENUE: LADY OSBORNE ROOM, TOWN HALL

TABLE OF CONTENTS

- 7.2 Hobart Interim Planning Scheme - Planning Scheme Amendment PSA-17-5 and S43A Permit Application PLN-17-479 - 286 Argyle Street, North Hobart

Attachment B Application Report and Plans 2



Submission to Planning Authority Notice

Council Planning Permit No.	PLN-17-479	Council notice date	29/06/2017
TasWater details			
TasWater Reference No.	TWDA 2017/01009-HCC		Date of response
TasWater Contact	Greg Clausen	Phone No.	6345 6323
Response issued to			
Council name	HOBART CITY COUNCIL		
Contact details	coh@hobartcity.com.au		
Development details			
Address	286-288 ARGYLE ST, NORTH HOBART	Property ID (PID)	5655233
Description of development	Partial Demolition, Alterations, Signage and Change of Use to Twelve Multiple Dwellings		
Schedule of drawings/documents			
Prepared by	Drawing/document No.	Revision No.	Date of Issue
markdruryarchitects	Existing Ground Floor Plan		June 2017
markdruryarchitects	Proposed Ground Floor Plan		June 2017
Howrah Plumbing	Sewer Long Section	A	13-06-17
Howrah Plumbing	Indicative Structural Pier and Panel Plan	A	13-06-17
Howrah Plumbing	Ground Floor Hydraulic Services	A	13-06-17
Conditions			
<p>Pursuant to the <i>Water and Sewerage Industry Act 2008</i> (TAS) Section 56P(1) TasWater makes the following submission(s):</p> <ol style="list-style-type: none"> 1. TasWater does not object to the draft amendment to planning scheme and has no formal comments for the Tasmanian Planning Commission in relation to this matter and does not require to be notified of nor attend any subsequent hearings. <p>Pursuant to the <i>Water and Sewerage Industry Act 2008</i> (TAS) Section 56P(1) TasWater imposes the following conditions on the permit for this application:</p> <p>CONNECTIONS & METERING</p> <ol style="list-style-type: none"> 1. A suitably sized water supply with metered connection / sewerage system and connection for this unit development must be designed and constructed to TasWater's satisfaction and be in accordance with any other conditions in this permit. 2. Any removal/supply and installation of water meters and/or the removal of redundant and/or installation of new and modified property service connections must be carried out by TasWater at the developer's cost. <p>56W CONSENT</p> <ol style="list-style-type: none"> 3. Prior to the issue of the Certificate for Certifiable Work (Building) and/or (Plumbing) by TasWater the applicant or landowner as the case may be must make application to TasWater pursuant to section 56W of the <i>Water and Sewerage Industry Act 2008</i> for its consent in respect of that part of the development which is built over or within two metres of TasWater infrastructure. 			



The plans submitted with the application for the Certificate for Certifiable Work (Building) and/or (Plumbing) must show footings of proposed buildings located over or within 2.0m from TasWater pipes and must be designed by a suitably qualified person to adequately protect the integrity of TasWater's infrastructure, and to TasWater's satisfaction, be in accordance with AS3500 Part 2.2 Section 3.8 to ensure that no loads are transferred to TasWater's pipes. These plans must also include a cross sectional view through the footings which clearly shows;

- a. Existing pipe depth and proposed finished surface levels over the pipe;
- b. The line of influence from the base of the footing must pass below the invert of the pipe and be clear of the pipe trench and;
- c. A note on the plan indicating how the pipe location and depth were ascertained.

BOUNDARY TRAP AREA

4. The proposed development is within a boundary trap area and the developer must provide a boundary trap that prevents noxious gases or persistent odours back venting into the property's sanitary drain. The boundary trap must be contained within the property boundaries and the property owner remains responsible for the ownership, operation and maintenance of the boundary trap.

DEVELOPMENT ASSESSMENT FEES

5. The applicant or landowner as the case may be, must pay a rezoning assessment fee and development assessment fee to TasWater, as approved by the Economic Regulator and the fees will be indexed, until the date they are paid to TasWater, as follows:
 - a. Rezoning Assessment: \$479.09; and
 - b. Development Assessment: \$343.55

The payment is required within 30 days of the issue of an invoice by TasWater.

Advice

For information on TasWater development standards, please visit
<http://www.taswater.com.au/Development/Development-Standards>

For application forms please visit <http://www.taswater.com.au/Development/Forms>

The developer is responsible for arranging to locate existing TasWater infrastructure and clearly showing it on any drawings. Existing TasWater infrastructure may be located by TasWater (call 136 992) on site at the developer's cost, alternatively a surveyor and/or a private contractor may be engaged at the developers cost to locate the infrastructure.

Declaration

The drawings/documents and conditions stated above constitute TasWater's Submission to Planning Authority Notice.

Authorised by

Jason Taylor

Development Assessment Manager

TasWater Contact Details

Phone	13 6992	Email	development@taswater.com.au
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21 June 2017

Manager Planning Policy & Heritage and Senior Statutory Planner
City Planning Division
City of Hobart
GPO Box 503
HOBART TAS 7001

Dear James & Ben

**286-288 Argyle Street, North Hobart
Section 43A Application**

Please find attached an application pursuant to Section 43A of the former provisions of the *Land Use Planning and Approvals Act 1993*.

The proposed planning scheme amendment is to rezone the land at 286-288 Argyle Street, North Hobart from Light Industrial to Inner Residential.

The permit application seeks approval to convert the existing warehouse into 12 residential apartments through a change of use to the Residential Use Class with alterations to the existing building and new signage.

A number of technical assessments are included with the application (appendices to the Supporting Planning Submission), however the Site Contamination Assessment is still being finalised and will be provided over the coming days.

Should you have any queries regarding this application please do not hesitate to contact me at emma@erassociates.com.au or on 0409 787 715.

Yours sincerely,

Emma Riley, MPIA
Director & Principal Planner



286 – 288 Argyle Street, North Hobart

Submission to City of Hobart in
support of a Section 43A request to amend the
Hobart Interim Planning Scheme 2015 and
permit application for residential apartments

21 June 2017



Contents

1.	Introduction	2
1.1	Purpose of the Report	2
1.2	Proposed Amendment	2
1.3	Proposed Use and Development	3
1.4	Statutory References	3
1.5	Title Information	3
2.	The Site and Surrounds	4
2.1	The Subject Land	4
2.2	Description of Surrounding Area	6
2.3	Contextual Analysis	7
2.4	Servicing	9
2.5	Consideration of Infrastructure Assets	9
2.6	Photos	10
3.	Assessment of Proposed Amendment.	12
3.1	Requirements of the Act	12
3.2	Southern Tasmanian Regional Land Use Strategy	13
3.3	Objectives of the Resource Management and Planning System.	15
3.4	State Policies	17
3.5	Gas Pipelines Act 2000	18
3.6	Potential Land Use Conflict	18
3.6	Regional Impact	19
3.7	Municipal Strategy	19
3.8	Other requirements of Section 20	20
4.	Assessment of Development Application	21
4.1	Detailed description of proposed Use and Development	21
4.2	Hobart Interim Planning Scheme 2015	22
4.3	Inner Residential Zone	23
4.4	Potentially Contaminated Land Code	27
4.5	Road and Rail Assets Code	27
4.6	Parking and Access Code	29
4.7	Electricity Transmission Infrastructure Protection Code	32
4.8	Signage	33

5. Conclusion

35

Appendices

- A Titles
- B Owners Consent
- C Proposed Plan
- D Traffic Impact Assessment
- E Environmental Site Assessment
- F Advice from Tas Networks
- G Servicing Information

NOTE

References in this document to the provisions of the *Land Use Planning and Approvals Act 1993* are references to the former provisions of the Act as defined in Section 2 of Schedule 6 – Savings and transitional provisions of the Act.

1. Introduction

1.1 Purpose of the Report

Emma Riley and Associates (ERA) have been engaged by Mark Drury Architect to request an amendment to the *Hobart Interim Planning Scheme 2015* (Interim Planning Scheme) and submission of a permit application for residential apartments pursuant to Section 43A of the *Land Use Planning and Approvals Act 1993* (the Act).

This report forms the basis of the application and has been prepared taking into account the provisions of the Interim Planning Scheme, the requirements under Section 32 of the Act and other relevant strategic documents.

Enquiries relating to this request can be directed to

Emma Riley
Principal Planner
Emma Riley & Associates Pty Ltd
40 Molle Street
HOBART TAS 7000

M: 0409 787 715

E: emma@erassociates.com.au

1.2 Proposed Amendment

The proposed amendment seeks approval to rezone the land from Light Industrial to Inner Residential under the Interim Planning Scheme as shown in Figure 1 below.



Figure 1: Area of land to be rezoned to Inner Residential

1.3 Proposed Use and Development

The permit application seeks approval to convert the existing vacant warehouse into 12 residential apartments.

The proposal is to utilise the shell of the existing structure, with the building vertically divided into 12 components aligning within the current steel portal frame structure so that each apartment is across three levels.

The ground floor will be converted into the entry space, storage and vehicle parking garage. Pedestrian and vehicular access will be off Argyle Street. The first floor will contain living spaces for each apartment with the second floor accommodating the bedrooms and bathroom.

Each apartment will have access to a series of courtyards, light wells and open 'slots' directing natural light and air into the core of the building while allowing for the retention of the existing brick walls to the side and rear boundaries.

There will be physical alterations to the facade of the building and northern and southern elevations. The rear of the building remains unaltered.

A detailed description of the proposal is outlined at Section 4.1 of this report.

1.4 Statutory References

1.4.1 Name of Planning Instrument

The subject of the proposed amendment is the *Hobart Interim Planning Scheme 2015* (hence forth referred to as the Interim Planning Scheme).

1.4.2 Name of Planning Authority

The Planning Authority is the **City of Hobart**.

1.5 Title Information

The proposed amendment relates to the following titles:

Address	Owner(s)	Title Reference	Land Area
286-288 Argyle Street	TTA Property Pty Ltd	9228/1	466m ²
286-288 Argyle Street	TTA Property Pty Ltd	65899/2	345m ²

The Certificates of Title are attached for this property and can be found in *Appendix A*.

2. The Site and Surrounds

2.1 The Subject Land

The subject land at 286-288 Argyle Street is located on the eastern side of Argyle Street between Burnett and Lefroy Streets. It is located opposite the intersection with Smith Street.

The 811m² site is currently fully developed comprising a large brick warehouse extending across the entire site area. The warehouse was built in the late 1970s for Giffords Glass (late K & D Glass) for glass cutting and framing. Prior to this the site was used for other industrial purposes from the early 1960s but in more recent times has been used for the sale of bulky goods. The property is now vacant and has been for approximately 2 years.

Prior to its use for light industrial purposes the site was used as residential. Two small cottages were demolished in the late 1950s to make way for the warehouse.

The subject land is as shown in **Figure 2** below.



Figure 2: Land subject to the amendment request (source: www.maps.thelist.tas.gov.au).



Figure 3: Aerial imagery from 1957 showing cottages on the subject site



Figure 4: Aerial imagery from 1965 showing the conversion of the site to industrial purposes



Figure 5: Aerial imagery from 1984 showing current building. The car yard in the centre of the street block is the land which was converted to residential through an infill project funded under the Better Cities Program.

2.2 Description of Surrounding Area

The subject land is located within North Hobart. Broadly North Hobart comprises a mix of residential and commercial land uses. The main activity centre is located along Elizabeth Street between Burnett and Federal Street. The subject land is located to the east of this on Argyle Street, being a main arterial road connecting the city area through to suburbs to the north.

The strip of properties on the same side of Argyle Street as the subject land extending between Burnett and Federal Streets is generally within the Light Industrial zone as shown in Figure 2 below. Existing land uses, are however, varied and include service industries, bulk goods, retail, food services, residential and business and professional services. The mix of uses are indicative of the area not being a planned industrial estate and was originally a residential area.

The remaining of the surrounding area is zoned Inner Residential, although still contains a mix of commercial and service based industries a legacy of the suburb's heritage. Over the past 25+ years North Hobart has been gradually gentrified with commercial and industrial uses throughout the section between Elizabeth Street and Letitia Streets gradually replaced by residential land uses.

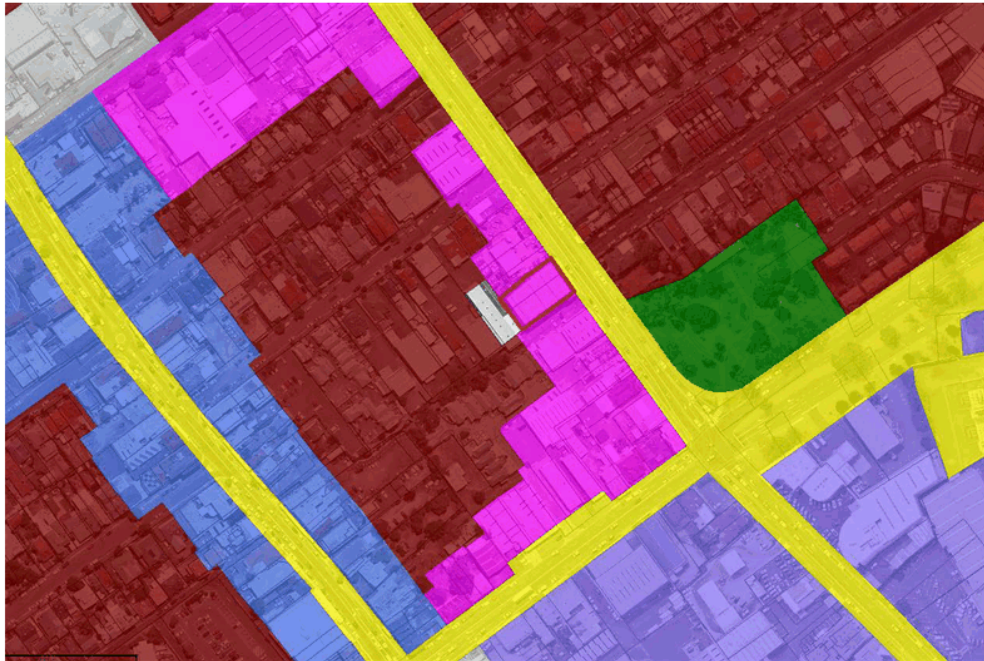


Figure 3: Existing zoning under the Hobart Interim Planning Scheme 2015 (source: www.thelist.tas.gov.au)

2.3 Contextual Analysis

Its move to a primary residential suburb with a central activity centre (along Elizabeth Street) has been a slow but deliberate strategy furthered by specific programs including the Better Cities Program which resulted in specific infill residential projects off Lefroy Street in close proximity to the subject land.

Today a significant portion of North Hobart has been identified as an infill residential area. This has primarily arisen because of the Southern Tasmania Regional Land Use Strategy and the Southern Integrated Transport Plan.

Land within a 400 metre corridor of the Hobart to Glenorchy Transit Corridor (see Figure 4 over page) has not only been identified as a densification area but subject to further studies such as the Infill Development Pilot Project to identify specific opportunities for further residential use and development.



Figure 4. Area of land within walking distance of the Hobart to Glenorchy transit corridor. The location of the subject site is shown with the red dot (source: Infill Development Pilot Project, Stage 1 Report)

North Hobart is now a highly desirable residential suburb. Centred around the North Hobart restaurant strip there is older housing stock of detached and semi-detached dwellings - often heritage listed - on small allotments, interspersed with apartments, units and terrace style housing.

At the 2011 census, 50% of the dwelling stock in North Hobart was detached dwellings compared to 82.5% for Greater Hobart; 24% was semi-detached dwelling as compared to 6.4% for Greater Hobart; and 34.5% was flat, unit or apartments compared to 10.5%.

North Hobart has a young population: the median age at the 2011 census was 33. It has a higher proportion of group households and single (or lone) person households than Greater Hobart as well as a high proportion of couple families without children. 20.7% of the population is within the 15 to 24 age group as compared to 13.4% for Greater Hobart indicating the presence of young independent adults.

The suburb is relatively affluent with a median weekly household income of \$1,159, well above the median for Greater Hobart of \$1,065.

A very high proportion of dwellings within North Hobart are rented (52%) with only 45% owner occupied. Dwelling prices have steadily increased over the last 18 years with some minor fluctuations: the median house price is now \$450,000 and median other dwelling price \$290,000. Rental price for single dwellings has also steadily increased, as has rental prices for other dwellings although with greater fluctuations.

2.4 Servicing

The subject site is fully serviced with reticulated services which are shown on the associated indicative servicing plans by Howrah Plumbing. These plans can be found in *Appendix C*

2.5 Consideration of Infrastructure Assets

Within the Argyle Street reservation there are two (2) 110kV underground electricity cables that extend from the Creek Road to North Hobart substations. One of these is likely to be located directly adjacent to the subject land. A number of other 11kV underground electricity cables are located within the Argyle Street reservation. Advice from Tas Networks in regards to these electricity cables is attached at *Appendix F*.

There is also a sewer main dissecting the site. An assessment of the current condition of the sewer main is included in *Appendix G*. Preliminary discussions with TasWater have been undertaken by the Architect, Mark Drury and Hydraulic Engineer Stuart Lamond.

2.6 Photos

Photo 1: View towards subject site from Argyle Street adjacent to Wagon and Horses Hotel



Photo 2: Existing front facade of warehouse



Photo 3: View down laneway adjoining to the South. Existing infill development can be seen in the background.



Photo 4: Existing warehouse

3. Assessment of Proposed Amendment.

3.1 Requirements of the Act

Section (2)(b) of Schedule 6 of the *Land Use Planning and Approvals Act 1993* (the Act) saves Parts 2A and 3 of the former provisions under the Act.

Pursuant to Section 32(1) of the former provisions, a draft amendment of a planning scheme, and an amendment of a planning scheme, in the opinion of the relevant decision-maker within the meaning of section 20(2A)–

(a).....

(b).....

(c).....

(d).....

(e) must, as far as practicable, avoid the potential for land use conflicts with use and development permissible under the planning scheme applying to the adjacent area; and

(ea) must not conflict with the requirements of section 300; and

(f) must have regard to the impact that the use and development permissible under the amendment will have on the use and development of the region as an entity in environmental, economic and social terms.

(2) The provisions of section 20(2), (3), (4), (5), (6), (7), (8) and (9) apply to the amendment of a planning scheme in the same manner as they apply to planning schemes.

Section 300 of the Act requires that an amendment to an interim planning scheme is as far as practicable, consistent with the regional land use strategy. Section 300 also sets a number of requirements relating to the insertion of a local provision and its relationship to a common provision.

In addition to these requirements, Section 20(1) is also relevant, as a planning scheme amendment is also the making of a planning scheme:

(1) A relevant decision-maker, in preparing, accepting, declaring or making a relevant scheme, or giving approval in relation to the making or approving of a relevant scheme, must, in the opinion of the relevant decision-maker–

(a) seek to further the objectives set out in Schedule 1 within the area covered by the scheme; and

(b) prepare the scheme in accordance with State Policies made under section 11 of the State Policies and Projects Act 1993; and

(c) ...

(d) have regard to the strategic plan of a council referred to in Division 2 of Part 7 of the Local Government Act 1993 as adopted by the council at the time the planning scheme is prepared; and

(e) have regard to the safety requirements set out in the standards prescribed under the Gas Pipelines Act 2000.

3.2 Southern Tasmanian Regional Land Use Strategy

The Southern Tasmanian Regional Land Use Strategy was declared in October 2011 with an amended strategy declared in October 2013 and then again on 14 September 2016. This Regional strategy provides direction on future use and development within the Southern Region.

For the proposed amendment of relevance are the Industrial Activity policies within Section 17 and the Settlement and Residential Policies within Section 19 of the Strategy. The Industrial Activity policies are relevant as the proposed amendment results in the rezoning of existing industrial land.

Demand for industrial land within the region can be categorised into the following four types of industrial types of activity as identified within the Southern Tasmania Industrial Land Study (Industrial Land Study)¹:

- **Local service industries**, which are population driven;
- **Export oriented industries**, which are driven by market opportunities to export to the mainland and overseas. The uptake of the irrigation schemes and resulting agricultural transition and growth of export clusters are key determinants;
- **Transport, warehousing and wholesales**, which are intermediate industries driven by both population and export growth and trend to gain higher efficiencies with Just-in-Time (JiT) distribution processes. In the previous study this industry was distributed between local service and export oriented industries;
- **Bulky goods retailing**, driven by population growth and the sector specific characteristics most notably the matured life cycle of this subsector.

Typically, many local service industries are accommodated within land zoned Light Industrial. These are generally required to be located primarily in proximity to population centres.

In comparison, export orientated industries and transport, warehousing and wholesales are typically located in larger industrial estates where key locational characteristics are primarily about proximity to transport routes and supporting infrastructures. For example, the Brighton Industrial Hub, is now a key location for transport, warehousing and wholesale activity within Southern Tasmania.

Bulky goods retailing within the context of Tasmania, is often located in the Commercial zone, although it sometimes occurs in Light Industrial or Business zoned land.

¹ The Southern Tasmania Industrial Land Study (Stage 1 and Stage 2 reports) was prepared in response to the initial identification of a potential shortage identified in the 2011 declared version of the Regional Land Use Strategy. When revised in 2013, the Regional Land Use Strategy was amended to incorporate the Southern Tasmania Industrial Land Study into its specific policies under Section 17.

The demand for local service industries is primarily population drive. As identified in the Industrial Land Study (p.3) demographic changes and trends in income and household expenditure patterns largely determine the growth of these industries and therefore the demand for industrial land.

The Industrial Land Study also identified that in general terms the land and location requirements for local services industries requires:

- Good access to arterial roads;
- Land parcels between 1,000 to 2,000 sqm; and
- Affordable land (approximately \$100 to \$300 per square metre).

Within the City of Hobart municipal area the Industrial Land Study has identified that through to 2026 the shortfall of land for local service industries is likely to be 11.7 to 14.5 hectares, although it is important to note that this shortfall arises because of demand calculated on the basis of population growth: the population growth itself arising from increased opportunities for infill residential development.

This means that the City of Hobart relies more heavily on adjoining municipal areas to meet its demand for local services industries. Although this is not an uncommon situation in heavily urbanised municipalities across Australia where there are significant strategic benefits arising from converting industrial land to higher value land uses.

Furthermore, this trend has already been evident for a considerable period of time: industrial activities have gradually been relocating outside of the City of Hobart, as market pressures for residential and commercial activities in the inner suburbs have changed the nature of the highest and best use for urban land around the City of Hobart.

Importantly, it is also necessary to recognise that with the establishment of the Brighton Industrial Hub – and to a lesser extent the Cambridge Park Industrial Estate – the capacity of the adjoining Glenorchy municipal area to accommodate the demand for local service industries across both municipalities is increasing.

As identified in the Industrial Land Study, the co-location and geographic replacement trends evident across Australia in the past 20 years, sees high impact and transport orientated uses relocated to strategically local sites on the urban fringe with supporting industries co-locating. This provides capacity within the land they vacate for smaller scale, often light industrial uses. There is emerging evidence that this is already occurring with the relocation of warehousing type activities to the Brighton area with industrial land in Glenorchy being take up by service based industries.

The proposed amendment amounts to rezoning of less than 0.1 hectare of industrial land. Comparatively negligible in the context of the supply and demand of land for local services industries. Furthermore, the land to be rezoned, while accessible off an arterial road is smaller than typically required for local service industries today with a higher land value than generally desirable.

In this context it is considered that the proposed amendment will not offend Regional Policy IA1 to:

Identify, protect and manage the supply of well sited industrial land that will meet region need across then 5, 15 and 30 year horizons.

Regional Policies IA2 and IA3 are not considered relevant.

Moreover, the proposed amendment directly furthers the attainment of the Settlement and Residential Development policies.

Regional Policy SRD 2 requires that residential growth for Greater Hobart is managed through a whole of settlement basis and in a manner, that balances the need for greater sustainability, housing choice and affordability. Prior to the setting of the Regional Land Use Strategy, 85% of residential growth was primarily located in outer suburbs and at a density of between 7 to 10 dwellings per hectare: an unsustainable pattern even with low population growth.

To achieve this overall policy the Regional Land Use Strategy at Regional Policy SRD 2.1 sets a 50% infill development target for Greater Hobart. This is further supportive by Regional Policies SRD 2.6 and SRD 2.7.

Specifically, Regional Policy SRD 2.6 states:

Increase densities to an average of at least 25 dwellings per hectare (net density) within a distance of 400 to 800 metres of integrated transit corridors and Principal and Primary Activity Centres, subject to heritage constraints.

Regional Policy SRD 2.7 requires that 40% of the 50% infill target is accommodated within the City of Hobart municipal area (equivalent to 3312 additional dwellings in existing urban areas).

Map 10 at page 100 of the Regional Land Use Strategy identifies a densification area that aligns with Regional Policy SRD 2.6.

The subject land is located within the densification area. It is located only 200 metres (270 metres walking distance using existing road network) from the transit corridor along Elizabeth Street. It adjoins and is located to existing inner residential areas including land at 4 Lefroy Street which was recently rezoned from Light Industrial to Inner Residential.

The rezoning of the subject land to Inner Residential will increase the supply of dwellings within the regionally identified densification area. As a brownfield site it will present an opportunity to contribute to a mix of dwelling types within the area due to the existing building form, also further Regional Policy SRD2.9.

3.3 Objectives of the Resource Management and Planning System.

Objective	Response
<i>Part 1</i>	
<i>(a) to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity</i>	The subject land is existing urban land. The rezoning will facilitate a change from one form of urban land use to another. It will therefore not affect the attainment of this objective.
<i>(b) to provide for the fair, orderly and sustainable use and development of air, land and water</i>	The development represents orderly and sustainable use and development of air, land and water. The rezoning facilitates the use of an existing underutilised former industrial site for residential purposes within the regionally identified residential densification area.

Objective	Response
<i>(c) to encourage public involvement in resource management and planning</i>	Public involvement will be achieved through the public exhibition process for the draft amendment and draft permit.
<i>(d) to facilitate economic development in accordance with the objectives set out in paragraphs (a), (b) and (c)</i>	The proposed amendment will facilitate economic development through the redevelopment of the site for residential purposes. It will contribute to opportunities for inner city living which is recognised as supporting the economic role and function of the adjacent activity centres, including the Hobart CBD and North Hobart area.
<i>(e) to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State</i>	The amendment process demonstrates the sharing of responsibility for resource management and planning between different spheres of government, the community and industry.
<i>Part 2</i>	
<i>(a) to require sound strategic planning and co-ordinated action by State and local government</i>	The proposed amendment is consistent with the Southern Tasmania Regional Land Use Strategy. As such, it represents sound strategic planning. The planning scheme amendment process allows for the coordinated action by State and local government.
<i>(b) to establish a system of planning instruments to be the principal way of setting objectives, policies and controls for the use, development and protection of land</i>	The proposed amendment does not affect the established system of planning instruments: it will allow for the future development of the land to be considered against the provisions of the planning scheme.
<i>(c) to ensure that the effects on the environment are considered and provide for explicit consideration of social and economic effects when decisions are made about the use and development of land</i>	As demonstrated within this report, there are limited environmental considerations relevant to the subject land. The exception is the identification of the land as potentially contaminated. The existing provisions of the Interim Planning Scheme provide adequate safeguards in regard to this issue. No further provisions are considered necessary.

Objective	Response
<i>(d) to require land use and development planning and policy to be easily integrated with environmental, social, economic, conservation and resource management policies at State, regional and municipal levels</i>	The proposed amendment does not affect the attainment of this objective.
<i>(e) to provide for the consolidation of approvals for land use or development and related matters, and to co-ordinate planning approvals with related approvals</i>	The S43A process ensures that there is a consolidated approval process.
<i>(f) to secure a pleasant, efficient and safe working, living and recreational environment for all Tasmanians and visitors to Tasmania</i>	The proposed amendment will facilitate an opportunity for residential living in proximity to the major employment district in Southern Tasmania, a wide range of retail and service activities as well as entertainment relates uses and open space networks including Soundy Park located on the opposite side of Argyle Street and the Queens Domain recreational facilities.
<i>(g) to conserve those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value</i>	The proposed amendment will have no impact upon a place listed or identified as significant for its scientific, aesthetic, architectural, historical or cultural value.
<i>(h) to protect public infrastructure and other assets and enable the orderly provision and co-ordination of public utilities and other facilities for the benefit of the community.</i>	<p>The proposed amendment will support the orderly provision of housing development and will have no adverse impact on the coordination of public utilities and other facilities.</p> <p>There are adequate safeguards through the permit application process to protect public infrastructure in proximity to the subject land.</p>
<i>(i) to provide a planning framework which fully considers land capability.</i>	The proposed amendment does not affect the attainment of this objective.

3.4 State Policies

3.4.1 State Policy on the Protection of Agricultural Land 2009

The *State Policy on the Protection of Agricultural Land 2009* does not apply to the proposed amendment.

3.4.2 State Policy on Water Quality Management 1997

The subject land has access to full reticulated services including stormwater. Given this and the nature of the existing development on the site, it is considered that there will be no impact on Water Quality from the proposed amendment.

3.4.3 State Coastal Policy 1996

The subject site is over 1 kilometre from the coast. The State Coastal Policy therefore does not apply the proposed amendment

3.4.4 National Environmental Protection Measures

National Environmental Protection Measures (NEPMs) are developed under the *National Environment Protection Council (Tasmania) Act 1995* and outline objectives and protections for aspects of the environment. Section 12A of the *State Policies and Projects Act 1993* provides NEPMs with the status of a State Policy.

Seven NEPMs have been made to date that deal with:

- Ambient air quality;
- Air Toxins;
- Assessment of Site Contamination;
- Diesel Vehicle Emissions;
- Movement of Controlled Waste Between States and Territories;
- National Pollutant Inventory; and
- Used Packaging Materials.

Given the sites industrial history, of specific relevance is the NEPM on the Assessment of Site Contamination.

In the context of the proposed amendment, it is considered that the existing Site Contamination Code provides adequate safeguards to address issues associated with site contamination at the permit application stage.

A Site Contamination Assessment has been prepared to accompany the permit application component in response to the requirements of the Site Contamination Code under the Interim Planning Scheme.

3.5 Gas Pipelines Act 2000

The subject land is not affected by the Gas Pipeline. This requirement is therefore not applicable.

3.6 Potential Land Use Conflict

The subject land is currently located within the Light Industrial Zone and under the proposed amendment will still adjoin the Light Industrial Zone.

The purpose of the Light Industrial Zone under the Interim Planning Scheme include at Clause 24.1.1:

To provide for manufacturing, processing, repair, storage and distribution of goods and materials where off-site impacts are minimal or can be managed to minimise conflict to impact on the amenity of any other uses.

To minimise land use conflict in order to protect the industrial viability and the safety and amenity of sensitive land uses in adjacent zones.

The purpose of the Light Industrial Zone therefore envisages that it will exist in close proximity to zones providing for sensitive land uses, such as the Inner Residential Zone. This is the case in the current situation where the strip of Light Industrial zoning that the subject land is located within adjoins a larger area of Inner Residential zoning.

The nature of this mix of uses in proximity to each other is a key characteristic of the North Hobart area, with its gradual 'gentrification' over the past 30 to 35 years. Within the surrounding area, medium density residential development co-exists with long standing light industrial uses and service based industries with limited evidence of land use conflict. In other words, the expectations of residential amenity within the area are generally consistent with what is reasonable in an inner urban area.

It is further noted while the adjacent area on Argyle Street is zoned Light Industrial it has a mixed use characteristics. The adjoining site to the north is used for a car sales yard (bulky good sales use class). Adjoining to the south is an electrical equipment repair shop (service industry). More broadly there is a mix of General Retail and Hire, Business and Professional Services and Food Services.

Adjoining to the west and on the opposite side of Argyle Street are existing Inner Residential zoned areas.

Notwithstanding this, the provisions of the Light Industrial Zone also provide safeguards should the adjoining properties seek a change of use to an industrial activity where there is potential for off-site impact. Specifically, the Light Industrial Zone includes use standards relating to hours of operation, noise emissions, external lighting and commercial vehicle movements in proximity to a residential zone.

3.6 Regional Impact

While the proposed amendment would result in the loss of land zoned Light Industrial, despite being potentially available for that use for a number of years, the land has not been used for Light Industrial purposes for approximately 2 years.

It is considered that the change in zoning of this land will not have any noticeable impact upon the supply and provision of industrial land across the region. Alternatively, it is directly responsive to the strategic directions articulated in the Regional Land Use Strategy relating to increasing opportunities for residential use and development along the Hobart to Glenorchy transit corridor

The proposed amendment is therefore considered to further the attainment of the Residential and Settlement policies and is therefore consistent within the Southern Tasmania Regional Land Use Strategy.

3.7 Municipal Strategy

Section 20(d) of the Act requires the Commission to have regard to the strategic plan of a Council prepared in accordance with Division 2 of Part 7 of the *Local Government Act 1993*.

The Capital City Strategic Plan 2015-2025 identifies five (5) key goals:

- Goal 1 – Economic development, vibrancy and culture
- Goal 2 – Urban Management
- Goal 3 – Environment and natural resources
- Goal 4 – Strong, safe and healthy communities

- Goal 5 – Governance

Under each goal there are specific strategic objectives identified.

None of these specifically identify strategic objectives relevant to the proposed amendment.

3.8 Other requirements of Section 20

The proposed amendment is also consistent with the other requirements under Section 20(2), (3), (4), (5), (6), (7), (8) and (9) of the Act. In particular, the proposed amendment does not:

- prevent the continuance or completion of any lawful use or development;
- prevent the use of any building which was erected before that coming into operation for any purpose for which it was lawfully being used immediately before that coming into operation, or the maintenance or repair of such a building;

4. Assessment of Development Application

4.1 Detailed description of proposed Use and Development

The permit application seeks approval for a change of use to the residential use class to accommodate 12 residential apartments and for alterations to the existing building.

As outlined in Section 1.3, the proposal is to utilise the shell of the existing structure. The building will then be vertically divided into 12 components aligning with the existing steel portal structure, with each component dedicate to an apartment.

The ground floor will be converted into the entrance area, storage space and vehicle parking garage. The layout shows the division of the ground floor space into a central circulation area with 12 individual spaces accommodating the ground floor entrance, two vehicle parking spaces and storage for each apartment.

From the ground floor entrance, residents will ascend directly through their own individual stairwell to the first floor which will accommodate the main living spaces and outdoor courtyards for each apartment. A further stairwell ascends to the second floor where two bedrooms, one bathroom and two light courts are located.

Each apartment will have access to a series of courtyards - with one for each apartment open through slots on the northern and southern elevations - and light wells which direct natural light and air into the core of the building while allowing for the retention of the existing brick walls to the side and rear boundaries. Individual areas of outdoor space are located at the base of each light well for each apartment. Each bedroom will have bi-fold glass doors with balustrade providing a sense of openness into the upper level of the light wells.

A summary of the floor areas and outdoor spaces for each apartment in Table 1 below.

Table 1: Floor Area details for each apartment

	Ground Floor (m ²)	First Floor (m ²)	Second Floor (m ²)	Total (m ²)	Courtyard (m ²)	Floor Area + Courtyards (m ²)
A1	6.60	63.40	64.85	134.85	8.60	143.45
A2	7.75	58.50	59.95	126.20	7.85	134.05
A3	6.90	57.75	59.20	123.85	8.15	132.00
A4	6.90	54.50	56.00	117.40	7.75	125.15
A5	6.75	54.80	56.30	117.85	7.75	125.60
A6	7.00	60.15	61.75	128.90	8.25	137.15
A7	6.75	59.65	61.30	127.70	8.10	135.80
A8	6.85	57.30	58.80	122.95	7.65	130.60
A9	7.00	59.60	61.10	127.70	7.45	135.15
A10	6.50	57.20	58.65	122.35	7.85	130.20

	Ground Floor (m ²)	First Floor (m ²)	Second Floor (m ²)	Total (m ²)	Courtyard (m ²)	Floor Area + Courtyards (m ²)
A11	6.50	56.90	58.35	121.75	8.85	129.60
A12	6.75	63.75	65.35	135.85	8.30	144.15

Building alterations are restricted to the facade, northern elevation and southern elevation.

The facade of the building will be modified to provide for a central garage and pedestrian entrance in the centre, with individual mail lockers and meter boxes for each apartment extending across the ground floor facade. The remainder of the existing roller doors will be sealed over with the central section of the facade finished in laser cut aluminium matrix screen over cement sheet substrate.

The existing awning will be extended in a tapering form along the length of the front facade.

On the northern elevation there will be six (6) new voids created providing open air access to the courtyards on the apartments on the northern half of the building.

On the southern elevation the existing roller door, air vents and windows will be bricked in and six (6) voids identical to those on the northern elevation will be created, similarly providing open air access to the courtyards to the apartments on the southern half of the building.

The proposal also includes the replacement of the existing signage on the front facade and northern elevations. On the southern elevation the existing signage will be removed with new signage stating the street number located on the eastern end of the elevation.

Plans prepared by Mark Drury Architect are attached at *Appendix C*

4.2 Hobart Interim Planning Scheme 2015

The assessment of the permit application component of this Section 43A application is undertaken as if the proposed amendment has been approved.

The permit application therefore proceeds on the basis that the subject site is within the Inner Residential Zone under the Interim Planning Scheme.

In addition to the Inner Residential Zone the following codes under the Interim Planning Scheme are considered relevant:

- E2.0 Potentially Contaminated Land Code
- E5.0 Road and Railway Assets Code
- E6.0 Parking and Access Code
- E8.0 Electricity Transmission Infrastructure Protection Code

As the proposal utilises an existing building with an alteration to the facade and side elevations, it is considered that the standards within the Stormwater Management Code are not applicable.

4.3 Inner Residential Zone

The purpose of the Inner Residential Zone pursuant to Clause 11.1.1 is to:

To provide for a variety of residential uses and dwelling types close to services and facilities in inner urban and historically established areas, which uses and types respect the existing variation and pattern in lot sizes, set back, and height.

To provide for compatible non-residential uses that primarily serve the local community.

To encourage residential development at higher densities in locations within walkable distance of services, facilities, employment and high frequency public transport corridors.

To encourage residential development that respects the neighbourhood character.

To provide a high standard of residential amenity.

To allow commercial uses which provide services for the needs of residents of a neighbourhood and do not displace an existing residential use or adversely affect their amenity particularly through noise, traffic generation and movement, and the impact of demand for on-street parking.

4.3.1 Use Status

The proposed use fits within the Residential Use Class and would meet the permitted use qualification.

4.3.2 Use Standards

None of the use standards are relevant to the proposal.

4.3.3 Development Standards

As the proposal largely relies on the existing warehouse with only modification, it is considered that the following clauses only are relevant:

- A1/P1 of Clause 11.4.1 Residential density for multiple dwellings;
- A2/P2 of Clause 11.4.3 Site Coverage and Private Open Space;
- A1/P1 of Clause 11.4.4 Sunlight and overshadowing; and
- A1/P1 of Clause 11.4.6 Privacy
- A1/P1 of Clause 11.4.8 Waste storage for multiple dwellings.

An assessment against these standards is outlined below.

Residential Density

The proposal is for 12 residential apartments across 811m². The site area per dwelling is 67.5m² and therefore the proposal relies upon P1 under Clause 11.4.1 of the Interim Planning Scheme. P1 states:

Site area per dwelling may be:

(a) *less than 200m² if any of the following applies:*

(i) *the development contributes to a range of dwelling types and sizes appropriate to the locality;*

- (ii) the development provides for a specific accommodation need, such as aged care, special needs or student accommodation;
- (b) more than 400m² if any of the following applies:
 - (i) site constraints preclude development at a higher density;
 - (ii) the development is designed or located to make provision for future development with a site area per dwelling of 400m² or less.

The proposal is considered to meet P1(a)(i) in that it contributes to a range of dwelling types and sizes appropriate to the locality.

Table 2 below provides a summary of the dwelling structure within North Hobart (as a State Suburb) across the last 3 census periods in comparison to Greater Hobart and Tasmania. North Hobart already has a greater proportion of flat, unit or apartment style dwellings that are typical across the metropolitan area. This is considered appropriate given that it is an inner residential suburb adjoining the Hobart CBD. However, detached and semi-detached dwellings still remain the dominant form of dwellings.

This application will contribute to increasing the diversity of dwelling types other than the dominant detached and semi-detached dwellings. This is considered appropriate to the locality not only because of its proximity to the Hobart CBD and surrounds but as North Hobart is a suburb which has a higher proportion of non-family households than Greater Hobart and Tasmania on average.

Table 2: Statistical Data for North Hobart

	2001	2006	2011	Greater Hobart (2011)	Tasmania (2011)
Dwelling structure					
Detached House	49.9%	51.20%	50.0%	82.5%	86.4%
Semi-detached house	26.8%	29.50%	24.0%	6.4%	5.4%
Flat, unit or apartment	19.4%	16.50%	34.5%	10.5%	7.5%
Other Dwelling type	2.2%	2.50%	1.1%	0.4%	0.7%
Household Type					
Family Household	46.0%	46.3%	49.2%	68.0%	38.8%
Single (or lone) person Household	38.9%	34.5%	38.7%	28.2%	28.0%
Group Households	10.8%	9.6%	12.1%	3.8%	3.2%

Private Open Space

A1 of Clause 11.4.3 is not considered relevant. The building is existing and no extension is proposed. In addition, each apartment has a finished floor level that is entirely more than 1.8 metres above finished ground level except for the garage and entry foyer.

The requirements of A2 are not met (see Table 1 above) and for the six (6) apartments on the southern half of the building the private open space is located to the south of the dwelling.

The proposal therefore relies upon P2 which states:

A dwelling must have private open space that:

- (a) includes an area that is capable of serving as an extension of the dwelling for outdoor relaxation, dining, entertaining and children's play that is:*
 - (i) conveniently located in relation to a living area of the dwelling; and*
 - (ii) orientated to take advantage of sunlight;*
- unless the projected requirements of the occupants are considered to be satisfied by communal open space or public open space in close proximity.*

The private open space for each dwelling is located directly off the living area. While small in area it is considered to be sufficient for the needs of the intended occupants.

It is also noted that the subject site is located directly opposite Soundy Park which provides a large open grassed parkland, available for dog exercise and a separately fenced playground area that has equipment suitable for children of all ages. In addition, the extensive recreational facilities available at the Queens Domain are only a short distance away (approximately 800 metres walking distance along roadways and pedestrian overpasses).

It is considered that P2 has been achieved.

Sunlight and Overshadowing

A1 of Clause 11.4.4 requires each dwelling to have a habitable room window facing between 30 degrees west and east of north.

The six (6) apartments on the northern half of the building will have a window achieving compliance with A1 as a result of the opening to their private open space off the living room area.

The six (6) apartments to the southern rely upon P1 which states:

A dwelling must be sited and designed so as to allow sunlight to enter at least one habitable room (other than a bedroom).

This is achieved by way of the opening to the private open space as well, similar to the arrangements on the north of the building. It is also noted that during the middle of the day sunlight will directly penetrate through the skylights into the living areas.

A2 and A3 are not relevant.

Width of openings for garages and carports

A1 under Clause 11.4.5 requires that a garage within 12 metres of the primary frontage has a total width of no more than 6 metres (5.5 metres is proposed). The proposal complies.

Privacy

A1 of Clause 11.4.6 requires:

A balcony, deck, roof terrace, parking space, or carport (whether freestanding or part of the dwelling) that has a finished surface or floor level more than 1m above natural ground level must have a permanently fixed

screen to a height of at least 1.7m above the finished surface or floor level, with a uniform transparency of no more than 25%, along the sides facing a:

- (a) side or rear boundary, unless the balcony, deck, roof terrace, parking space, or carport has a setback of at least 3 m from the boundary; and*
- (b) dwelling on the same site, unless the balcony, deck, roof terrace, parking space, or carport is at least 6 m:*
 - (i) from a window or glazed door, to a habitable room of the other dwelling on the same site; or*
 - (ii) from a balcony, deck, roof terrace or the private open space, of the other dwelling on the same site.*

Each apartment has a balcony located on the boundary. While for the most part the balconies are screened by the existing walls of the building, due to the opening it technically does not achieve compliance with A1 in that there is not screening to a height of 1.7m consistently across the balcony.

The proposal therefore relies upon P1 which states:

A balcony, deck, roof terrace, parking space or carport (whether freestanding or part of the dwelling) that has a finished surface or floor level more than 1m above natural ground level, must be screened, or otherwise designed, to minimise overlooking of:

- (a) a dwelling on an adjoining lot or its private open space; or*
- (b) another dwelling on the same site or its private open space; or*
- (c) an adjoining vacant residential lot.*

The adjoining lots affected by the balconies are within the Light Industrial Zone and contain non-residential uses. P1 is therefore achieved.

A2 and A2 are not considered relevant.

Waste storage for multiple dwellings

A1 of Clause 11.4.8 requires that:

A multiple dwelling must have a storage area, for waste and recycling bins, that is an area of at least 1.5m² per dwelling and is within one of the following locations:

- (a) in an area for the exclusive use of each dwelling, excluding the area in front of the dwelling; or*
- (b) in a communal storage area with an impervious surface that:*
 - (i) has a setback of at least 3 m from a frontage; and*
 - (ii) is at least 5.5 m from any dwelling; and*
 - (iii) is screened from the frontage and any dwelling by a wall to a height of at least 1.2m above the finished surface level of the storage area.*

Each multiple dwelling is provided with its own waste storage area adjacent to the ground floor entrance and tucked in under the entry stairwell that complies with the requirements of A1.

4.4 Potentially Contaminated Land Code

The subject site is identified on the City of Hobart's register as potentially contaminated. While the development component will not involve the disturbance of more than 1m² of land, the proposal does however involve a change to a sensitive use.

Clause E2.5 is therefore considered relevant. A1 under Clause E2.5 states:

The Director, or a person approved by the Director for the purpose of this Code:

- (a) certifies that the land is suitable for the intended use; or*
- (b) approves a plan to manage contamination and associated risk to human health or the environment that will ensure the land is suitable for the intended use.*

A1 cannot be met and therefore the proposal relies upon P1 which states:

Land is suitable for the intended use, having regard to:

- (a) an environmental site assessment that demonstrates there is no evidence the land is contaminated; or*
- (b) an environmental site assessment that demonstrates that the level of contamination does not present a risk to human health or the environment; or*
- (c) a plan to manage contamination and associated risk to human health or the environment that includes:*
 - (i) an environmental site assessment;*
 - (ii) any specific remediation and protection measures required to be implemented before any use commences; and*
 - (iii) a statement that the land is suitable for the intended use.*

An environmental site assessment has been prepared by Geo Environmental Solutions (see **Appendix E**) that addresses this performance criteria.

4.5 Road and Rail Assets Code

The proposal, while not involving the construction of a new access, will involve the intensification of the use of an existing access.

The following clauses are considered relevant:

- A3/P3 of Clause E5.5.1
- A2/P2 of Clause E5.6.2; and
- A1/P1 of Clause E5.6.4.

An assessment against these standards is outlined below.

4.5.1 Existing road access and junctions

A3 of Clause E5.5.1 states:

The annual average daily traffic (AADT) of vehicle movements, to and from a site, using an existing access or junction, in an area subject to a speed limit of 60km/h or less, must not increase by more than 20% or 40 vehicle movements per day, whichever is the greater.

The Traffic Impact Assessment (TIA) attached at **Appendix D** indicates that the proposal will generate up to 60 vehicle per day. For the previous warehouse use the traffic generation is estimated to have been 30 vehicles per day. The proposal therefore requires consideration against the performance criteria which states:

Any increase in vehicle traffic at an existing access or junction in an area subject to a speed limit of 60km/h or less, must be safe and not unreasonably impact on the efficiency of the road, having regard to:

- (a) the increase in traffic caused by the use;*
- (b) the nature of the traffic generated by the use;*
- (c) the nature and efficiency of the access or the junction;*
- (d) the nature and category of the road;*
- (e) the speed limit and traffic flow of the road;*
- (f) any alternative access to a road;*
- (g) the need for the use;*
- (h) any traffic impact assessment; and*
- (i) any written advice received from the road authority.*

The TIA concludes that given that the existing passing traffic volume on Argyle Street the proposal will not impact on the safety and efficiency of the road.

4.5.2 Number of Accesses

A2 of Clause E5.6.2 states:

No more than one access providing both entry and exit, or two accesses providing separate entry and exit, to roads in an area subject to a speed limit of 60km/h or less.

There is only one access existing and no further are proposed. The proposal complies with A2.

4.5.3 Sight distances at accesses, junctions and level crossings.

A1 of Clause E5.6.4 states:

Sight distance at:

- (a) An access or junction must comply with the Safe Intersection Sight Distance shown in Table E5.1; and*
- (b) Rail level crossings must comply with AS 1742.7 Manual of uniform traffic control devices – Railway crossings, Standards Association of Australia.*

The TIA attached at **Appendix D** demonstrates that the standard has been achieved. Complies

4.6 Parking and Access Code

The Parking and Access Code applies to all use and development. The following clauses are considered relevant to the proposal:

- Clause E6.6.1, Number of Car Parking Spaces;
- Clause E6.6.7, Number of Vehicle Accesses;
- Clause E6.7.2, Design of Vehicular Accesses;
- Clause E6.7.3, Vehicular Passing Areas along an Access;
- Clause E6.7.4, On Site Turning;
- Clause E6.7.5, Layout of Parking Areas;
- Clause E6.7.6, Surface Treatment of Parking Areas;
- Clause E6.7.7, Lighting of Parking Areas; and
- Clause E6.7.12, Siting of Car Parking.

An assessment against these standards is outlined below.

4.6.1 Number of Car Parking Spaces

Clause E6.6.1 requires that the number of on site parking spaces must be no less and no greater than the number specific in Table E6.1. Table E6.1 requires 2 spaces for each dwelling and 1 visitor space per 4 dwellings.

Each apartment is provided with 2 spaces but as there is no provisions for visitor parking and 3 are required by Table E6.1 the proposal relies upon P1 which states:

The number of on-site car parking spaces must be sufficient to meet the reasonable needs of users, having regard to all of the following:

- (a) *car parking demand;*
- (b) *the availability of on-street and public car parking in the locality;*
- (c) *the availability and frequency of public transport within a 400m walking distance of the site;*
- (d) *the availability and likely use of other modes of transport;*
- (e) *the availability and suitability of alternative arrangements for car parking provision;*
- (f) *any reduction in car parking demand due to the sharing of car parking spaces by multiple uses, either because of variation of car parking demand over time or because of efficiencies gained from the consolidation of shared car parking spaces;*
- (g) *any car parking deficiency or surplus associated with the existing use of the land;*
- (h) *any credit which should be allowed for a car parking demand deemed to have been provided in association with a use which existed before the change of parking requirement, except in the case of substantial redevelopment of a site;*
- (i) *the appropriateness of a financial contribution in lieu of parking towards the cost of parking facilities or other transport facilities, where such facilities exist or are planned in the vicinity;*

- (j) *any verified prior payment of a financial contribution in lieu of parking for the land;*
- (k) *any relevant parking plan for the area adopted by Council;*
- (l) *the impact on the historic cultural heritage significance of the site if subject to the Local Heritage Code;*
- (m) *whether the provision of the parking would result in the loss, directly or indirectly, of one or more significant trees listed in the Significant Trees Code.*

The TIA attached at **Appendix D** addresses the performance criteria indicating that due to the location of the proposal in close proximity to public transport routes, shopping facilities and on street parking the provision of parking is adequate.

4.6.2 Number of Vehicle Accesses

A1 of Clause E6.7.1 requires no more than 1 vehicle access point or the existing number for each road frontage. The proposal complies with A1.

4.6.3 Design of Vehicular Accesses

A1 of Clause E6.7.2 requires:

Design of vehicle access points must comply with all of the following:

- (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;*
- (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.*

The TIA attached at Appendix D outlines that the design of the vehicle access relies upon the performance criteria, due to the pedestrian door not providing a sufficient sight triangle between motorists exiting the building and pedestrians walking along the footpath to meet the requirements of Figure 3.3 of AS/MZS 2890.1.

P1 of Clause E6.7.2 states:

Design of vehicle access points must be safe, efficient and convenient, having regard to all of the following:

- (a) *avoidance of conflicts between users including vehicles, cyclists and pedestrians;*
- (b) *avoidance of unreasonable interference with the flow of traffic on adjoining roads;*
- (c) *suitability for the type and volume of traffic likely to be generated by the use or development;*
- (d) *ease of accessibility and recognition for users.*

It is recommended that within the TIA that a flashing light is installed on the wall outside the building as well as a sign installed at a height of 1.5 metres on the inside column to the driveway door (which is fully glazed). The TIA concludes that these measures, together with the partial sight lines that will be available, will provide a more than sufficient warning to address the pedestrian sight distance requirements.

4.6.4 Vehicular Passing Areas along an Access

A1 of Clause E6.7.3 requires that:

Vehicular passing areas must:

- (a) *be provided if any of the following applies to an access:*
 - (i) *it serves more than 5 car parking spaces;*
 - (ii) *is more than 30 m long;*
 - (iii) *it meets a road serving more than 6000 vehicles per day;*
- (b) *be 6 m long, 5.5 m wide, and taper to the width of the driveway;*
- (c) *have the first passing area constructed at the kerb;*
- (d) *be at intervals of no more than 30 m along the access.*

The proposal provides for a double width access from the road to the entry of the garage. The width of the access is 5.5 metres. No further passing bays are required due to the length of the access. The proposal therefore complies with A1.

4.6.5 On site Turning

A1 of Clause E6.7.4 requires:

On-site turning must be provided to enable vehicles to exit a site in a forward direction, except where the access complies with any of the following:

- (a) *it serves no more than two dwelling units;*
- (b) *it meets a road carrying less than 6000 vehicles per day.*

The proposal complies with A1.

4.6.6 Layout of Parking Areas

A1 of Clause E6.7.5 requires:

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.

The TIA attached at Appendix D demonstrates that the layout of the parking area is in accordance with the relevant requirements of the Australian Standards. Complies.

4.6.7 Surface Treatment of Parking Areas

A1 of Clause E6.7.6 requires that:

Parking spaces and vehicle circulation roadways must be in accordance with all of the following;

(a) *paved or treated with a durable all-weather pavement where within 75m of a property boundary or a sealed roadway;*

(b) *drained to an approved stormwater system,*

unless the road from which access is provided to the property is unsealed.

The ground floor parking area is within the building and will have a concrete finish. As it is within the building no stormwater from the parking area will be generated. That said, stormwater from the building's roof will be drained to the existing public stormwater system as per the current situation. The proposal therefore complies with A1.

4.6.8 Lighting of Parking Areas

A1 of Clause E6.7.7 requires:

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.

In addition to the penetration of natural light through the light wells, artificial lighting to the garage will be provided for both pedestrians and vehicles in accordance with the above standards.

While specific design details are yet to be resolved, compliance with the standard can be assured by way of condition.

4.6.9 Siting of Car Parking

A1 of Clause E6.7.12 requires:

Parking spaces and vehicle turning areas, including garages or covered parking areas in the Inner Residential Zone, Urban Mixed Use Zone, Village Zone, Local Business Zone and General Business Zone must be located behind the building line of buildings located or proposed on a site except if a parking area is already provided in front of the building line of a shopping centre.

The parking area is entirely within the building and therefore complies with A1.

4.7 Electricity Transmission Infrastructure Protection Code

The subject site is partially within the Electricity Transmission Infrastructure Protection overlay due to the underground cables in Argyle Street. It includes both the Electricity Transmission Infrastructure and Inner Protection Area.

Clause E8.7.1 is considered relevant. A1 of this clause states:

Development is not within:

- (a) *an inner protection area; or*
- (b) *a registered electricity easement.*

A1 cannot be met as part of the development (facade alterations) are within the Inner Protection area. The proposal therefore relies upon P1 which states:

Development must be located an appropriate distance from electricity transmission infrastructure, having regard to all of the following:

- (a) *the need to ensure operational efficiencies of electricity transmission infrastructure;*
- (b) *the provision of access and security to existing or future electricity transmission infrastructure;*
- (c) *safety hazards associated with proximity to existing or future electricity transmission infrastructure;*
- (d) *the requirements of the electricity transmission entity.*

The proposal has been referred to Tas Networks for comments (see **Appendix F**). In summary, given the existing building, the limited extent of development and that the electricity infrastructure is located underground within the road reservation, the proposal is considered to be located an appropriate distance from the infrastructure.

4.8 Signage

The proposal involves signage on the facade and the northern and southern elevations. The signage on the facade and northern elevation will read 'Batch House Apartments', being a play on the previous use of the warehouse for glass manufacturing. The signage on the southern elevation will read '286-288' indicating the property address.

The signage on the facade and the northern elevation replaces the existing signage, being in the same location and the same size. It is considered that this signage can be considered exempt pursuant to Clause E17.4.3 of the Interim Planning Scheme.

The signage on the southern elevation is considered to be most appropriately defined as a 'street number' sign although due to its size, functions will not comply with the standards in Table E.17.2. It is however a permitted sign in the Inner Residential Zone pursuant to Table E.17.3.

The proposed signage therefore complies with the relevant Acceptable Solutions under the Use Standards for Signage at Clause E17.7.1

It does however rely upon P1 of Clause E17.7.1 which states:

A sign not complying with the standards in Table E17.2 or has discretionary status in Table E17.3 must satisfy all of the following:

- (a) *be integrated into the design of the premises and streetscape so as to be attractive and informative without dominating the building or streetscape;*
- (b) *be of appropriate dimensions so as not to dominate the streetscape or premises on which it is located;*
- (c) *be constructed of materials which are able to be maintained in a satisfactory manner at all times;*
- (d) *not result in loss of amenity to neighbouring properties;*

- (e) *not involve the repetition of messages or information on the same street frontage;*
- (f) *not contribute to or exacerbate visual clutter;*
- (g) *not cause a safety hazard.*

The proposed street number sign while visually apparent will not in the context of the scale and appearance of the building dominate either the building itself or the streetscape. It will provide for easy identification for visitors to the site while providing an interesting visually 'play' on the street address.

The proposed signage is considered to comply with P1.

5. Conclusion

The application is for a combined planning scheme amendment and permit application pursuant to Section 43A of the former provisions of the *Land Use Planning and Approvals Act 1993*.

The planning scheme amendment component seeks to rezone the land at 286 to 288 Argyle Street and contained within Certificate of Title Volume 9228 Folio 1 and Volume 65899 Folio 2 from Light Industrial to Inner Residential.

Section 3 of this supporting submission provides a full assessment of the rezoning against the relevant legislative requirements. It is submitted that the proposed rezoning furthers the attainment of the Southern Tasmania Regional Land Use Strategy and is consistent with the objectives of the Act.

The *State Policy on Water Quality Management* is the only relevant State Policy, however the site is within a fully urbanised area and there are existing safeguards within the Interim Planning Scheme to address issues of water quality.

It is further submitted that the rezoning does not give rise to any potential for land use conflict. The planning scheme anticipates that the Light Industrial Zone will exist in proximity to the Inner Residential Zone, through existing use standards that address amenity impacts. Furthermore the adjoining land to the west and the land opposite on Argyle Street is already within the Inner Residential Zone.

Overall the proposed amendment is considered to satisfy the legislative requirements under Section 32 and Section 300 of the former provisions of the *Land Use Planning and Approvals Act 1993*.

The permit application seeks approval to convert the existing warehouse into 12 residential apartments. The development component is limited to alterations to the existing building.

An assessment against the requirements of the Interim Planning Scheme – as if the planning scheme amendment had been approved – has identified that the proposal will generate the following discretions:

- Residential Density – the proposal relies upon P1 of Clause 11.4.1. The proposal provides for a density of 67.5m² per dwelling rather than 200m² as required by A1. The application does however contribute to a range of dwelling types suitable for the locality and therefore compliance with P1 is attained;
- Private Open Space – the proposal relies upon P2 of Clause 11.4.3;
- Sunlight – the proposal relies upon P1 of Clause 11.4.4. The apartments on the southern half of the building do not have window facing between 30 degrees east and west of North. They will however receive direct sunlight as required by P1;
- Privacy – the proposal relies upon P1 of Clause 11.4.6. The proposal proposes balconies with openings directly adjacent to the northern and southern side boundaries. The adjoining sites are however non-residential sites in a non-residential zone and therefore the amenity of any dwelling is not affected;
- Potentially contaminated land – the proposal relies upon P1 of Clause E2.5. An Environmental Site Assessment prepared by Geo-Environmental Solutions has been provided with the application addressing P1;
- Existing Road Access and Junctions – the proposal relies upon P1 of Clause E5.5.1 in that the traffic generation increases by more than 20% or 40 vehicles per day. The TIA concludes that the safety and efficiency of Argyle Street will not however be affected in light of the volume of traffic that it carries each day.

- Number of parking spaces – the proposal relies upon P1 of Clause E6.6.1 as there is no provision of visitor parking where 3 spaces are required by A1. The TIA has concluded that the parking supply is sufficient having regard to the nearby public transport options and supply of on street parking.
- Design of Vehicular Accesses – the proposal relies upon P1 of Clause E6.7.1 as there is not sufficient sight distance for vehicle exiting the garage to view pedestrians along the footpath. The TIA recommends both a warning light and signage in order to meet the performance criteria.
- Electricity Transmission Protection Corridor – the proposal relies upon E8.7.1 as there is development (alterations to the existing building) proposed within the Inner Protection Zone of the Electricity Transmission Protection Corridor. Advice from Tas Network attached to this submission indicates there are no issues and that compliance with P1 is attained.
- Development Standards for Signs – the proposed street number sign on the southern elevation relies upon P1 under Clause E17.7.1.

In summary, it has been found that the permit application component meets the requirements of the Interim Planning Scheme and should be approved.

Appendix A

Title Documentation

Appendix B
Owners Consent

Appendix C

Proposed Plans

Appendix D

Traffic Impact Assessment

Appendix E

Environmental Site Assessment

Appendix F

Advice from Tas Networks

Appendix G
Servicing Information

Emma Riley & Associates ABN 67 141 991 004

40 Molle Street, Hobart
T: 0417 246 474 E: enquiries@erassociates.com.au

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Document Status

Author:	Emma Riley
Reviewer:	Clare Hester
Version:	Final for Submission_21 June 2017

**RESULT OF SEARCH**

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME 9228	FOLIO 1
EDITION 6	DATE OF ISSUE 30-May-2016

SEARCH DATE : 12-May-2017

SEARCH TIME : 04.23 PM

DESCRIPTION OF LAND

City of HOBART

Lot 1 on Diagram 9228

Derivation : Part of 3A-3R-19Ps. - Section K.2. - Gtd. to J.B.
Mather.

Prior CT 3641/54

SCHEDULE 1M531801 TRANSFER to TTA PROPERTY PTY LTD Registered
02-Sep-2015 at noonSCHEDULE 2

Reservations and conditions in the Crown Grant if any

E21268 MORTGAGE to Australia and New Zealand Banking Group
Limited Registered 02-Sep-2015 at 12.01 PME42599 TRANSFER of MORTGAGE E21268 to Macquarie Bank Limited
Registered 30-May-2016 at noonE42600 MORTGAGE to Macquarie Bank Limited Registered
30-May-2016 at 12.01 PMUNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations



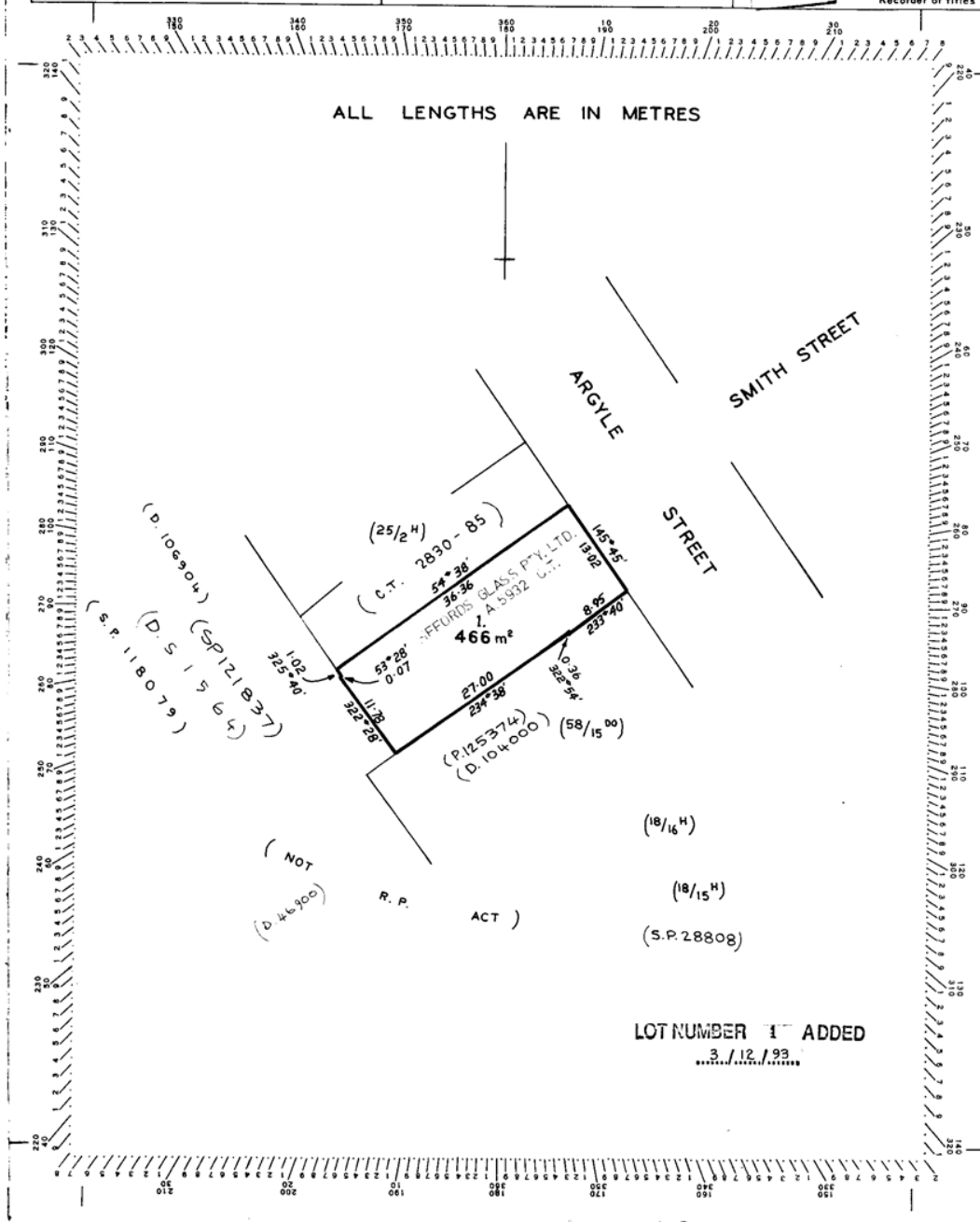
FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



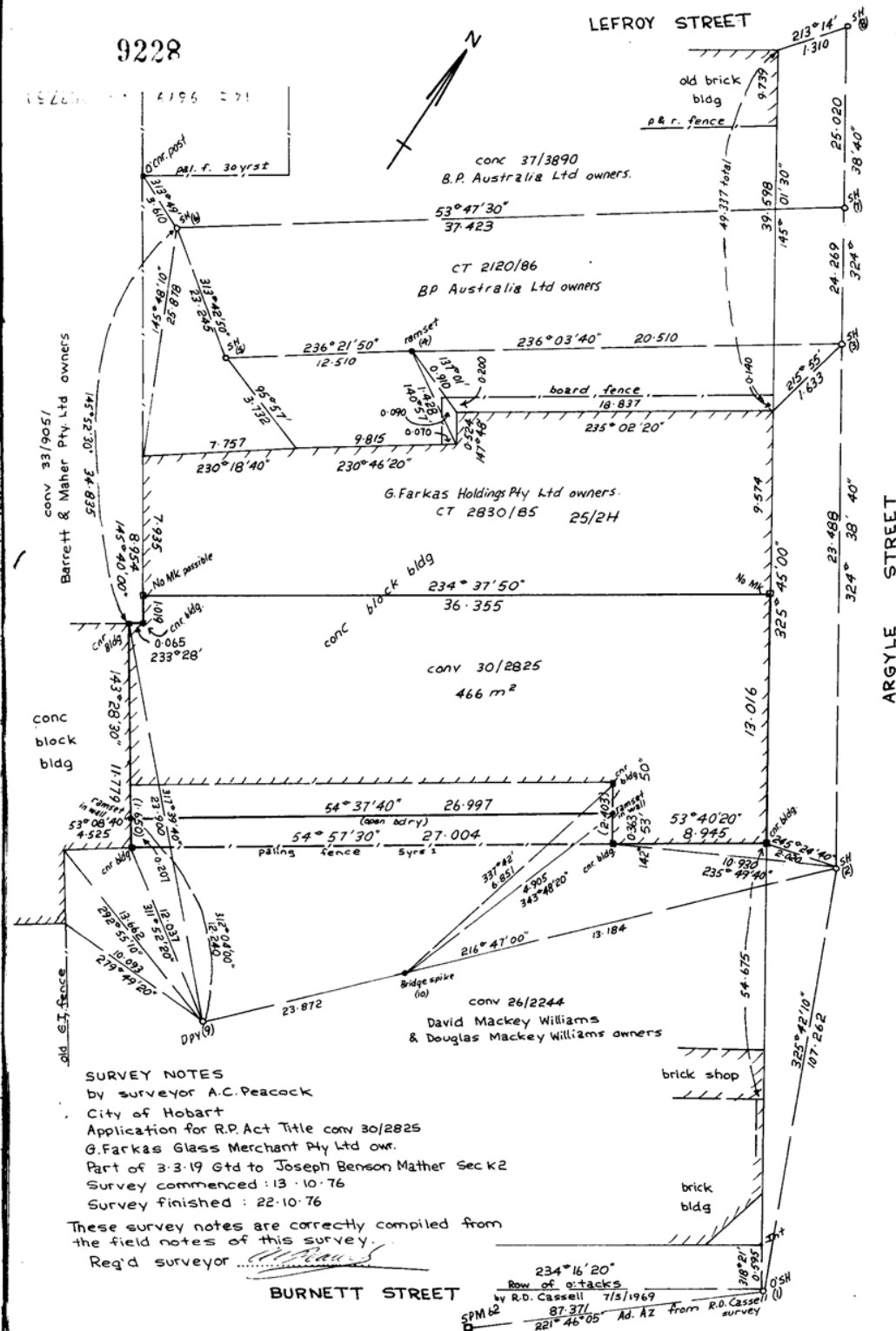
Owner: G. Farkas Glass Merchant Pty Ltd GIFFORDS GLASS PTY. LTD. App. 5932 C.T.	PLAN OF SURVEY by Surveyor A.C. Peacock of land situated in the	Registered Number: D9228
Title Reference: conv 30/2826 Conv. 50/6124	CITY OF HOBART	Approved Effective from: 28 SEP 1977
Grantee: Part of 3.3.19 Gtd. to Joseph Benson Mather Sec K2	scale 1:500	P/I <i>Mitchener</i> Recorder of titles



SURVEY NOTES

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

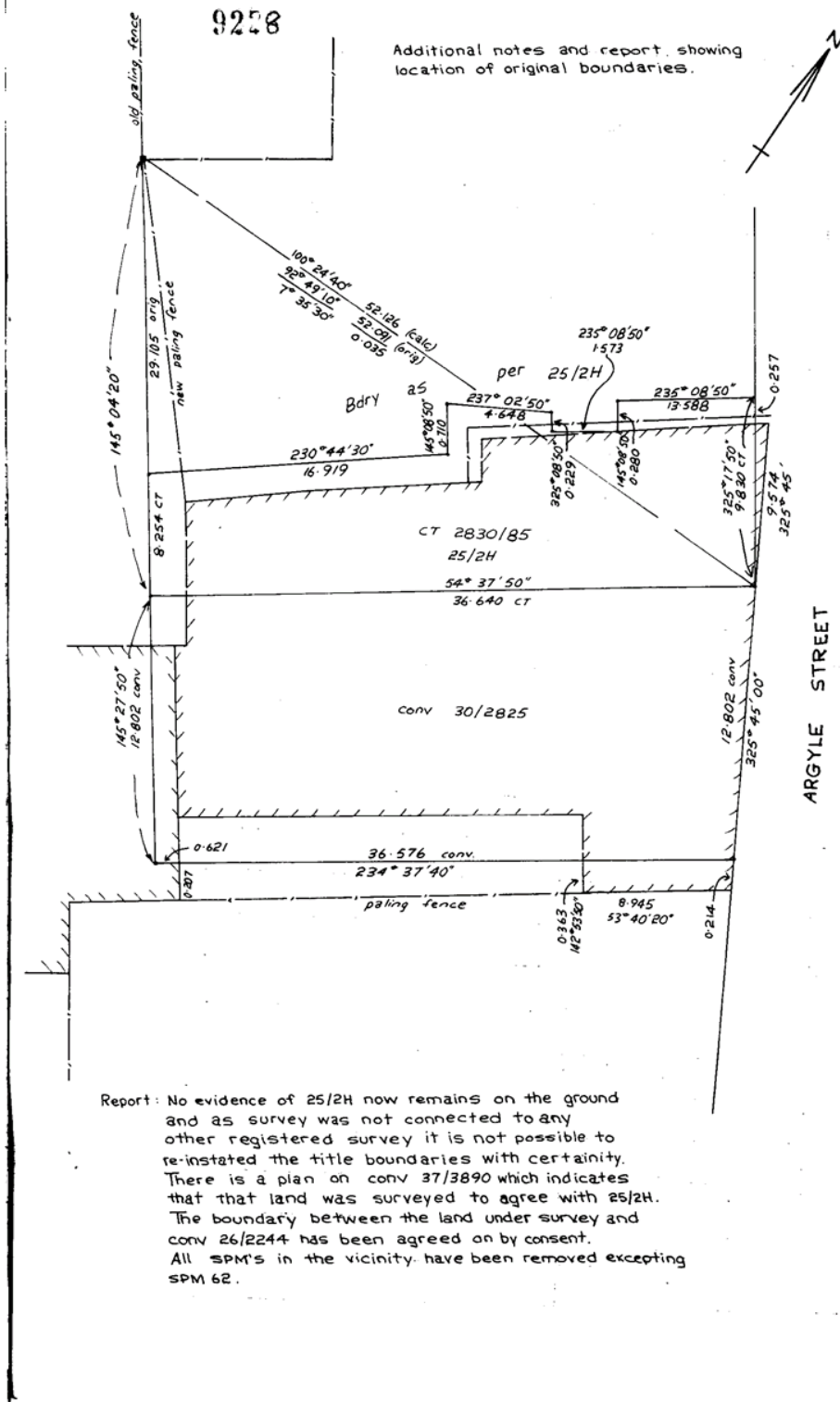




SURVEY NOTES

REORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



**RESULT OF SEARCH**

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME 65899	FOLIO 2
EDITION 6	DATE OF ISSUE 30-May-2016

SEARCH DATE : 12-May-2017

SEARCH TIME : 04.30 PM

DESCRIPTION OF LAND

City of HOBART

Lot 2 on Diagram 65899 (formerly being 25-2HOB)

Derivation : Part of 3A-3R-19Ps. Section K.2 Gtd. to J.B.

Mather

Prior CT 2830/85

SCHEDULE 1

M531801 TRANSFER to TTA PROPERTY PTY LTD Registered
02-Sep-2015 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any

E21268 MORTGAGE to Australia and New Zealand Banking Group
Limited Registered 02-Sep-2015 at 12.01 PM

E42599 TRANSFER of MORTGAGE E21268 to Macquarie Bank Limited
Registered 30-May-2016 at noon

E42600 MORTGAGE to Macquarie Bank Limited Registered
30-May-2016 at 12.01 PM

UNREGISTERED DEALINGS AND NOTATIONS

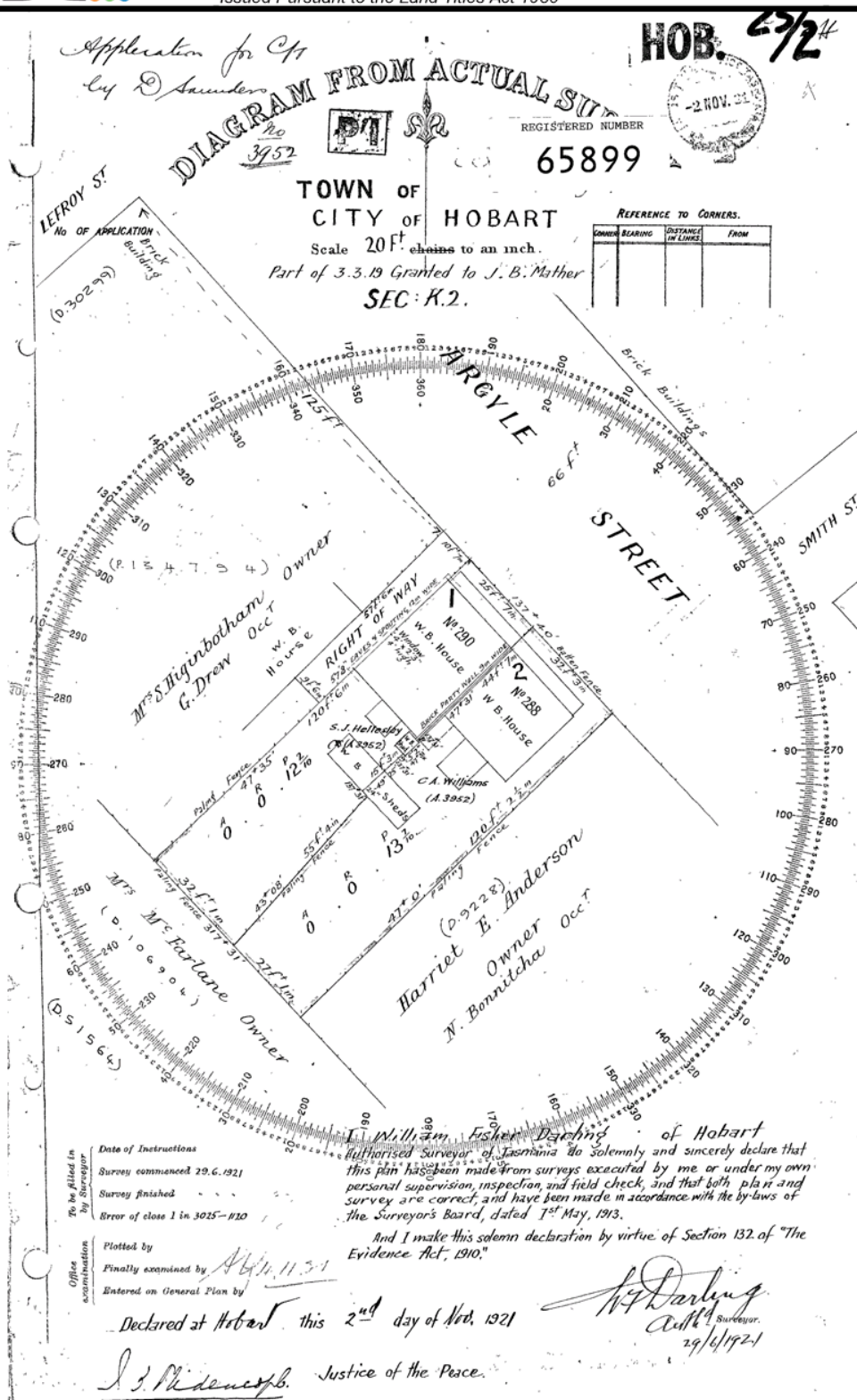
No unregistered dealings or other notations



FOLIO PLAN

RECORDED OF TITLES

Issued Pursuant to the Land Titles Act 1980

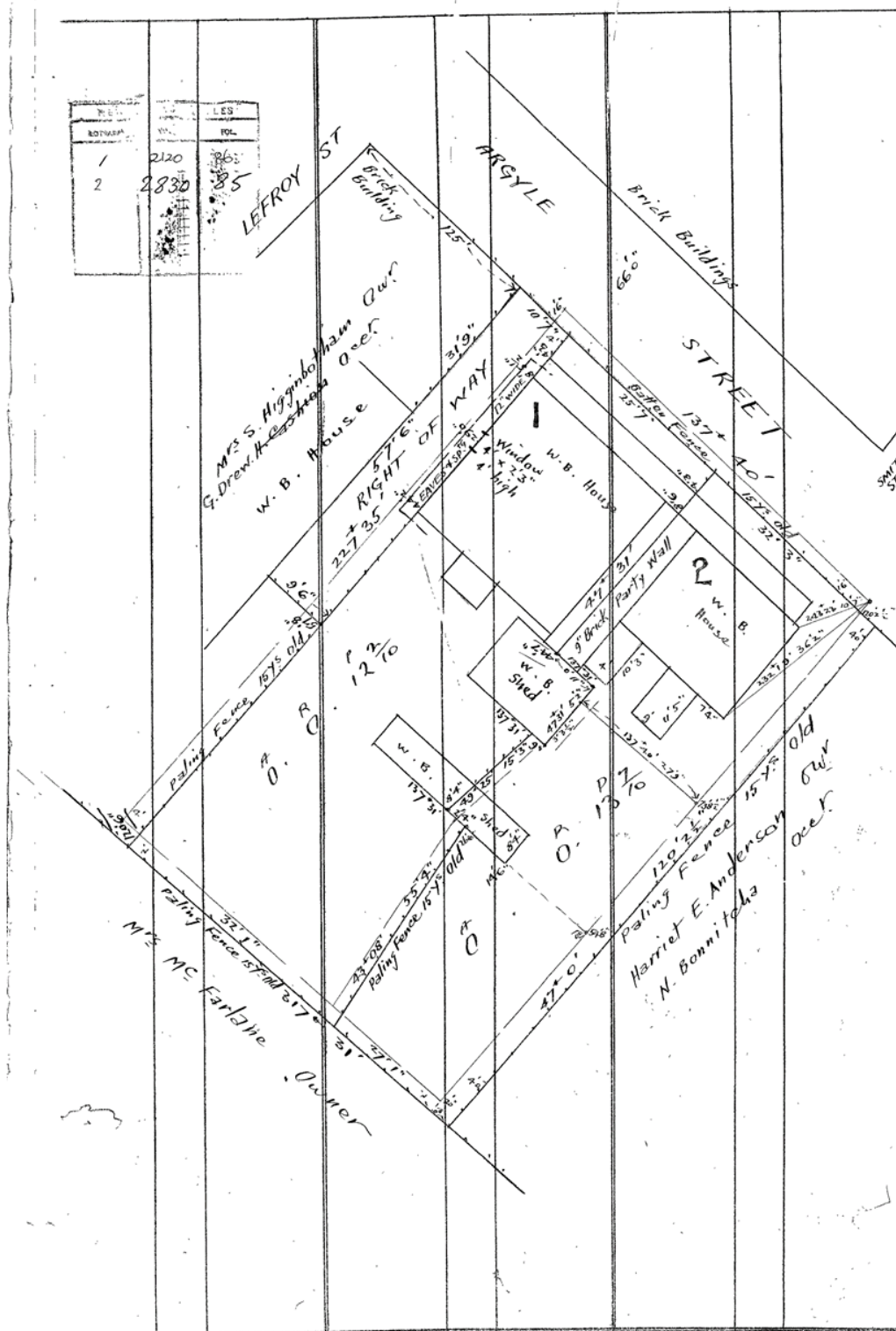




SURVEY NOTES

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980



Nicholls

We, Adrian Waldemar Brown and ~~Michael~~ Michael Clarke, directors of TTA Property Pty Ltd as trustee for TTA Property Unit Trust, owner of 286-288 Argyle Street, North Hobart (Certificate of Titles 9228 Folio 1 and 65899 Folio 2) hereby give our consent pursuant to Section 43A of the former provisions of the *Land Use Planning and Approvals Act 1993* for the making of a request by Emma Riley & Associates for an amendment to the *Hobart Interim Planning Scheme 2015* in the following form:

1. Rezone the land contained in Certificate of Title Volume 9228 Folio 1 and Certificate of Title Volume 65899 Folio 2 from Light Industrial to Inner Residential as shown in Figure 1 below.



Figure 1: Proposed Rezoning.

2. Apply for a planning permit for the use and development of the site for 12 residential apartments as shown in the documentation prepared by Mark Drury Architect and submitted with the request made by Emma Riley & Associates



Adrian Waldemar Brown

Director of TTA Property Pty Ltd owner of 286-288 Argyle Street, North hobart

Dated: 16/6/17



Michael Clarke

Director of TTA Property Pty Ltd owner of 286-288 Argyle Street, North hobart

Dated: 16/6/17

DRAWING SCHEDULE

DA01	SITE PLAN
DA02	EXISTING INTERIOR DETAILED SURVEY PLAN
DA03	EXISTING GROUND FLOOR PLAN
DA04	EXISTING FIRST FLOOR PLAN
DA05	EXISTING ROOF PLAN
DA06	EXISTING EAST ELEVATION
DA07	EXISTING NORTH ELEVATION
DA08	EXISTING SOUTH ELEVATION
DA09	EXISTING WEST ELEVATION
DA10	EXISTING SECTION S1
DA11	EXISTING SECTION S2
DA12	PROPOSED GROUND FLOOR PLAN
DA13	PROPOSED FIRST FLOOR PLAN
DA14	PROPOSED SECOND FLOOR PLAN
DA15	PROPOSED ROOF PLAN
DA16	PROPOSED EAST ELEVATION
DA17	PROPOSED NORTH ELEVATION
DA18	PROPOSED SOUTH ELEVATION
DA19	PROPOSED WEST ELEVATION
DA20	PROPOSED SECTION S1
DA21	PROPOSED SECTION S2

CODES SCHEDULE

1	BOUNDARY LINE	26	NEW SIGNAGE TO REPLACE EXSITING
2	EXISTING GROUND LINE	27	RELOCATED EXISTING SIGNAGE LIGHTING
3	EXISTING STRUCTURAL GRID LINE	28	NEW STREET AWNING
4	EXISTING FAKE BRICK WALL	29	NEW OPENINGS IN FACADE
5	EXISTING METAL WALL CLADDING	30	NEW SERVICE ACCESS PANELS, PAINT FINISH
6	EXISTING FENESTRATION	31	CARPARK EXHAUST DUCTS
7	EXISTING ROLLER SHUTTER DOOR	A1	APARTMENT #1 OF 12
8	EXISTING SIGNAGE	B1	BEDROOM 1
9	EXISTING SIGNAGE LIGHTING	B2	BEDROOM 2
10	EXISTING VENTILATION VENTS	BR	BATHROOM
11	EXISTING STREET AWNING	CP	CARPARK
12	EXISTING EXIT/ENTRY DOOR	CY1	COURTYARD 1
13	EXISTING SEWER DRAIN	CY2	COURTYARD 2
14	EXISTING STRUCTURAL STEEL COLUMNS	D	DINING
15	EXISTING STRUCTURAL STEEL ROOF BEAMS	E	ENTRY
16	EXISTING CONCRETE FLOOR SLAB	G	GALLERY
17	EXISTING METAL DECK ROOFING	K	KITCHEN
18	EXISTING PAINTED BRICK WALL	L	LAUNDRY
19	EXISTING FOOTPATH	LV	LIVING
20	EXISTING INTERIOR BUILDING (OFFICES + AMENITIES)	LC1	LIGHT COURT 1
21	INFILL EXISTING WALL OPENINGS IN FACE BRICK TO MATCH	LC2	LIGHT COURT 2
22	PAINTED ALUMINIUM OPEN CUT PANELS	RH	ROOF HATCH
23	NEW OPENINGS IN EXISTING BRICK WALL	RL1	ROOF LIGHT 1
24	NEW GLAZED ENTRY/EXIT DOORS	RL2	ROOF LIGHT 2
25	NEW GLAZED 'FIRE STATION' GARAGE DOOR	ST	STORE
		SW1	STAIRWELL 1
		SW2	STAIRWELL 2

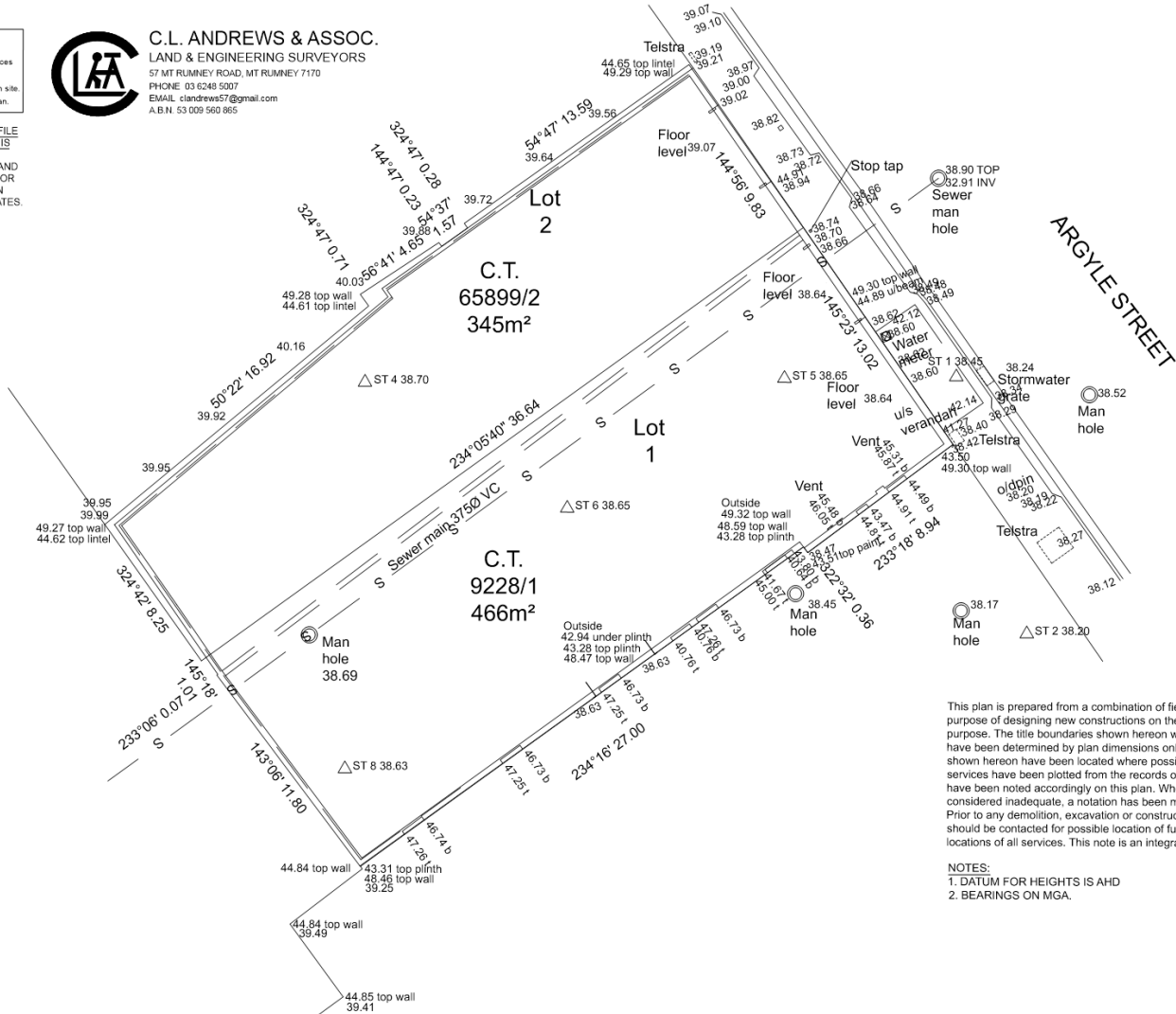
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e: mark@markdruryarchitect.com.au p: 0418 124 618							
		DESIGNED: MD	DRAWN: MD + AD	CHECKED: MD	REVISION: A		

WARNING
Beware underground services. Locate all existing services prior to construction. The location shown on plans are indicative only and precise location should be proven on site. No guarantee is given that all services are shown on plan.

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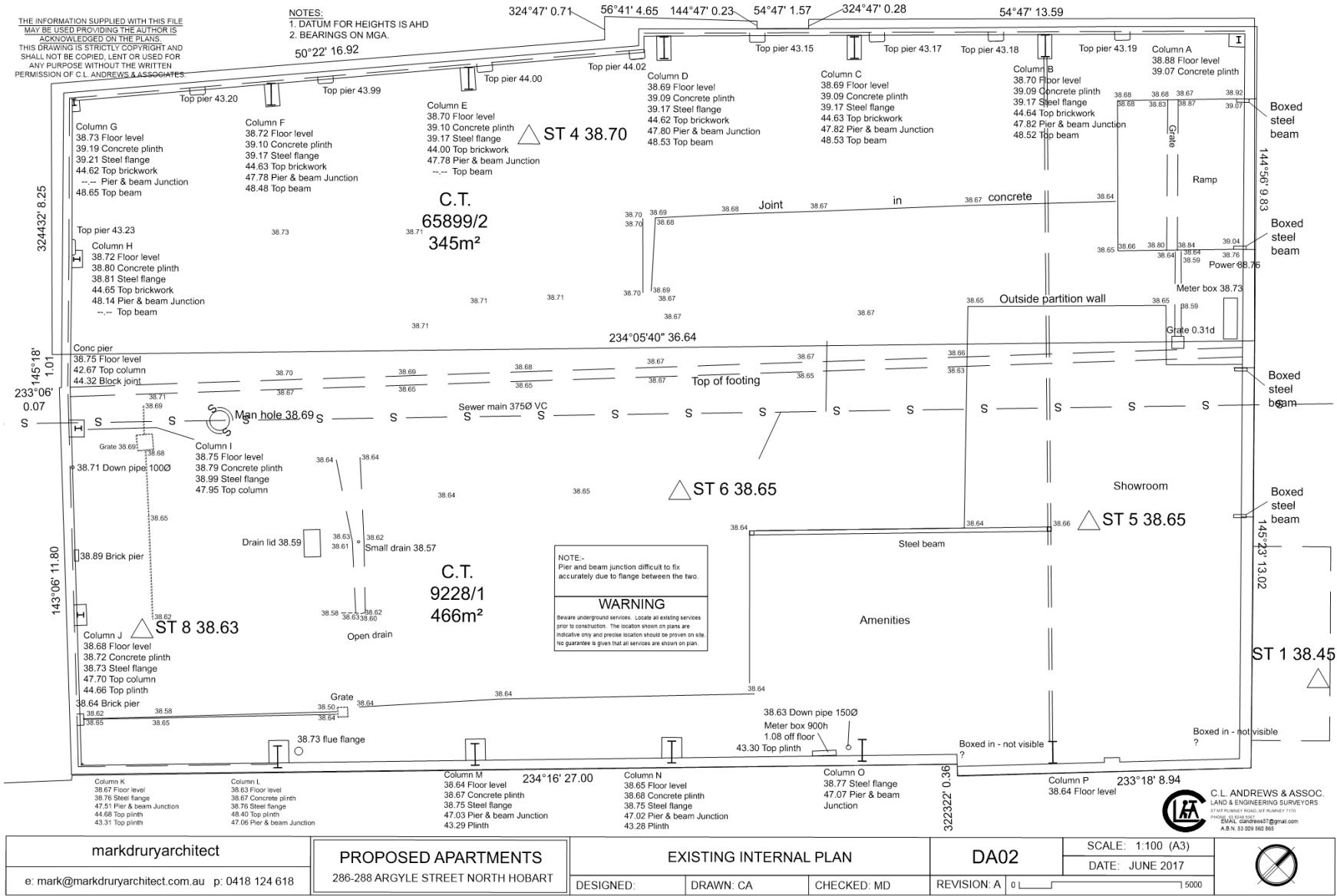
C.L. ANDREWS & ASSOC.
LAND & ENGINEERING SURVEYORS
57 MT RUNNEY ROAD, MT RUNNEY 7170
PHONE: 03 6246 5007
EMAIL: clandrews57@gmail.com
A.B.N. 53 009 560 965

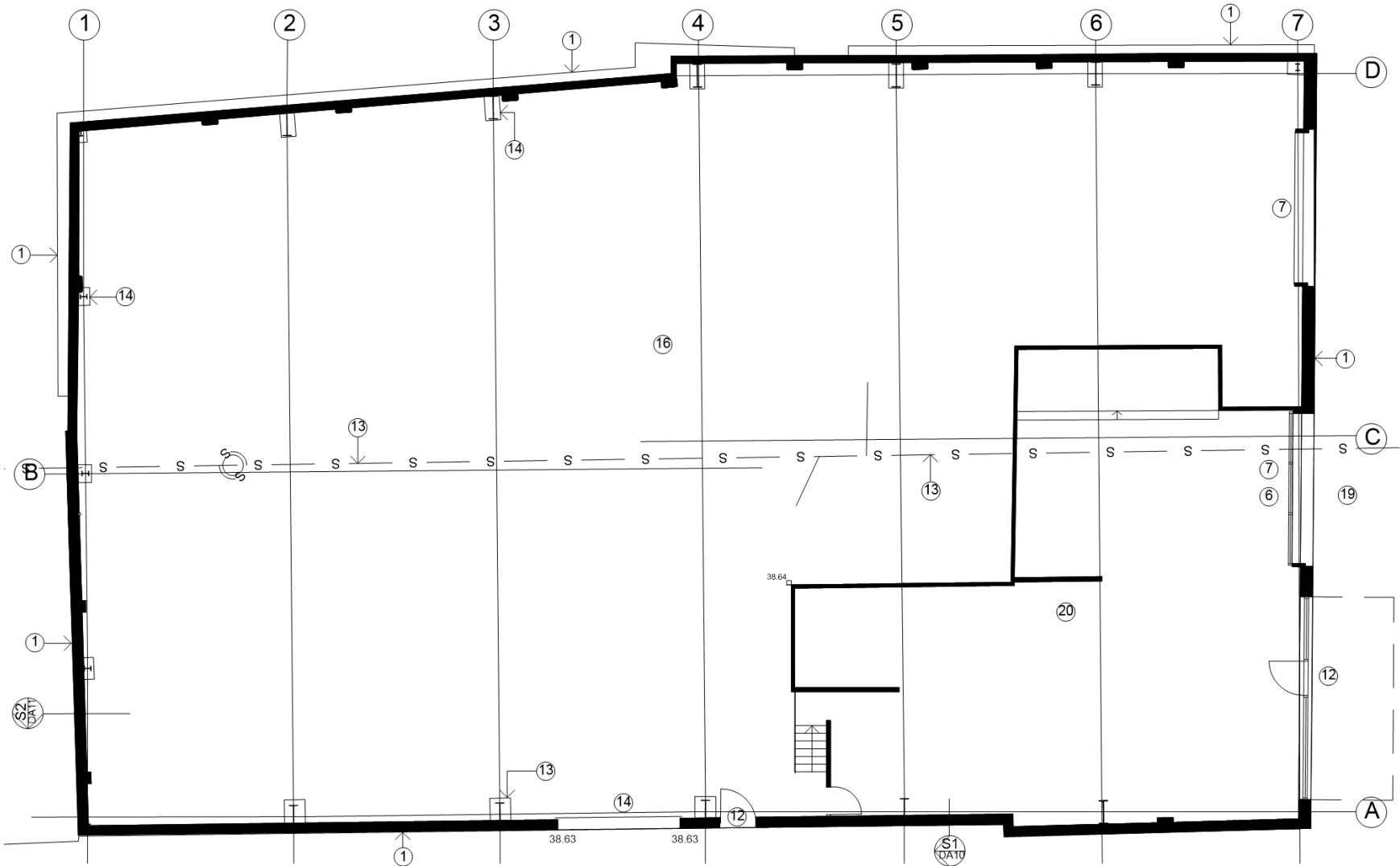


This plan is prepared from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose. The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only, not by field measurement. Services shown hereon have been located where possible by field survey. If not able to be located, services have been plotted from the records of relevant information where available and have been noted accordingly on this plan. Where such records either do not exist or are considered inadequate, a notation has been made hereon.
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 is an integral part of this plan.

NOTES:
1. DATUM FOR HEIGHTS IS AHD
2. BEARINGS ON MGA.

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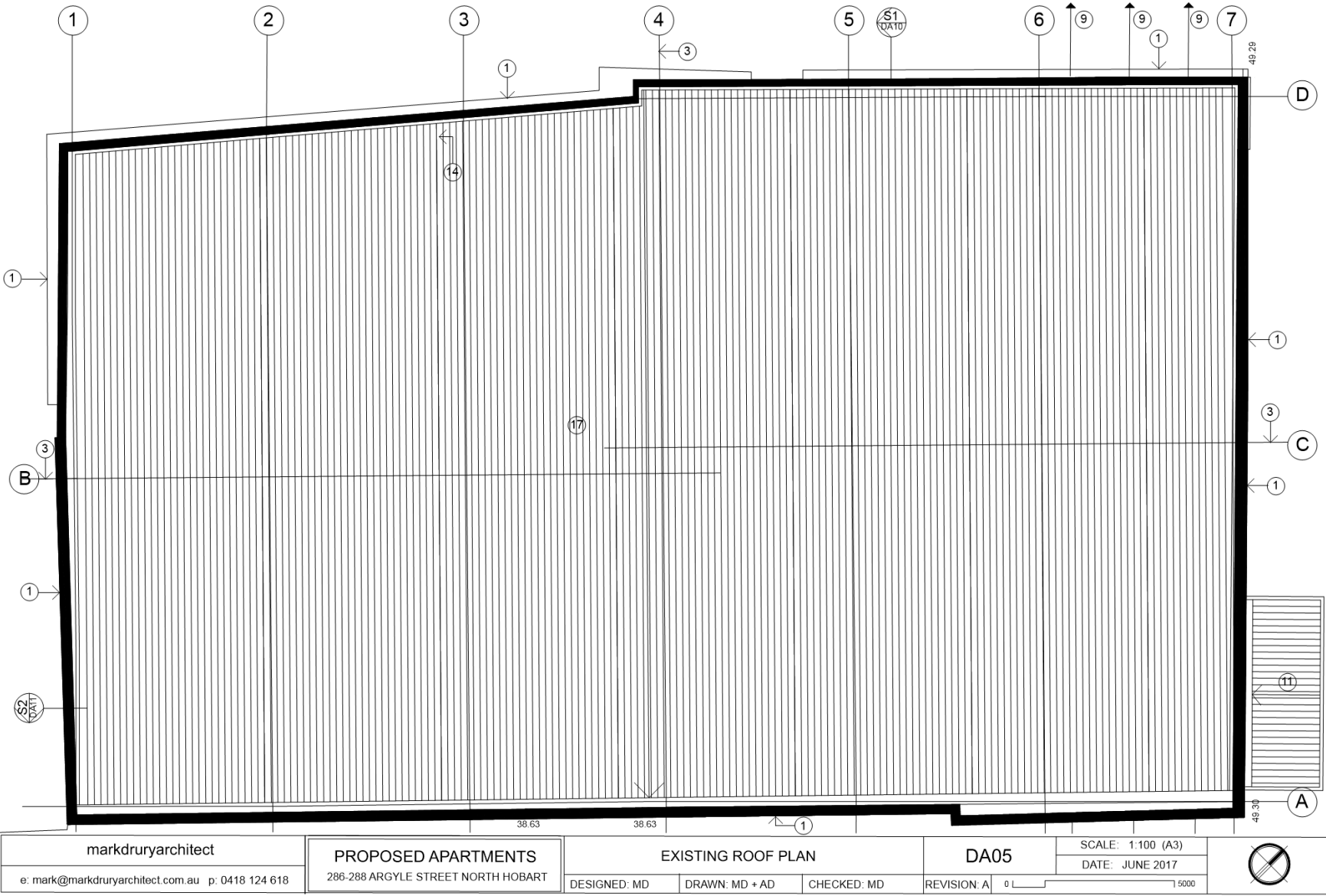


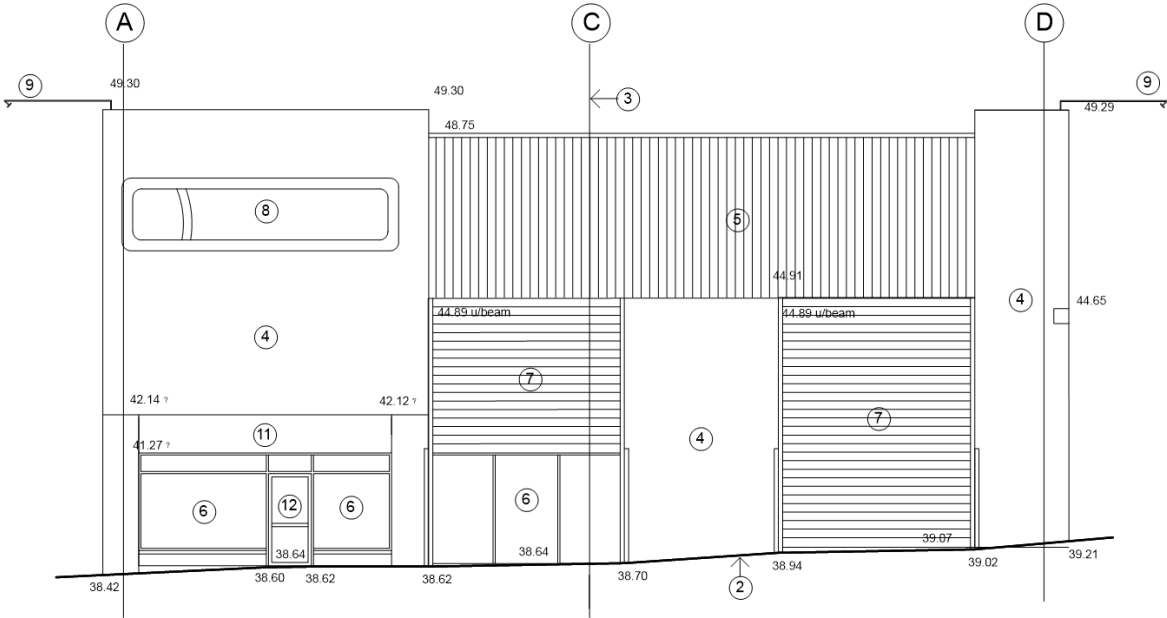



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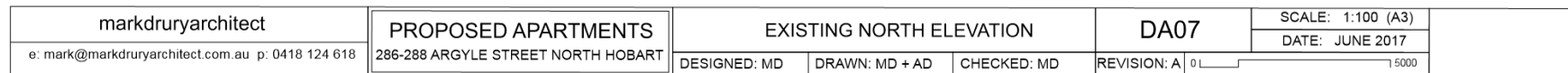


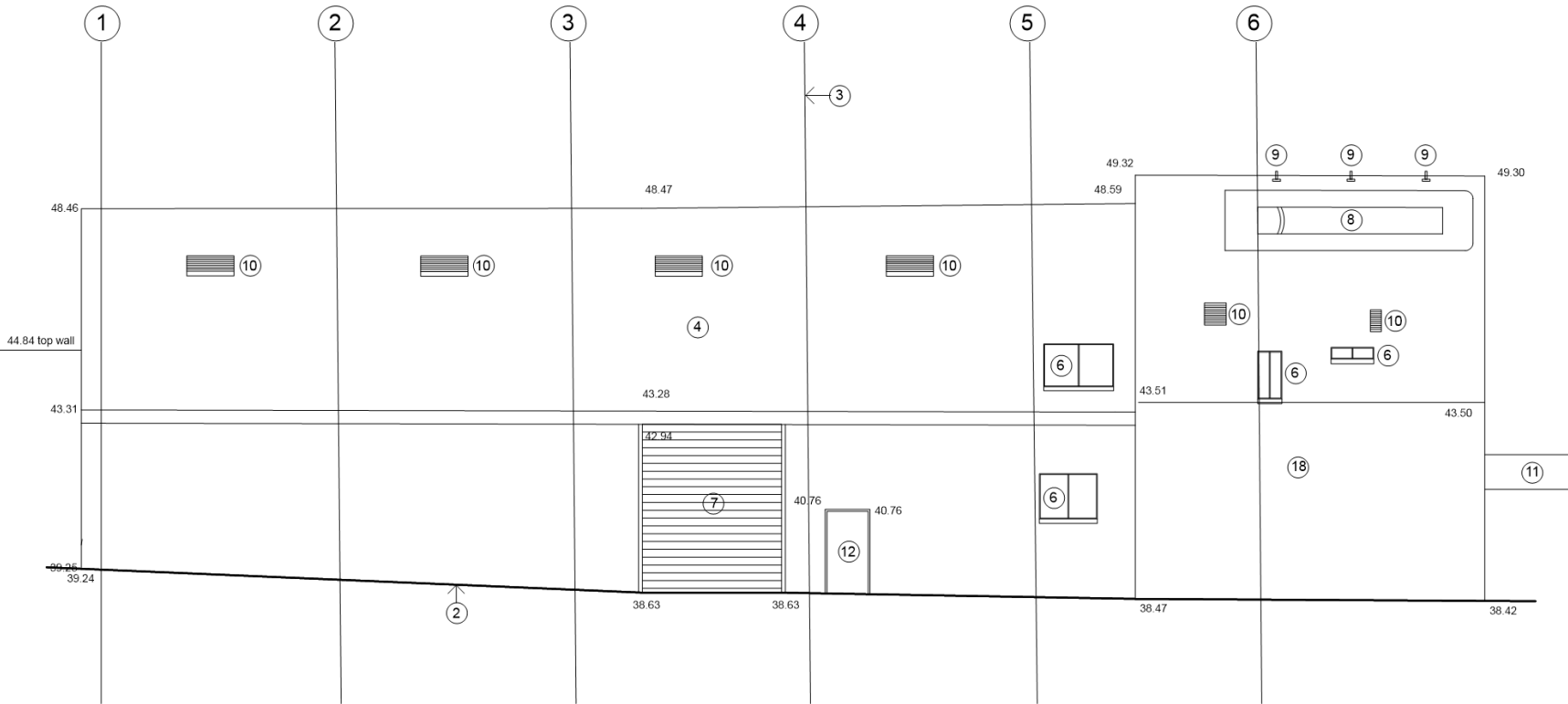
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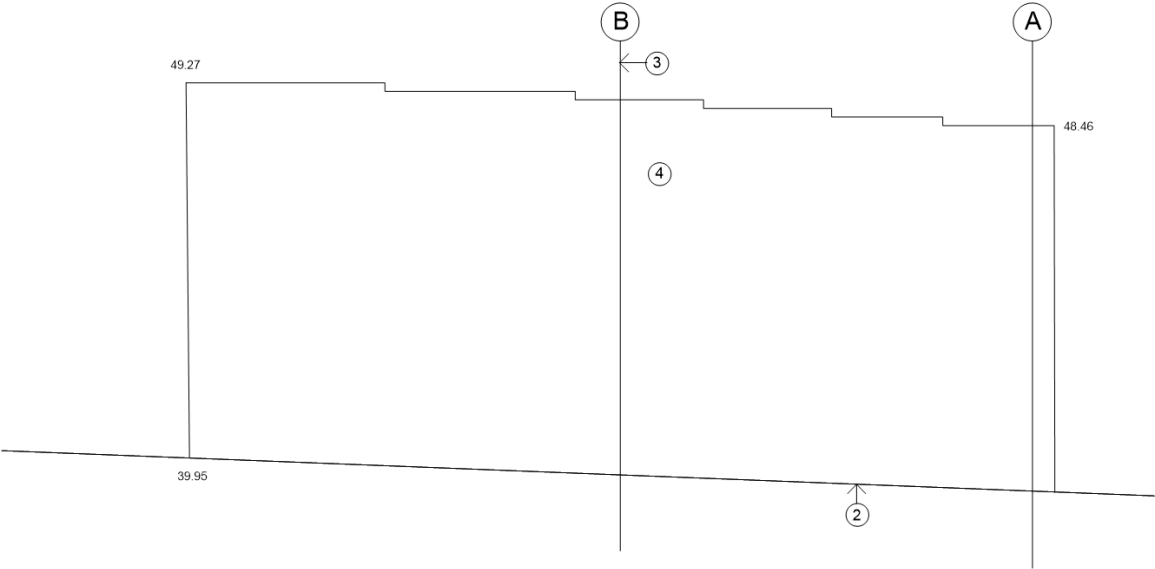


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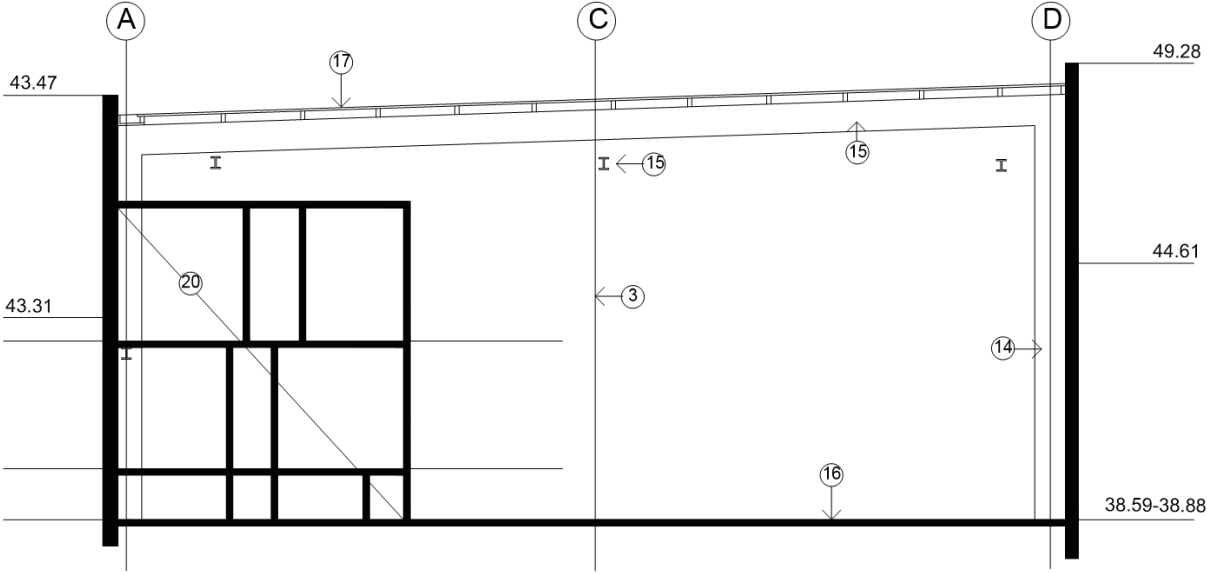




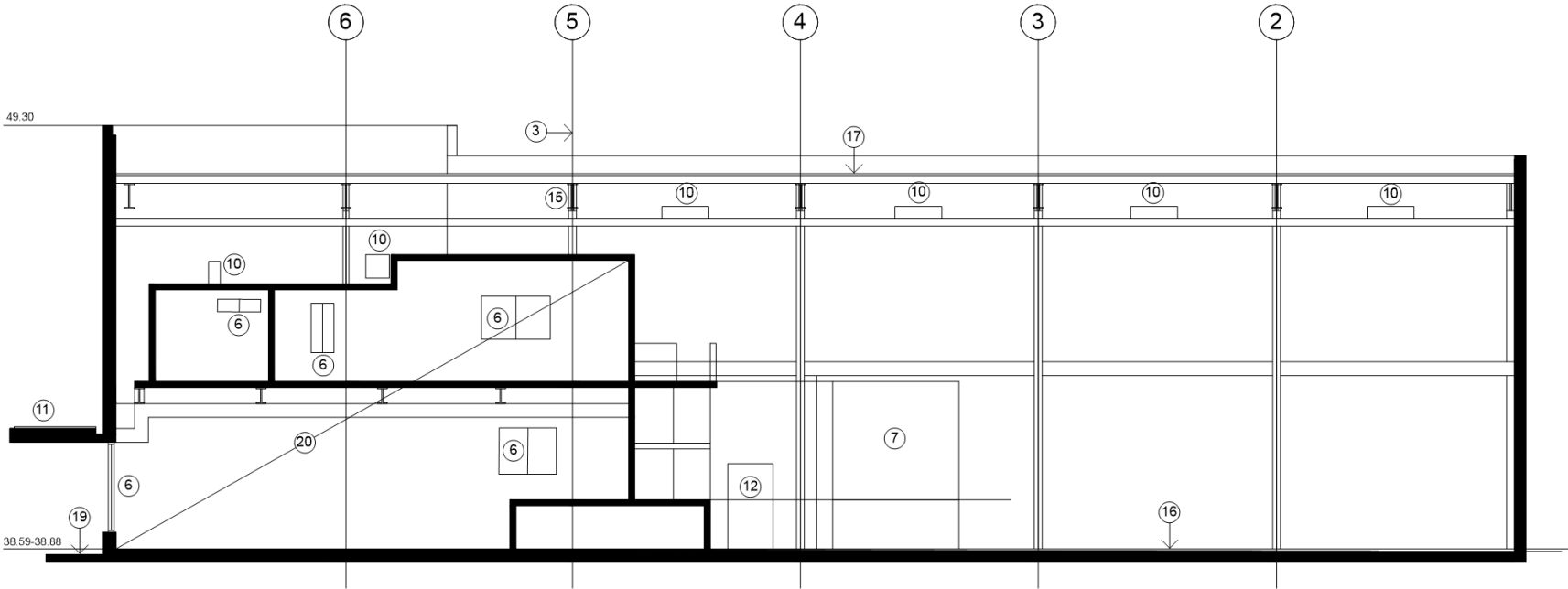
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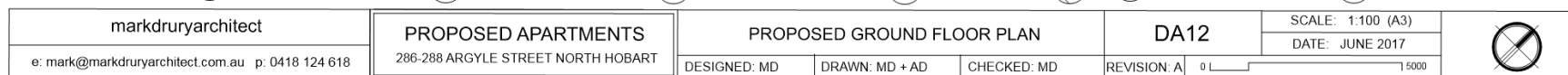
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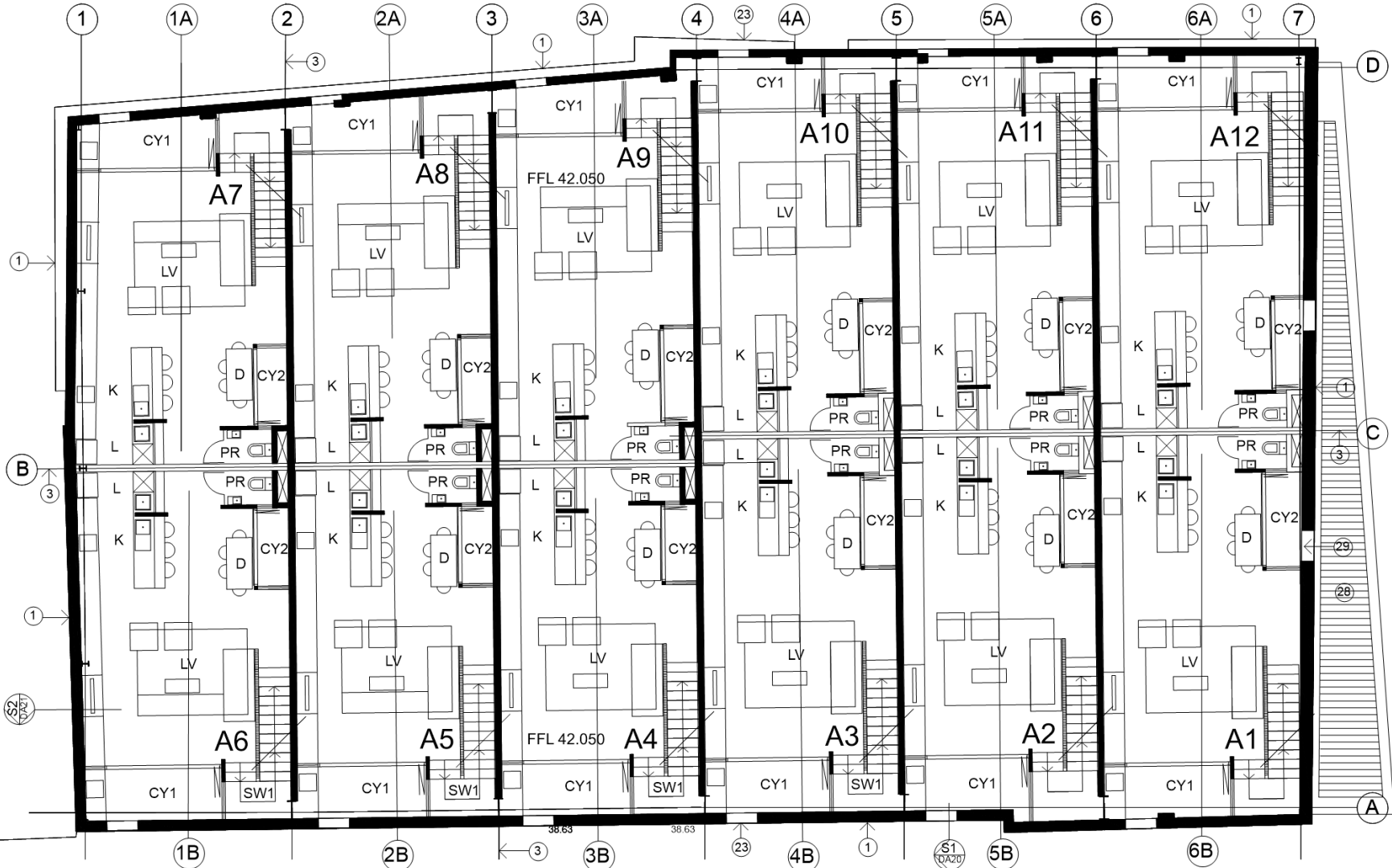



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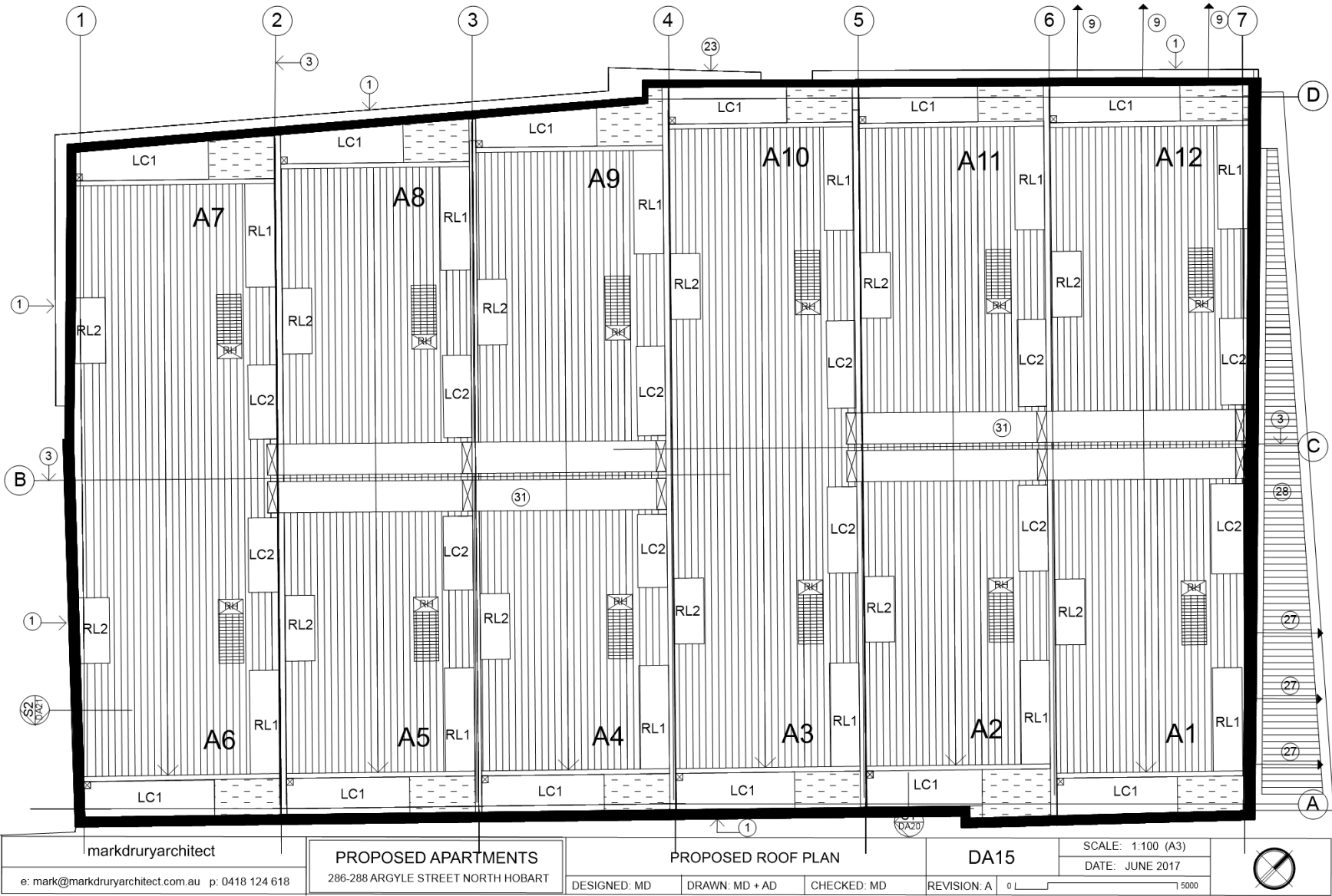
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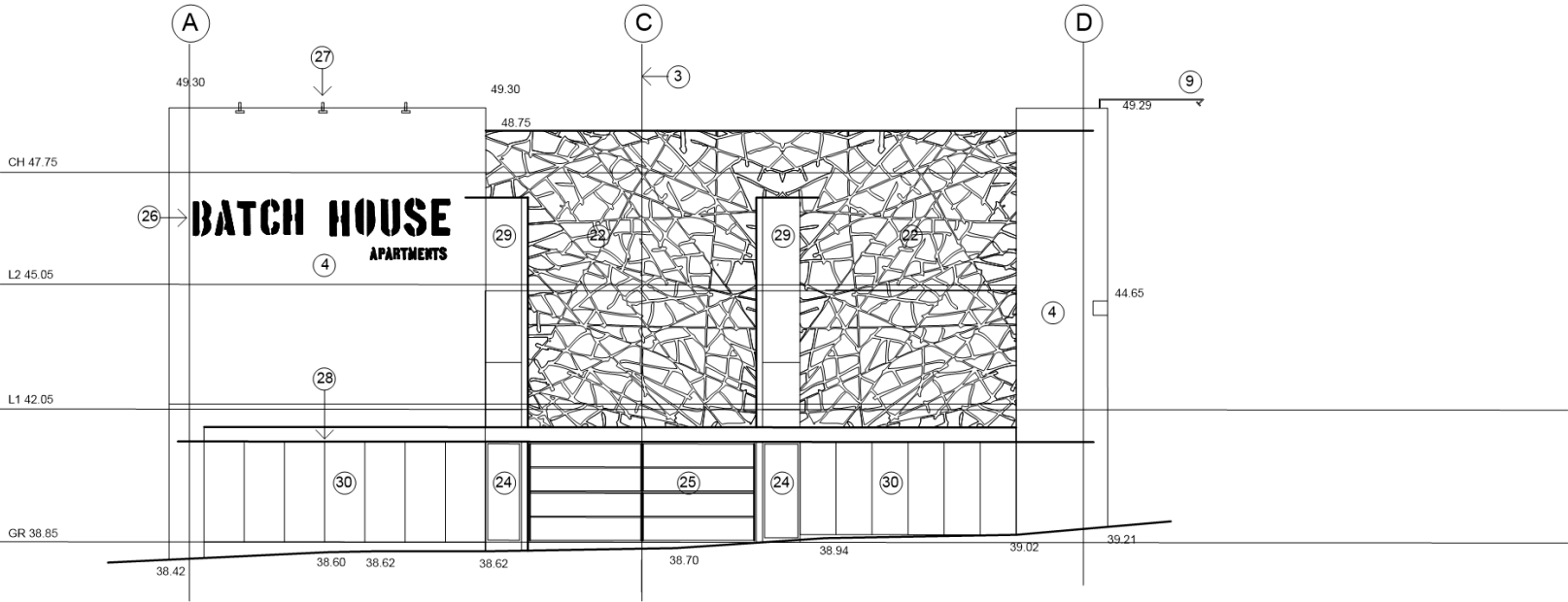




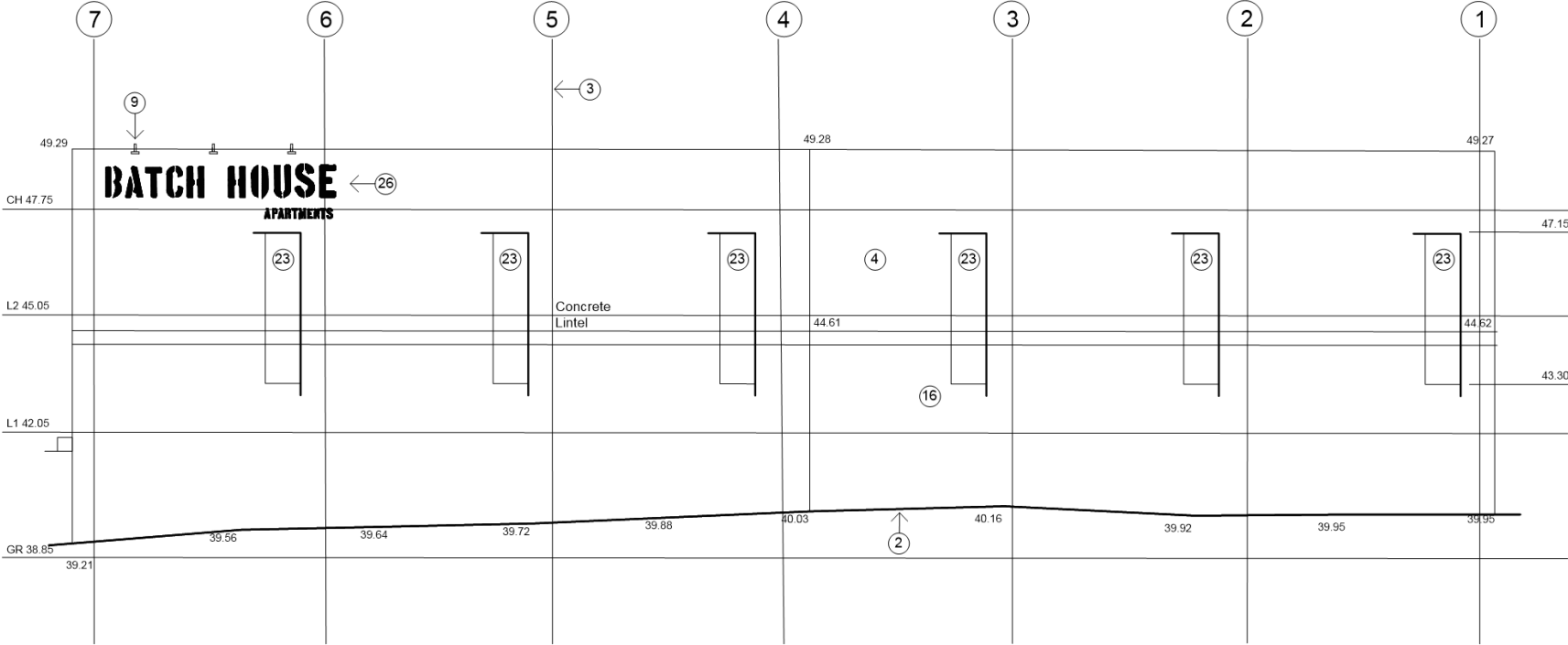
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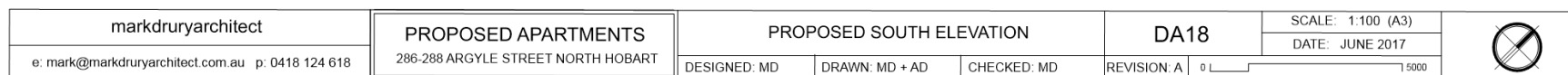


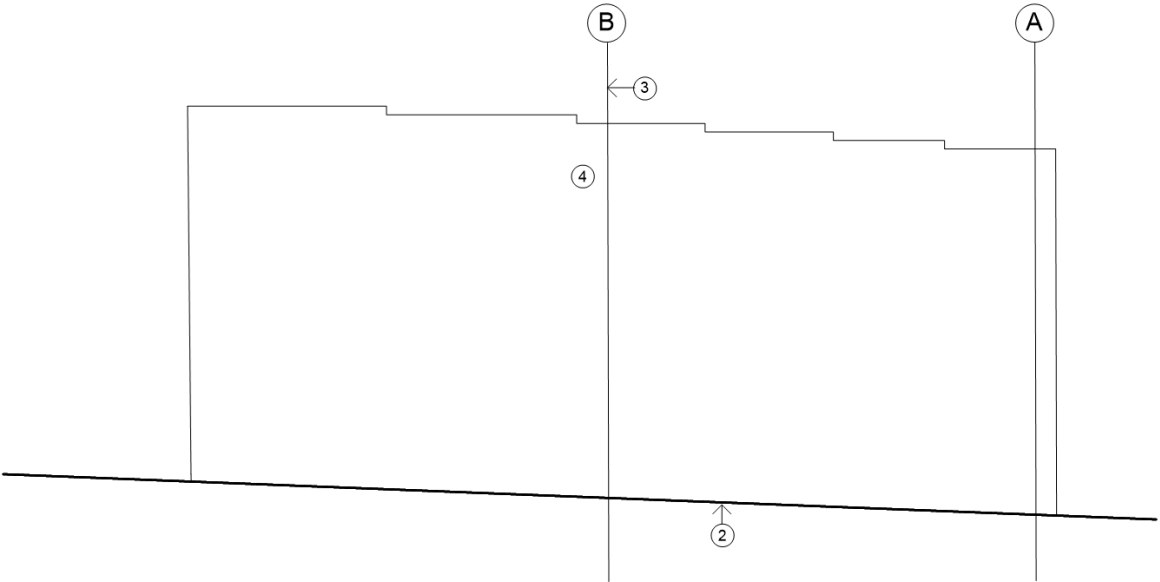


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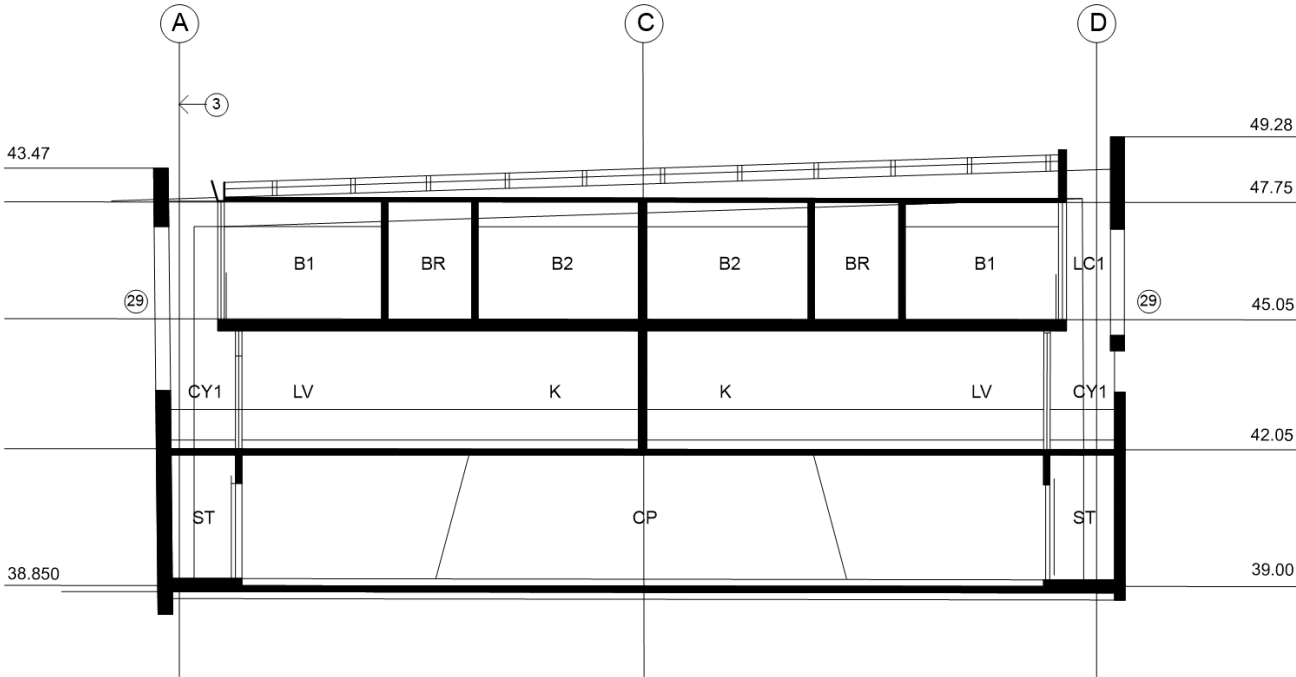


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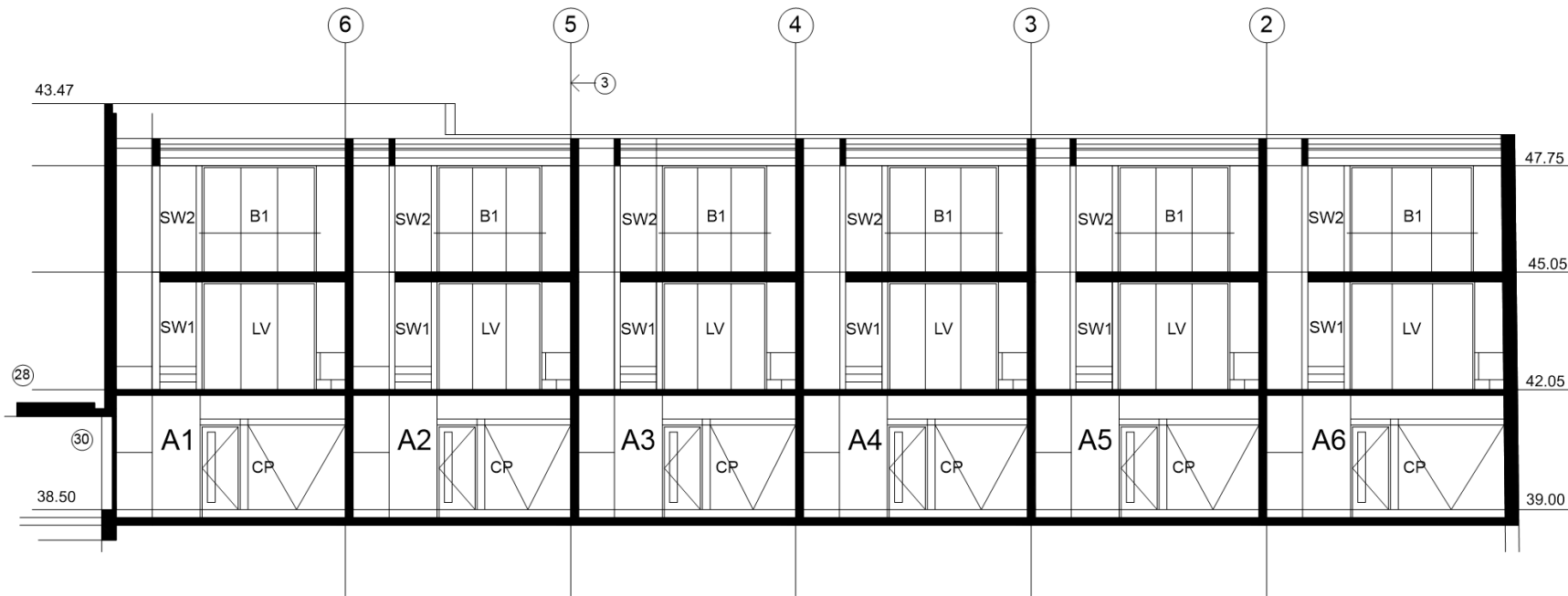




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PROPOSED REDEVELOPMENT
286-288 ARGYLE STREET
HOBART TAS 7000

DRAWING INDEX

DRAWING NOTES

H01	DRAWING INDEX & NOTES
H02	DRAWING NOTES – 1
H03	DRAWING NOTES – 2
H04	DRAWING NOTES – 3
H05	SITE PLAN
H06	SEWER LONG SECTION
H07	INDICATIVE STRUCTURAL PIER & PANEL PLAN

H11	GROUND FLOOR HYDRAULIC SERVICES
H12	FIRST FLOOR HYDRAULIC SERVICES
H13	SECOND FLOOR HYDRAULIC SERVICES
H14	ROOF LEVEL HYDRAULIC SERVICES

GENERAL

- G1. These drawing are to be read in conjunction with Architectural drawings, Project Contract and Specifications. Standards references are the most recent version.
- G2. The Local Authority for this project is Taswater and the Hobart City Council.
- G3. Locate all existing gas, electrical, telecommunications, water mains, sewer mains and stormwater mains etc. prior to the commencement of construction and advise the Superintendent of anything that appears not to have been considered in the design.
- G4. Confirm all levels on site prior to the commencement of works.
- G5. Site survey was provided by the client. Contractor is to allow for all set out requirements.
- G6. The Contractor shall be responsible for damages caused by his sub-contractors, any service damaged is to be reinstated immediately.
- G7. Remove all surplus materials from site.
- G8. Following agreement with the Superintendent, terminate and abandon redundant existing services discovered during construction and make a note on as-constructed drawing.
- G9. The Superintendent is required to inspect the works at hold points on this development. A minimum of two working days notice is required for inspections. The Superintendent shall also inspect the site as he/she sees fit, to ensure work is being done in accordance with the design.
- G10. Raw materials and constructed works need to be tested to ensure they are of suitable quality and comply with local Municipal Standards and the Building Code of Australia (BCA), and where not covered by these to comply with standard drawings and specifications from Tasmanian Department of Infrastructure, Energy and Resources (DIER), Water Services Association of Australia (WSAA) codes for Water, Sewerage and Sewerage Pumping Station, Institute of Public Works Engineering Australia (IPEWA) and product manufacturers. As constructed survey drawings are required to allow the Superintendent to confirm in writing to the Local Authority that construction has been substantially completed in accordance with these drawings.
- G12. On completion of works provide three sets of as-constructed drawings and service manuals along with electronic drawing files in PDF and DWG formats suitable for reading with a recent version of Adobe/Autocad to the Superintendent.
- G13. It is assumed that adjacent to the development site is adequate infrastructure provided by the Local Authority and other Statutory Authorities to supply road access, water and power as required by this design; and there is adequate infrastructure or environmental capacity to receive stormwater and sewerage drainage. Particular assumptions are described in the following sections.
- G14. Any variation from the design drawings are to be at the written approval of the Designer.

- G15. It is assumed roads accessing the development site are adequate to take the design traffic load of heavy vehicle axle groups during the design life of 40 years.
- G16. The contractor is responsible for ensuring that a valid building and plumbing permit is in place for the work and that the Building Surveyor is notified of all site inspection requests.
- G17. The contractor is responsible for organising all site inspections and observing all hold points nominated within the contract, by the Building Surveyor or Plumbing Surveyor.



A	PLANNING APPROVAL	SL	13-06-17
REV	DESCRIPTION	APP'D	DATE



PROJECT PROPOSED REDEVELOPMENT 286-288 ARGYLE STREET HOBART TAS 7000		
SCALES @ A3	DESIGNED BY	DRAWN BY
NTS	SL	SL
-	PLOT DATE	13-06-17

TITLE DRAWING NOTES & INDEX

REVISION A	
PLOT DETAILS	-
PROJECT NO.	17.0118
DWG NO.	H01

DRAWING NOTES

WATER

- W1. All water supply shall comply with AS 3500, NCCA, Taswater and other Authorities or Regulations having jurisdiction over the installation.
- W2. All copper pipework shall be hard drawn tubing Type 'B' conforming to AS 1432.
- W3. All pipework shall be concealed. Where pipework is exposed it shall be chrome plated.
- W4. All dwelling pipework shall be DN20mm with DN 15mm branches to individual fixtures unless noted otherwise. Maximum length of DN15mm branches shall be 2.0 metres.
- W6. Do not install pipework into sound insulated or fire rated walls unless otherwise noted.
- W7. Where pipework is in contact with dissimilar metals, the metals shall be insulated against bi-metal corrosion.
- W8. All isolation valves shall be positioned in approved accessible locations. Valves located in ducts or walls shall be positioned behind approved type access covers.
- W9. Hose bib cocks shall be 600mm above finished surface level and shall be 20mm in size, U.N.O., and fitted with approved vacuum breakers.
- W10. Hot water installations shall be set at min. 60°C delivery.
- W11. Hot water at high temperature (65°C) to kitchen and laundry. Hot water tempered to 50°C to bathroom fixtures. Hot water tempered to 45°C in disabled, child care and aged care facilities.
- W12. Tempered, hot water pipework and valves shall be lagged as per AS/NZS 3500.4:2003 Section 8 for Climate Region C. Hot water circulating line to be lagged with sectional rockwool with foil outer cover. External lagging to be UV protected, and lagging exposed to moisture needs to be moisture protected. Solar flow and return lagging should be rated for temperatures up to 150°C, other lagging rated to 105°C. All lagging should be fire rated to NCCA requirements, PVC free, zero ozone depleting potential, low volatile organic compounds.
- W13. All screwed stop valves shall have union couplings and be accessible. Group valves wherever possible.
- W14. The plumber shall arrange for all inspections and testing of services required by the local authority prior to concealment. Pressure test hot and cold water services to 1.5 times normal working pressure and fire services to 1700 kPa minimum pressure prior to connection to existing services. pump equipment shall be removed whilst testing is carried out.
- W15. Following completion of the works, flush all piping systems and leave free of foreign matter, clean out aerators, strainers, filters, etc., flow and pressure test all hydrants and hose reels.

CONCRETE

- C1. All workmanship and materials shall be in accordance with AS3600.
- C2. Concrete grades (UNO on drawings) :
- | ELEMENT | Grade |
|----------|-------|
| General | N25 |
| Footings | N20 |
| Pavement | N25 |
- C3. Concrete shall not be poured when the site temperatures are below 5°C.
- C4. Concrete shall be cured by continuous wetting (water spray, ponding or irrigated hessian) or application of an impermeable membrane (secured plastic or curing compound) for an appropriate period of time (not less than 3 days). In hot dry and windy weather spray the surface with aliphatic alcohol while concrete is plastic, water cure for at least 24 hours then cover with impermeable membrane (or continue to water cure) for a further 2 days.
- C5. Construction joints shall be properly formed and used only where shown or specifically approved by the Engineer.
- C6. Cover to reinforcement (mm) shall be 40mm for slabs and 50mm for footings.
- C7. Reinforcement shall be deformed, 500 MPa yield strength, normal (N) ductility in accordance with AS/NZS4671 for bars and low (L) ductility for mesh.
- C8. Formwork shall be designed and constructed in accordance with AS3610, and is the responsibility of the contractor.
- C9. All steel items to be cast into the concrete surface shall be hot dip galvanised.

STORMWATER

- SW1. Pipe and channel infrastructure has been designed to convey 20 year average recurrence interval (ARI) storms, with overland flow paths provided for 100 year ARI storms. It is assumed that water flowing onto the development site is contained within Local Authority infrastructure for 20 year ARI storms and the road reserve for 100 year ARI storms.
- SW2. All materials and workmanship shall be in accordance with the Local Authority's by-laws and AS/NZS3500.
- SW3. Stormwater trenches, pipe bedding and back filling to comply with the Concrete Pipe Association of Australia installation requirements for type HS2 support.
- SW4. Below ground pipework and fittings to be uPVC SWHD, joints shall be of solvent cement type or flexible joints made with approved rubber rings.
- SW5. Pipework shall be laid in position and at the grades shown.
- SW6. Minimum grade of paved areas and pipework shall be 1 in 100 unless noted otherwise (u.n.o.).
- SW7. Surface water drains, catchpits/grated pits, and junction boxes shall be constructed as detailed or as specified by the manufacturer.
- SW8. Install all agricultural drains to the requirements of AS/NZS3500 and part 3.1.2. of the NCCA.
- SW9. All manholes to be located clear of future fencelines.



					PROJECT PROPOSED REDEVELOPMENT 286-288 ARGYLE STREET HOBART TAS 7000	TITLE DRAWING INDEX - 1	REVISION A 
					SCALES @ A3 NTS	DESIGNED BY SL	PLOT DETAILS -
						DRAWN BY SL	PROJECT NO. 17.0118
A	PLANNING APPROVAL	SL	13-06-17				DWG NO. H02
REV	DESCRIPTION	APP'D	DATE				

DRAWING NOTES**BUILDING HYDRAULICS**

- H1. All materials and workmanship to be done in accordance with AS3500, the Tasmanian Plumbing Code and Local Authority requirements.
- H2. All drainage pipework shall be uPVC class SN6 u.n.o., all waste and vent shall be DWV class pipe.
- H3. During construction temporarily seal all open ends of pipes and valves to prevent entry of foreign matter, do not use rags, paper or wooden plugs.
- H4. Supply and install all fixtures, valves, tapware and sundry items as scheduled within the specification.
- H5. All pipework under trafficable areas to be backfilled full depth with DIER R40 class A - 19mm FCR
- H6. Provide fire stops as required.
- H7. Contract drawings are diagrammatic and as such show the intent of design. Installation to be as per AS/NZS3500. Allow for all bends, offsets and other measures as necessary to avoid interference with the structure and/or other building services.
- H08. Refer to architects demolition plan for removal of existing fixtures and fittings. The removal of existing plumbing fixtures shall include all associated waste and vent pipes, floor drains, water service pipework brackets, supports, etc and seal off existing services. Seal off and make good all floor, wall and roof penetrations.
- H09. All pipework under trafficable areas to be backfilled full depth with DIER R40 class A - 19 mm FCR compacted to AS3798.
- H10. The location of existing services where shown are approximate only and shall be confirmed on site. Where possible, determine location of existing power, Telstra, water and drainage services prior to commencing new work.
- H11. All penetrations through existing suspended floor slabs shall be drilled to locations approved by the Structural Engineer. Drill pilot hole prior to core drilling to ensure clearance of beams and other services in slab. All penetrations shall be core drilled to suit pipe size. Allowance for 10 mm clearances shall be made for fire proofing.
- H12. Refer to architectural drawings for location of fire and smoke stop walls. All pipe penetrations shall be sealed with two hour fire stop sealant. Install fire stop collars to PVC-U pipework passing through floors and fire walls in accordance with the manufacturers written instructions.
- H13. Provide service identification and direction of flow markers to pipework in accordance with AS1345. Lay detector tape over all in-ground non-metallic pipework.
- H14. Make good all disturbed surfaces to match existing.
- H15. Plumbing contractor to arrange for all new works by local authority and for sealing off and making good existing as required. Pay all fees associated with the works.
- H16. Maintain services to existing fixtures at all times. where changeover is required, liaise with the architect prior to the shutting down of any service.
- H17. Contractor to provide all documents, approvals, certificates, warranties, log books, etc. upon completion of works to the architect. All fees and inspections to be included and arranged by the contractor.
- H18. Confirm all invert levels prior to trench excavation.
- H19. Refer to the architects drawings for sanitary fixture and tap selections. Supply and fix accessories necessary for the correct installation of the fixtures and equipment.

SEWER

- S1. House connections to be DN100 uPVC at a minimum grade of 165%.
- S2. Sewer system to be constructed to the requirements of the Municipal Standard Drawings OR WSAA Standard Drawings u.n.o.
- S3. Sewer trenches, pipe bedding and back filling to comply with AS2566.
- S4. All hydraulic connections and tapings to be clear of driveways and trafficked areas.
- S5. Where both stormwater and sewer lines are along rear and side boundaries they shall be located to satisfy the requirements of the WSA & Southern Waters supplement to the code.
- S6. All manholes to be located clear of future fences.
- S7. Sewerage drainage installation shall comply with the AS3500, NCCA, Taswater and other Authorities or Regulations having jurisdiction over the installation. Confirm the location and level of the nominated outlet prior to trench excavation or laying of any drains. Ascertain from Taswater all necessary connection requirements and install all work for connection in accordance with these requirements.
- S9. Pipework shall be DN 100mm unless noted otherwise. All pipework shall be equal to or greater than the nominated outlet size of the fixture, appliance or tundish.
- S10. Where pipework penetrates fire rated walls or floors, a fire stop collar shall be installed. All work shall be strictly installed to the manufacturer's recommendations.
- S11. All pipework shall be adequately supported to AS3500.
- S12. Pipework shall be constructed of Unplasticised Polyvinyl Chloride (UPVC), U.N.O. pipework receiving hot discharges shall be constructed of High Density Polyethylene (HDPE) or copper type 'B'.
- S13. All pipework shall be concealed in walls, void space or ducts unless noted otherwise.
- S14. Pipework shall be pressure tested progressively to ensure no leaks.
- S15. Where floor waste gullies are indicated, the floors shall be graded towards the outlet.
- S16. Tundishes shall be installed to receive mechanical plant waste and be connected above waste traps where detailed on Mechanical Engineer's drawings. Provide and install Mag in-wall tundishes with stainless steel cover window (supplied by MA Griffith) or equal approved type.
- S17. No sewer connections shall be made within restricted zones of stacks as per AS3500. Install long radius bends at the base of all stacks as per AS3500 and include all brackets and supports.
- S18. Acoustic lagging shall be installed to all pipework as detailed by approved qualified persons and in accordance with the Acoustic specification/report.

0 50mm 75mm

A	PLANNING APPROVAL	SL	13-06-17
REV	DESCRIPTION	APP'D	DATE



PROJECT
PROPOSED REDEVELOPMENT
286-288 ARGYLE STREET
HOBART TAS 7000

SCALES @ A3	DESIGNED BY	DRAWN BY
NTS	SL	SL
-	PLOT DATE	13-06-17

TITLE
DRAWING INDEX - 2

REVISION	A	
PLOT DETAILS	-	
PROJECT NO.	17.0118	
DWG NO.	H03	

DRAWING NOTES

FIRE SERVICES

FS1. Installation of Fire Service water supply including hydrants, booster connections, fire hose reels and commissioning shall be to the requirements and approval of the Building Surveyor, Tasmanian Fire Brigade, NCCA, AS 2419.1, AS 1221, AS2441 and Taswater.

FS2. Fire hose reels shall be installed and placed in working order as soon as building works permits.

FS3. All below ground fire service pipework shall be hard drawn copper tube type 'B' unless noted otherwise. All above ground fire service pipework shall be medium-duty hot-dipped galvanised steel tube with 60 minutes fire rated supports, unless noted otherwise.

FS4. All fire isolation valves shall be secured in the open position by a padlocked galv. Metal strap or chain. Provide and install engraved non-ferrous metal tags with 8mm upper case wording: "FIRE SERVICES ISOLATING VALVE - TO BE PADLOCKED IN THE OPEN POSITION". Locking devices shall be 225 Contract Series Padlocks Serial Number 225/40/119/003.

FS5. Install isolation valves to all fire hose reel pipework at the points of connection to fire hydrant system in accordance with the NCCA.

FS6. Concrete anchor blocks shall be provided at all sudden changes of direction, both vertically and horizontally at tees and end of lines.

FS7. Upon completion of the Fire installation, provide a Compliance Report as required by the controlling authority that the installation complies with the regulations and submit copies of the report to the Superintendent.

FS8. All fire Services in basement or not located within fire isolated stairs/duct shall be provided with 60/-/- fire rated supports unless protected by a fire sprinkler system.

LEGEND

Existing surface level (surveyed)

Existing surface level (interpolated)

Proposed bulk earthworks level

Proposed finished surface level

Existing water supply external to building

Proposed water supply external to building

Existing fire supply

Proposed fire supply

Existing sewer drain

Existing sewer drain

Proposed sewer drain

Proposed sewer drain (greasy waste)

Proposed sewer drain (trade waste)

Existing stormwater drain

Proposed stormwater drain

Proposed stormwater (larger)

Proposed DN100 ag. drain and geofabric sock

Proposed cold water supply internal to building

Proposed hot water supply

Proposed hot water supply (flow)

Proposed hot water supply (return)

Proposed tempered water supply

Proposed gas supply

Proposed concrete construction joint

Proposed concrete key joint



Proposed concrete sawn joint

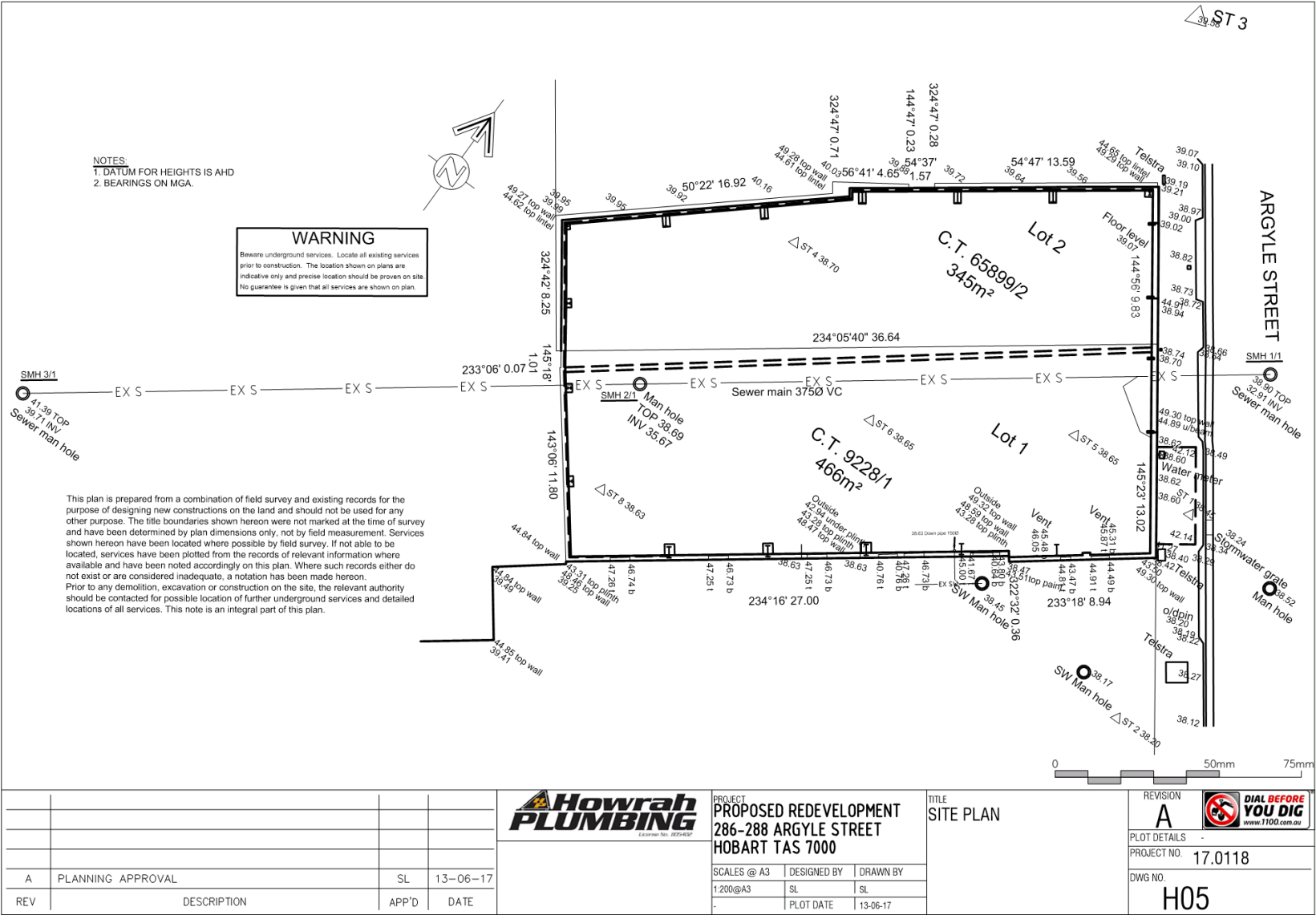
Proposed sediment fence

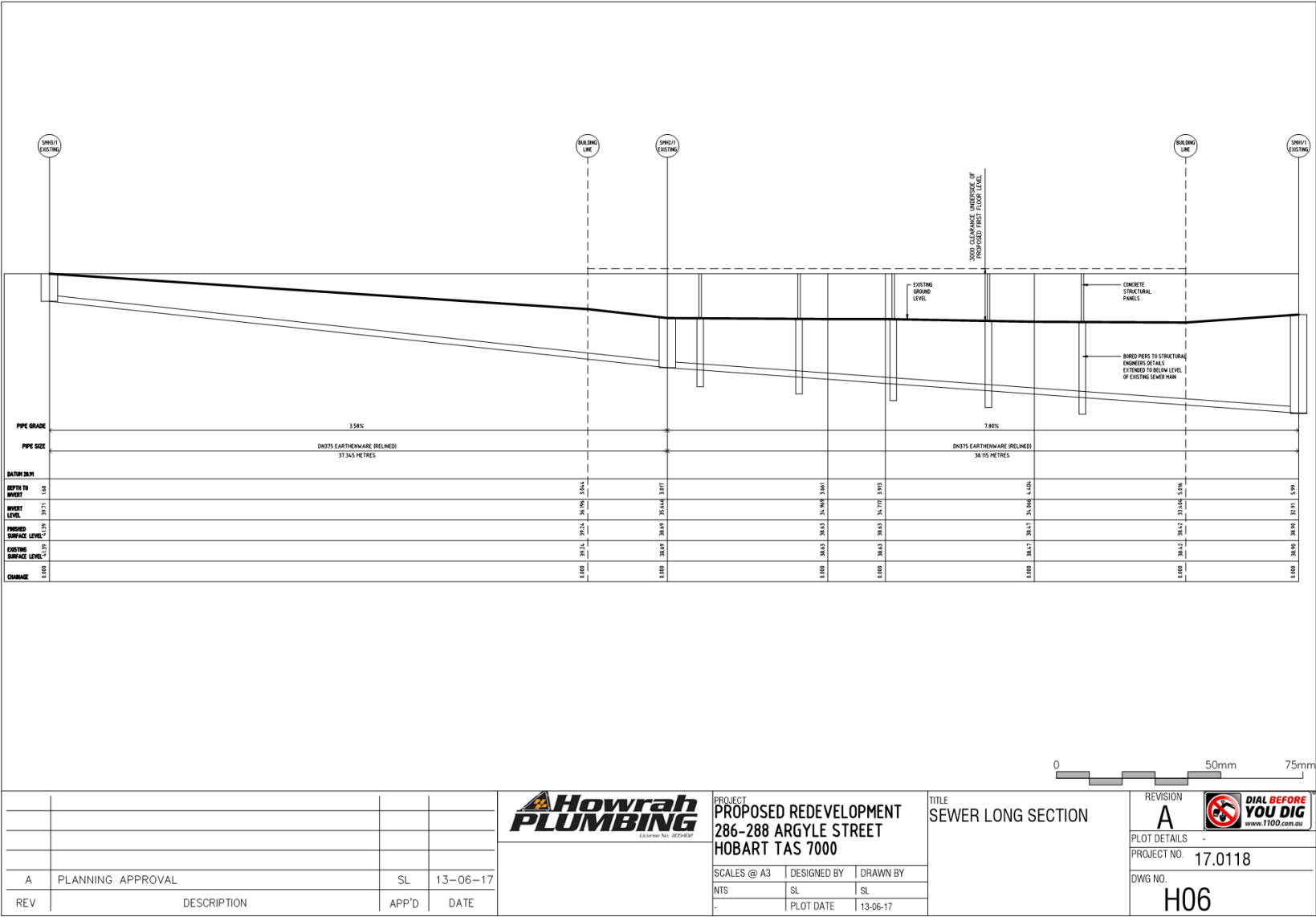
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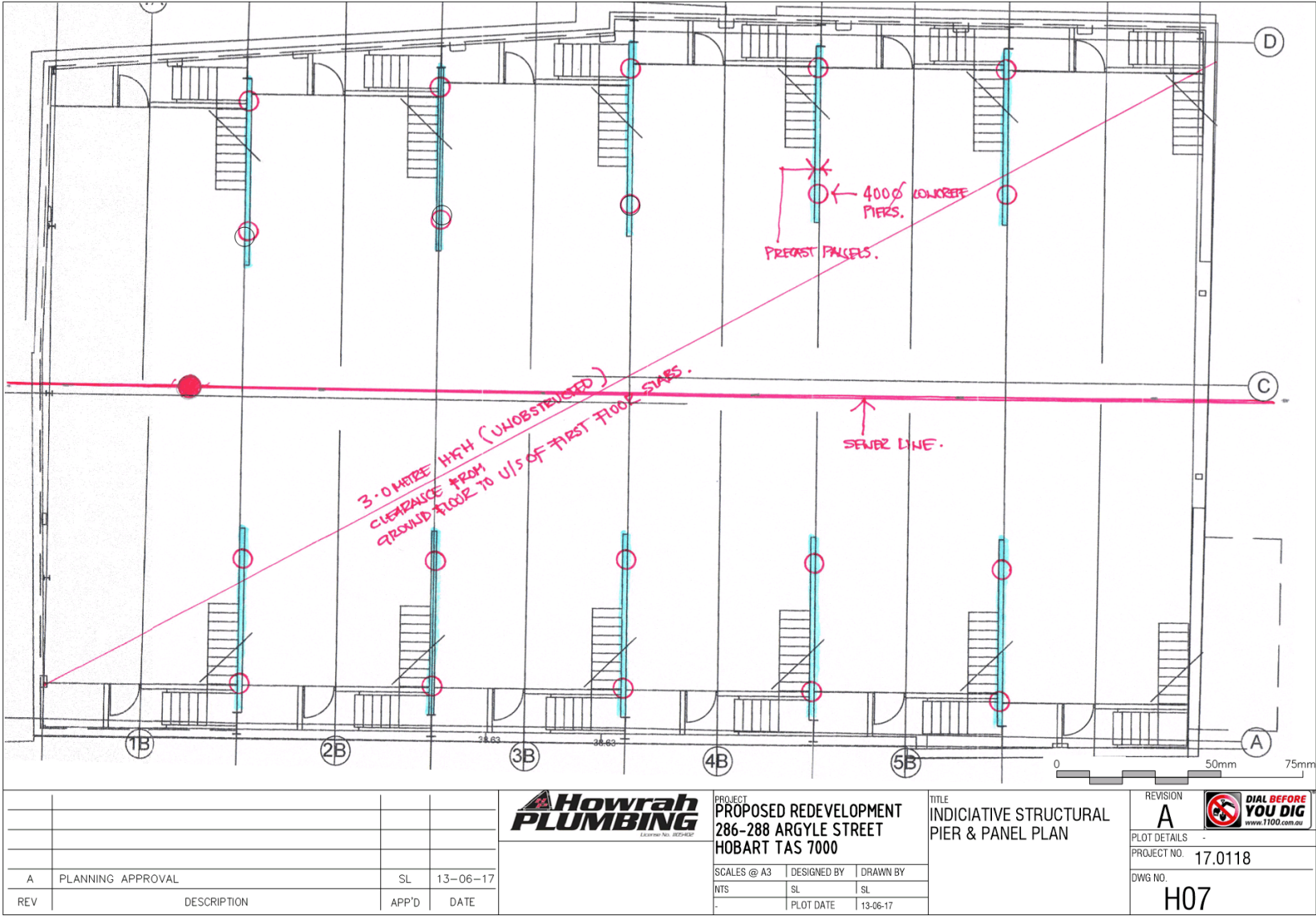
50mm

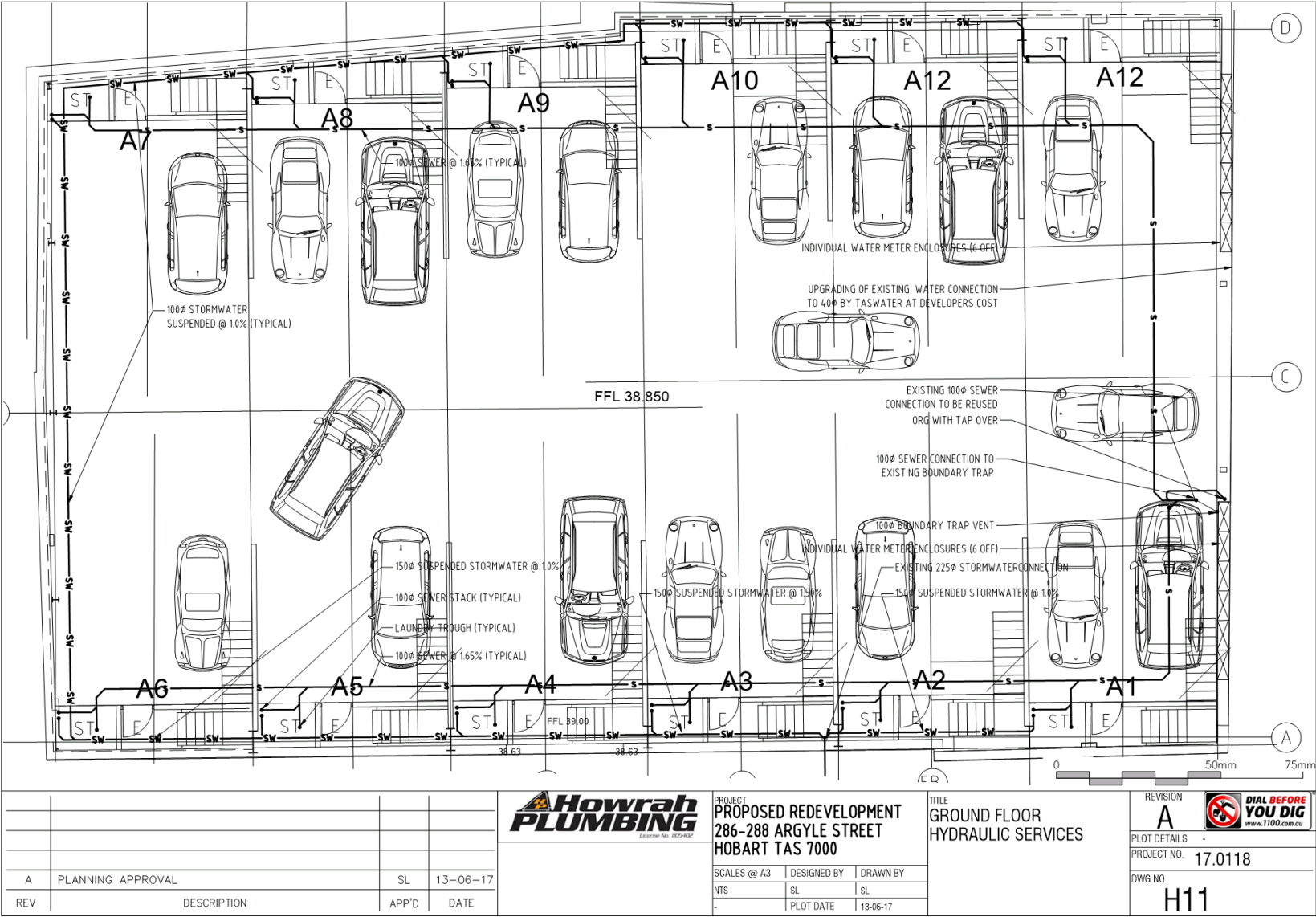
75mm

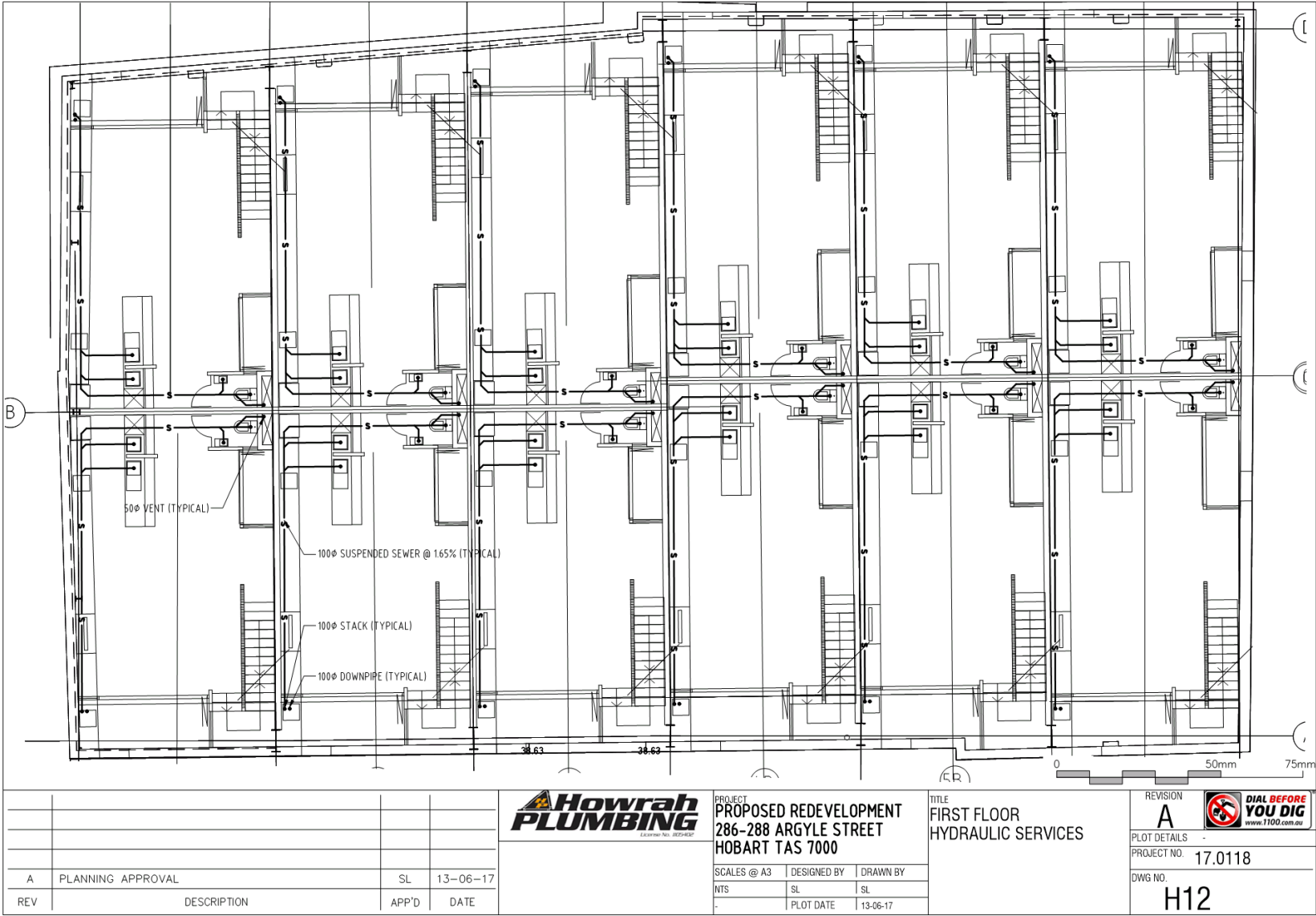
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A	PLANNING APPROVAL	SL	13-06-17		SCALES @ A3 NTS	DESIGNED BY SL	DRAWN BY SL
REV	DESCRIPTION	APP'D	DATE			PLOT DATE	13-06-17

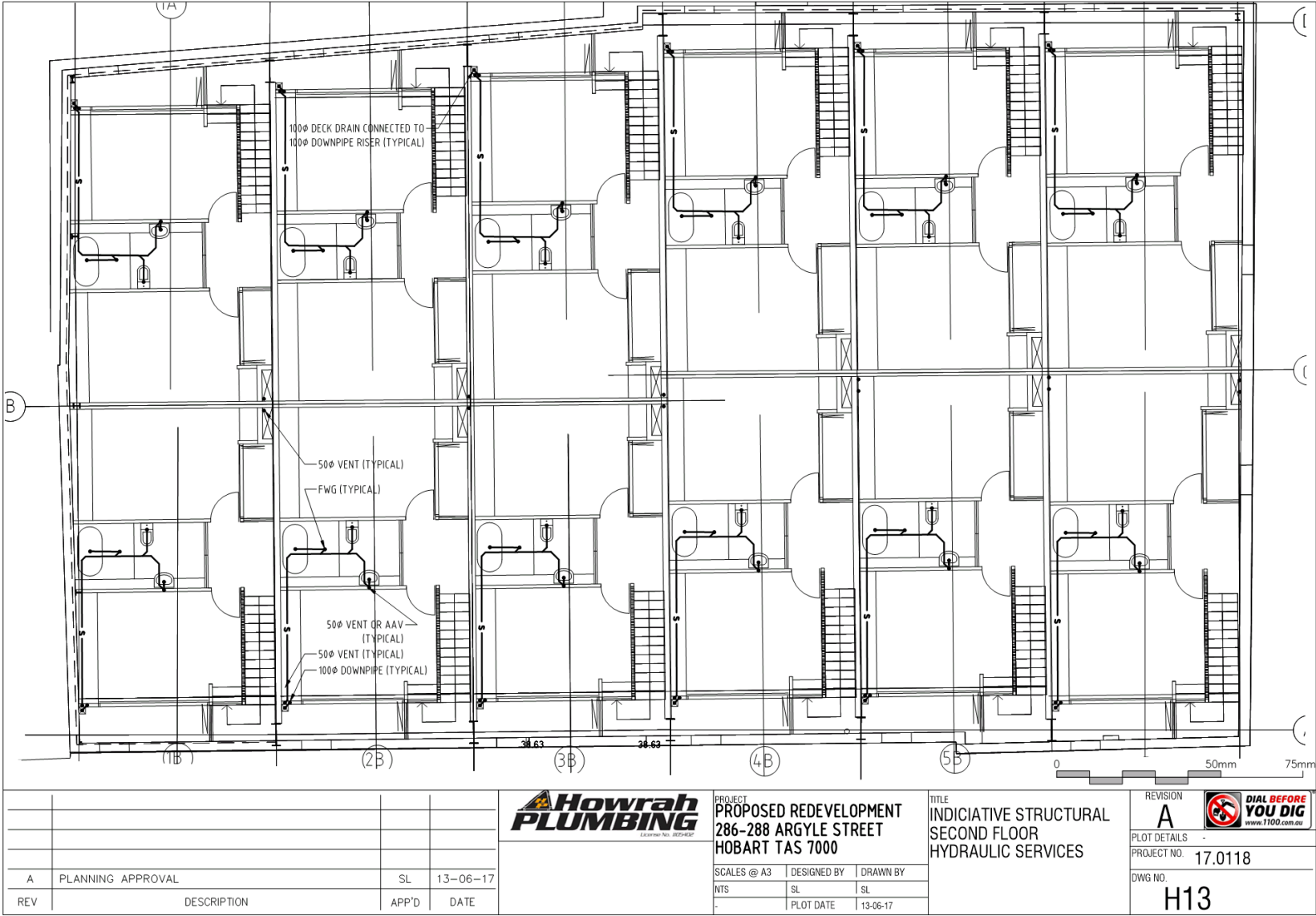














A	PLANNING APPROVAL	SL	13-06-17
REV	DESCRIPTION	APP'D	DATE


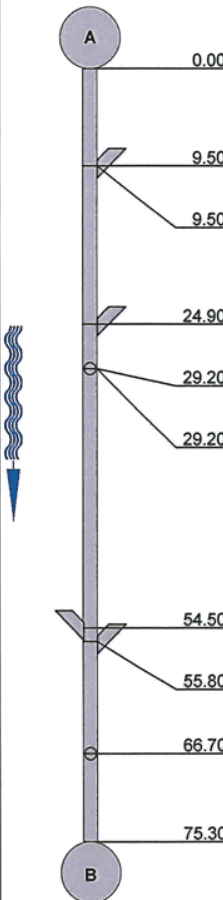
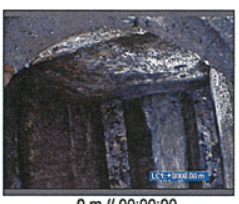




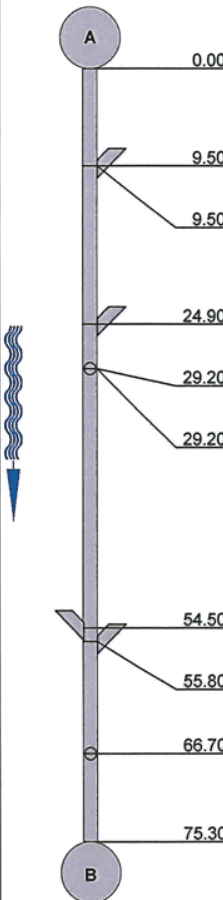
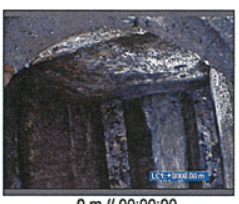




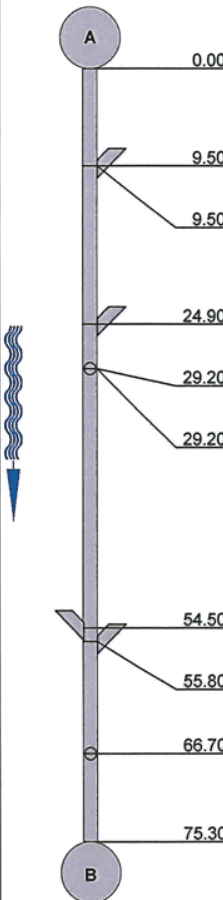
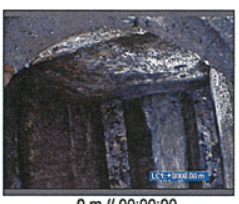







PROJECT
PROPOSED REDEVELOPMENT
286-288 ARGYLE STREET
HOBART TAS 7000

SCALES @ A3	DESIGNED BY	DRAWN BY
NTS	SL	SL
	PLOT DATE	13-06-17

TITLE
ROOF LEVEL
HYDRAULIC SERVICES

REVISION	
A	
PLOT DETAILS	-
PROJECT NO.	17.0118
DWG NO.	H14

		Nu - Jet Knoll Street Glenorchy 0363726129 0438 120 552 www.nujet.com.au Email: admin@nujet.com.au																																																							
		WSA assessment																																																							
Date: 30/05/2017	Asset owner's job ref.: 11452	Asset Owner: Howrah Plumbing	Operator : Stu Knight	Section number: 1	Pipe Asset Id: MQZ1SEG54377																																																				
Time of inspection: 11:02:47	Cleaning: not cleaned	Standard: WSA 05-2008 2.2	LRP	Conduit Unit Length	Method of Inspection Television Camera																																																				
Town: Suburb: Nth Hobart Street: Lefroy St Asset Location Driveway		Catchment: Asset Owner: Howrah Plumbing Precipitation.: Rain Flow control No measures		US MH: A Survey Dir: downstream DS MH: B Inspect Length : 75.30 m																																																					
Purpose of inspection : Other Authorities Works Use of Conduit: Sewage Type of Conduit: Gravity sewer Lining Method: Cured in place lining			Shape : Circular Dia/Height: 375 mm Lining: Glass reinforced plastics Pipe Material: Vitrified clay																																																						
Remarks :																																																									
<table border="1"> <thead> <tr> <th>1:600</th> <th>Position</th> <th>Code</th> <th>Observation</th> <th>Str Rate</th> <th></th> </tr> </thead> <tbody> <tr> <td rowspan="10">  </td> <td>0.00</td> <td>STMH</td> <td>Start node, maintenance hole, Nodename: A , rmd con lid in car park</td> <td></td> <td> 0 m // 00:00:00</td> </tr> <tr> <td>9.50</td> <td>JNPO</td> <td>Junction open, poor workmanship, height 100mm , at 10 o'clock</td> <td></td> <td rowspan="2"> 0 m // 00:00:00</td> </tr> <tr> <td>9.50</td> <td>PLRC</td> <td>The re-establishment of a connection has been done improperly , reduction in cross sectional area: 5-20%, poorly cut open (to large), at 10 o'clock</td> <td></td> </tr> <tr> <td>24.90</td> <td>JNGO</td> <td>Junction open, good workmanship, height 100mm , at 10 o'clock</td> <td></td> <td rowspan="2"> 9.5 m // 00:03:10</td> </tr> <tr> <td>29.20</td> <td>CNPO</td> <td>Connection, poor workmanship, connection appears to be open , height 100mm</td> <td></td> </tr> <tr> <td>29.20</td> <td>PLRC</td> <td>The re-establishment of a connection has been done improperly , reduction in cross sectional area: 21-50%, poorly cut out (miss), at 12 o'clock</td> <td></td> </tr> <tr> <td>54.50</td> <td>JNGO</td> <td>Junction open, good workmanship, height 100mm , at 2 o'clock</td> <td></td> <td rowspan="2"> 9.5 m // 00:03:10</td> </tr> <tr> <td>55.80</td> <td>JNGO</td> <td>Junction open, good workmanship, height 100mm , at 11 o'clock</td> <td></td> </tr> <tr> <td>66.70</td> <td>CNGO</td> <td>Connection, good workmanship, connection appears to be open , height 100mm , at 12 o'clock</td> <td></td> <td rowspan="2"> 9.5 m // 00:03:12</td> </tr> <tr> <td>75.30</td> <td>FHMH</td> <td>Finish node, maintenance hole, Nodename: B , in road</td> <td></td> </tr> </tbody> </table>						1:600	Position	Code	Observation	Str Rate			0.00	STMH	Start node, maintenance hole, Nodename: A , rmd con lid in car park		 0 m // 00:00:00	9.50	JNPO	Junction open, poor workmanship, height 100mm , at 10 o'clock		 0 m // 00:00:00	9.50	PLRC	The re-establishment of a connection has been done improperly , reduction in cross sectional area: 5-20%, poorly cut open (to large), at 10 o'clock		24.90	JNGO	Junction open, good workmanship, height 100mm , at 10 o'clock		 9.5 m // 00:03:10	29.20	CNPO	Connection, poor workmanship, connection appears to be open , height 100mm		29.20	PLRC	The re-establishment of a connection has been done improperly , reduction in cross sectional area: 21-50%, poorly cut out (miss), at 12 o'clock		54.50	JNGO	Junction open, good workmanship, height 100mm , at 2 o'clock		 9.5 m // 00:03:10	55.80	JNGO	Junction open, good workmanship, height 100mm , at 11 o'clock		66.70	CNGO	Connection, good workmanship, connection appears to be open , height 100mm , at 12 o'clock		 9.5 m // 00:03:12	75.30	FHMH	Finish node, maintenance hole, Nodename: B , in road	
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Nu - Jet
Knoll Street
Glenorchy
Tel: 0438 120 552
Website: www.nujet.com.au
Email: admin@nujet.com.au

Inspection Pictures				
Location/Street Lefroy St	Town or suburb:	Date : 30/05/2017	Section number: 1	Sewer Ref.: MQZ1SEG54377




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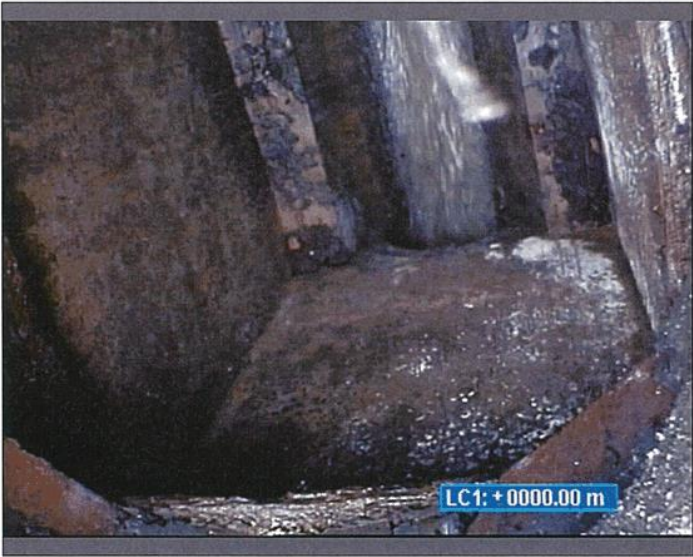


Photo: 1_1_1_B.JPG, Media No.: 300517_1, 00:00:00
0m, Start node, maintenance hole, Nodename: A , rnd con lid in car park



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Knoll Street
Glenorchy
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Email: admin@nujet.com.au

Inspection Pictures				
Location/Street Lefroy St	Town or suburb:	Date : 30/05/2017	Section number: 1	Sewer Ref.: MQZ1SEG54377

Lefroy St Nth Hobart
A B
Vitrified clay C 375 Cured in place lining



Photo: 1_1_3_A.JPG, Media No:: 300517_1, 00:03:10
9.5m, Junction open, poor workmanship, height 100mm , at 10 o'clock

Lefroy St Nth Hobart
A B
Vitrified clay C 375 Cured in place lining



Photo: 1_1_3_B.JPG, Media No:: 300517_1, 00:03:10
9.5m, Junction open, poor workmanship, height 100mm , at 10 o'clock



Nu - Jet
Knoll Street
Glenorchy
Tel: 0438 120 552
Website: www.nujet.com.au
Email: admin@nujet.com.au

Inspection Pictures

Location/Street Lefroy St	Town or suburb:	Date : 30/05/2017	Section number: 1	Sewer Ref.: MQZ1SEG54377
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Photo: 1_1_4_A.JPG, Media No.: 300517_1, 00:03:12
9.5m, The re-establishment of a connection has been done improperly, reduction in cross sectional area: 5-20%, poorly cut open (to large), at 10 o'clock

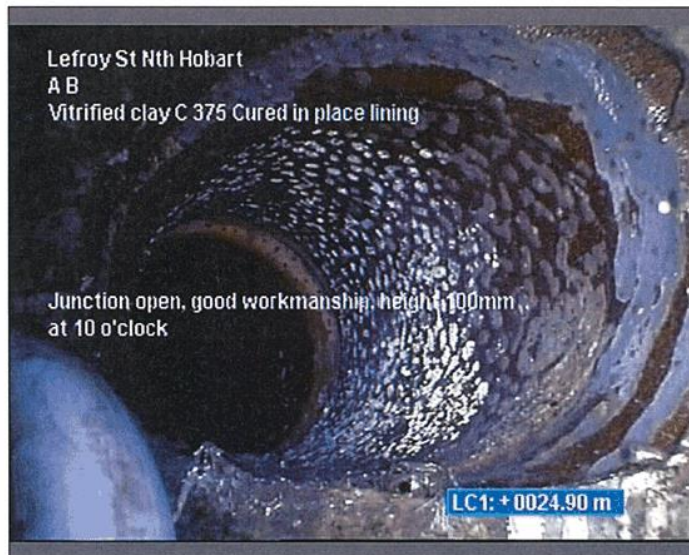


Photo: 1_1_5_A.JPG, Media No.: 300517_1, 00:05:42
24.9m, Junction open, good workmanship, height 100mm, at 10 o'clock



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Glenorchy
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Inspection Pictures

Location/Street Lefroy St	Town or suburb:	Date : 30/05/2017	Section number: 1	Sewer Ref.: MQZ1SEG54377
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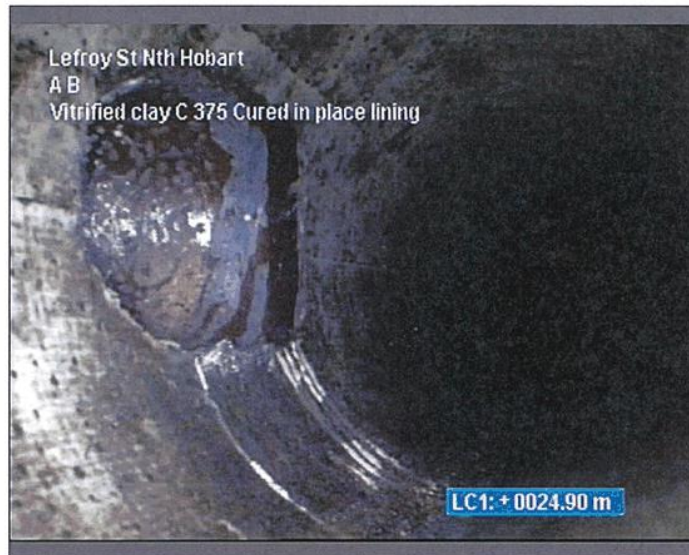


Photo: 1_1_5_B.JPG, Media No.: 300517_1, 00:05:42
24.9m, Junction open, good workmanship, height 100mm , at 10 o'clock



Photo: 1_1_6_A.JPG, Media No.: 300517_1, 00:07:34
29.2m, Connection, poor workmanship, connection appears to be open , height 100mm



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Photo: 1_1_6_B.JPG, Media No.: 300517_1, 00:07:34
29.2m, Connection, poor workmanship, connection appears to be open , height 100mm

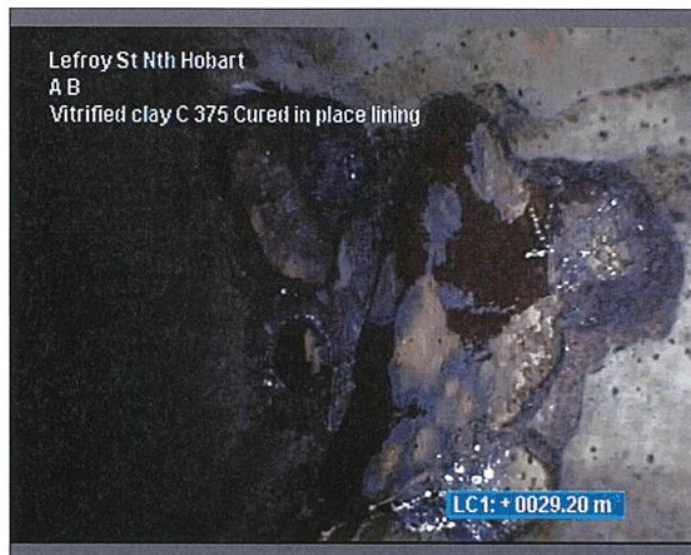


Photo: 1_1_7_A.JPG, Media No.: 300517_1, 00:07:39
29.2m, The re-establishment of a connection has been done improperly , reduction in cross sectional area: 21-50%, poorly cut out (miss), at 12 o'clock



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Inspection Pictures

Location/Street Lefroy St	Town or suburb:	Date : 30/05/2017	Section number: 1	Sewer Ref.: MQZ1SEG54377
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Lefroy St Nth Hobart
A B
Vitrified clay C 375 Cured in place lining




Photo: 1_1_7_B.JPG, Media No:: 300517_1, 00:07:39
29.2m, The re-establishment of a connection has been done improperly , reduction in cross sectional area: 21-50%, poorly cut out (miss), at 12 o'clock

Lefroy St Nth Hobart
A B
Vitrified clay C 375 Cured in place lining

Junction open, good workmanship, height 100mm ,
at 2 o'clock



Photo: 1_1_8_A.JPG, Media No:: 300517_1, 00:11:46
54.5m, Junction open, good workmanship, height 100mm , at 2 o'clock



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Photo: 1_1_8_B.JPG, Media No.: 300517_1, 00:11:46
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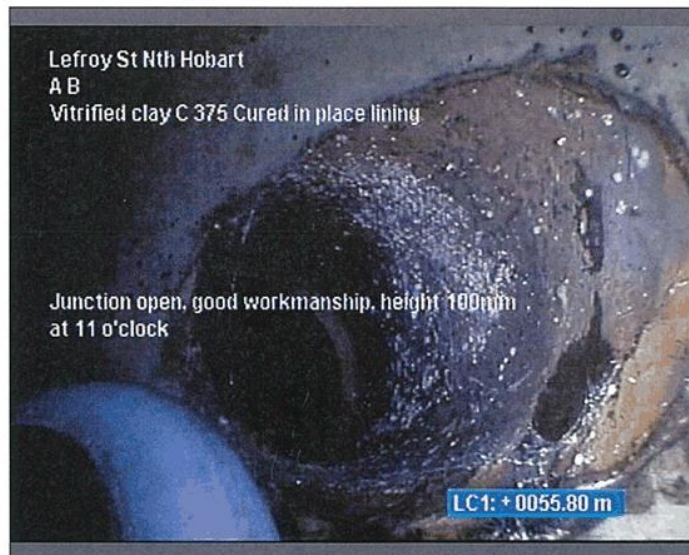



Photo: 1_1_9_A.JPG, Media No.: 300517_1, 00:12:27
55.8m, Junction open, good workmanship, height 100mm , at 11 o'clock




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Inspection Pictures

Location/Street Lefroy St	Town or suburb:	Date : 30/05/2017	Section number: 1	Sewer Ref.: MQZ1SEG54377
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AB

Vitrified clay C 375 Cured in place lining



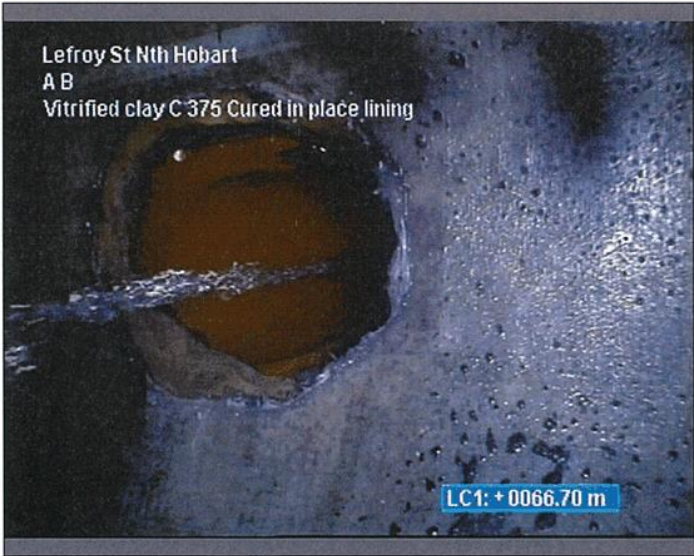
LC1: +0055.80 m

Photo: 1_1_9_B.JPG, Media No:: 300517_1, 00:12:27
55.8m, Junction open, good workmanship, height 100mm , at 11 o'clock

Lefroy St Nth Hobart


AB

Vitrified clay C 375 Cured in place lining



LC1: +0066.70 m

Photo: 1_1_10_A.JPG, Media No:: 300517_1, 00:14:08
66.7m, Connection, good workmanship, connection appears to be open, height 100mm , at 12 o'clock



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Inspection Pictures

Location/Street Lefroy St	Town or suburb:	Date : 30/05/2017	Section number: 1	Sewer Ref.: MQZ1SEG54377
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Lefroy St Nth Hobart
A B
Vitrified clay C 375 Cured in place lining




Photo: 1_1_10_B.JPG, Media No:: 300517_1, 00:14:08
66.7m, Connection, good workmanship, connection appears to be open, height 100mm , at 12 o'clock

Lefroy St Nth Hobart
A B
Vitrified clay C 375 Cured in place lining

Finish node, maintenance hole, Nodename: B , in road



Photo: 1_1_11_A.JPG, Media No:: 300517_1, 00:16:01
75.3m, Finish node, maintenance hole, Nodename: B , in road

286-288 Argyle St _ sewer _ Howrah Plumb _ 30-5-2017 // Page: 10



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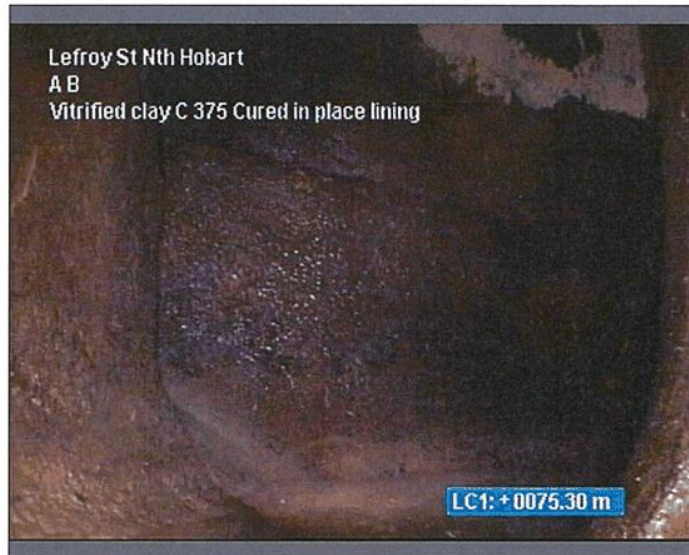


Photo: 1_1_11_B.JPG, Media No.: 300517_1, 00:16:01
75.3m, Finish node, maintenance hole, Nodename: B , in road



TRAFFIC IMPACT STATEMENT

PROPOSED RESIDENTIAL APARTMENT DEVELOPMENT

286-288 ARGYLE STREET, NORTH HOBART

1. INTRODUCTION

The owners of the site at 286-288 Argyle Street in North Hobart propose to modify the building to accommodate 12 residential apartments. The building had a commercial use in the past.

This Traffic Impact Statement (TIS) has been prepared to address the proposed site access arrangements as well as the internal traffic circulation and parking having regard for current standards and practices and the Hobart Interim Planning Scheme.

Preparation of a full traffic impact assessment report was considered not necessary for this proposed development.

2. PROPOSED DEVELOPMENT

The building at 286-288 Argyle Street has been used as a commercial site for many years. At that time, there were two commercial vehicle access driveways into the building which allowed trucks to reverse into the building from Argyle Street.

The proposal is to convert the building into a residential building with 12 two-bedroom apartments.

The ground floor level will have parking for 24 cars. Vehicle access will be via a driveway off Argyle Street through a 5.5m wide doorway with secured entry.

There will be a doorway each side of the vehicle entrance for pedestrians to enter and leave the building.

The proposed layout of the driveway access, car parking spaces and manoeuvring area is detailed on the attached drawings.

Views of the development site and along Argyle Street past the development site are seen in Photographs 2.1 and 2.2.



Photograph 2.1: View of development site from Argyle Street



Photograph 2.2: View to south along Argyle Street with development site ahead on right

3. TRAFFIC ACTIVITY

In the area of the development site, Argyle Street is a two-way two lane road with a bicycle lane and a parking lane along both sides of the road.

To consider the traffic conflicts on Argyle Street at the access driveway to the site resulting from the proposed development, peak hour traffic volume data has been received from the Hobart City Council from a turning movement survey undertaken at the Federal Street/Argyle Street intersection on 1 June 2016.

The data indicates that during the morning peak hour between 8:00am and 9:00am the two-way traffic volume on Argyle Street to the south of Federal Street was 1,580 vehicles/hour. The two-way traffic volume south of Federal Street during afternoon peak hour, between 4:30pm and 5:30pm, was 1,307 vehicles/hour.

A morning peak hour traffic volume survey was also undertaken by this consultant at the junction of Lefroy Street and Argyle Street during the 8:00 – 9:00am period on Friday 10 June 2016 for another development project in the area.

The result from this survey has been summarised in Figure 4.1.

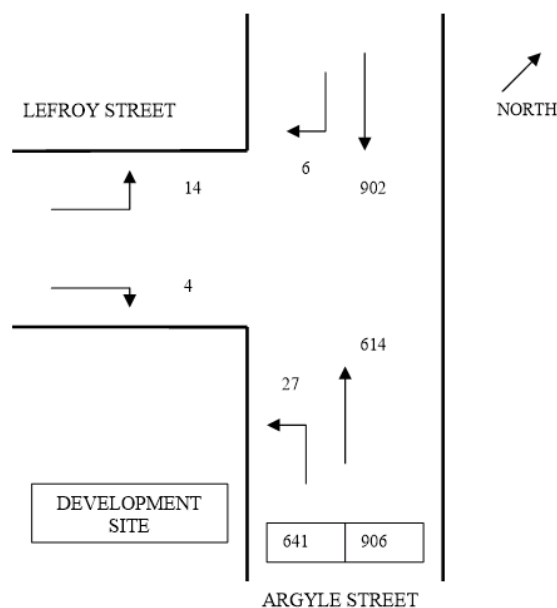


Figure 4.1: Turning traffic volumes at Lefroy Street junction with Argyle Street – 8:00am to 9:00am

As expected this latter survey found the same morning peak hour traffic volume on Argyle Street. The traffic volume past the development site was

1,547 vehicles/hour and the afternoon peak hour traffic volume was estimated at around 1,300 vehicles/hour.

The daily traffic volume on Argyle Street would be around 14,000 vehicles/hour.

In considering the traffic activity that the apartments will generate when occupied, guidance is normally sought from the New South Wales, Road Traffic Authority (RTA) document – Guide to Traffic Generating Developments. The RTA guide is a nationally well accepted document that provides advice on trip generation rates and vehicle parking requirements for new developments.

The updated 'Technical Direction' to the Guide dated August 2013 advises that the trip generation for residential dwellings in regional areas of New South Wales is 7.4 trips/dwelling/day.

This is consistent with findings by this consultant for dwellings in Tasmania. Surveys in the built-up areas of Tasmania over a number of years have found that typically the traffic generation is 8.0 trips/dwelling/day with smaller residential subdivisions generating around 4 trips/subdivision/day and larger subdivisions generating around 6 trip/subdivision/day.

It is most appropriate that current local traffic generation data is used whenever possible as it will reflect the actual traffic activity that will result from a development. Based on the above Tasmanian trip generation data and having regard to the location of the site relative to various transport options, including passing bicycle lanes, and walking distance to the North Hobart shopping centre, it is expected that the traffic generation for these proposed residential apartments would be no more than 5 trips/apartment/day.

Accepting this trip generation rate, it is expected that the total number of vehicle trips expected to be generated by the proposed 12 apartment development will be up to 60 vehicles/day.

Based on the 10% rule (10% of the daily traffic occurs in the morning and afternoon peak hour) the development is likely to generate around 6 vehicles/hour during peak traffic periods.

It is not known what vehicle volume was entering and exiting the site when it was used as a commercial building with its two roll-a-door accesses.

As a warehouse with an area of around 750m², the RTA Guide indicated the building would have generated some 30 vehicles/day. This is less than the 40 vehicles/day increase in traffic activity for any new development, referred to in Clause E5.5.1 A3. Therefore, development meets the acceptable solution with respect in increased traffic activity.

Notwithstanding this, while the passing traffic volume on Argyle Street is quite high, the level of two-way traffic activity generated by the proposed

development will not have a significant impact on the Argyle Street traffic flow.

There are available gaps in the traffic stream at these flow rates, as seen from observations during the turning moment survey at Lefroy Street. Furthermore, the nearby traffic signals, particularly the pedestrian signals at Lefroy Street, create further gaps in the traffic stream for turning vehicles, if required.

4. ACCESS DRIVEWAY TO SITE

Vehicle Traffic

The proposed vehicle access to the site will be via a 5.5m wide driveway off Argyle Street at the location of the current driveway, which would have been approved by Council.

The proposed width is sufficient to accommodate the two-way traffic volume of up to 6 vehicles/hour.

As a private access driveway to a development site, the sight distances along Argyle Street for vehicles entering and exiting the site need to be in accordance with Figure 3.2 in AS 2890.1, to meet the requirements of Clause E6.7.2.

The speed limit along Argyle Street is 50km/h. Figure 3.2 in AS 2890.1 indicates that for a (85th percentile speed) of 50km/h, the required minimum sight distance is 45m and the desirable minimum sight distance is 69m.

As can be seen in Photographs 4.1 and 4.2, the available sight distances to and from turning vehicles at the access driveway are much greater than the desirable minimum sight distance.



Photograph 4.1: View to south along Argyle Street from development site access driveway



Photograph 4.2: View to north along Argyle Street from development site access driveway

Pedestrian Traffic

The building will be provided with a pedestrian doorway each side of the vehicle driveway.

The doors will be fully glazed so that motorists exiting the building will be able to see through the door any pedestrian on the Argyle Street footpath that is approaching the driveway, over a distance of around 1m before the driveway.

As the pedestrian doors will not provide a sufficient sight triangle between motorists exiting the building and pedestrians walking along the footpath to meet the requirements of Figure 3.3 of AS 2890.1, some additional measures are proposed to address possible pedestrian safety concerns.

The sight triangle deficiency will exist only for pedestrians approaching from the north.

Consideration has been given to appropriated audio and visual warning measures, similar to measures that exist at other sites in Hobart, including at the emergency services (fire and ambulance) exits in Melville Street.

Given the residential use of the building, audio devices such as bells are not proposed. It is recommended that a flashing light be installed on the wall outside the building, near the right side of the door, which would be set off when an exiting vehicle activates the opening of the driveway door.

In addition, it is recommended a sign, similar to that in Figure 4.1, be installed at a height of 1.5m on the inside of the columns to the driveway door. The sign size should be around 300mm square.

These measures, together with the partial sight lines that will be available, will provide a more than sufficient warning to address the pedestrian sight distance requirements.



Figure 4.1: Proposed sign for driveway

5. INTERNAL TRAFFIC ARRANGEMENTS

Consideration has been given to the proposed layout and design of the internal parking aisle to the car parking spaces which will service the residential units. A review has also been undertaken of the car parking layout and adequacy of parking on the site.

The drawing showing the site layout has been examined having due regard for the requirement of AS 2890.1.

Car parking supply

Clause E6.6.1 of the Hobart City Council Interim Planning Scheme requires 2 car parking spaces per apartment plus 1 dedicated visitor parking space per 4 apartments (rounded up to the nearest whole number) for multiple dwelling developments with residential apartments that have two or more bedrooms.

The required car parking supply for the proposed residential apartment development would therefore be a total of 24 resident car parking spaces and three visitor parking spaces.

There will be 24 car parking spaces on the site for the residents of the apartments with each of the proposed two-bedroom apartments provided with two car parking spaces.

Notwithstanding this, it is understood the Council recognises that the planning scheme requirement for the high number of car parking spaces is at times too demanding and not that practical for multiple dwelling developments in areas that have access various transport modes to shopping areas and services.

This has been found from surveys of car parking demand at multiple dwelling developments and a lesser parking demand is also recommended in the New South Wales RTA: Guide to Traffic Generating Developments.

The development site is located within 270m walking distance of the North Hobart shopping centre. There are regular bus services along Argyle Street and Elizabeth Street, well within the maximum 400m walking distance to such services, and there are bicycle lanes along both sides of Argyle Street, past the site. All these factors would significantly reduce the residents' reliance on car use.

Passing observations have also indicated that the one hour and two hour time limited parking restrictions along Argyle Street create available on-street parking. The number of parking spaces with reasonable walking distance is more than would be required by visitors to the apartments. This can be appreciated from the photographs in this report which were taken around the late morning on a weekday.

It is therefore concluded the parking supply within the building for residents and along Argyle Street for visitors will be quite sufficient to meet the parking demand.

Parking area design

All the resident, visitor and staff car parking spaces on the site will be compliant with AS 2890.1. The required turn paths of vehicles have been checked and found to have adequate width for three point turns by B85 cars for all manoeuvres.

The specific dimensions that have been assessed are as follows:

- All parking spaces will be 5.4m long and 2.4m wide in accordance with User Class 1A for residential parking (as detailed in Figure 2.2 of AS 2890.1 for 90-degree parking);
- There will be at least a 300mm side clearance to the side walls for door opening and manoeuvring (as detailed in Figure 2.2 of AS 2890.1). The width between the walls each side of each pair of parking spaces varies between 5.5m and 6.2m;
- The width of the parking aisle will be at least 6.9m and up to 8.4m (significantly greater than the 5.8m required width as detailed in Figure 2.2 of AS 2890.1 for Class 1A 90-degree parking);
- There will be a 1.06m extension to the end of the parking aisle (to western wall of the building) beyond CP 12 and 13 for reversing out of these parking spaces (which is as detailed in Figure 2.3 of AS 2890.1);
- The height clearance will be a minimum of 2.4m at the building entry doorway and 3.0m within the building except for the area under the stairs at every second parking space. Clause 5.3.1 of AS 2890.1 requires a height clearance of 2.2m to allow access for cars and light vans. In the area under each set of stairs, the height clearance will be a minimum of 1.45m at the front wall of the parking space and 2.2m at a point 0.8m from the front wall, increasing to 3.0m towards the rear of the parking space. Given that the height of all passenger cars is below 1.5m (see AS 2890.1 Appendix B6) all such parking spaces will be fully usable with more than sufficient clearance for the vehicles and headroom for vehicle occupants; the other car parking space for each apartment will have a clear height clearance of 3m.

With all dimensions meeting the requirements of AS 2890.1, the parking spaces will be compliant with the standard and meet the Acceptable Solution for Clause E6.7.5.

On-site turning considerations

The parking arrangements for the development have been designed to comply with Clause E6.7.4 of the Planning Scheme with respect to on-site turning.

Cars using all of the designated parking spaces will be able to enter and exit each parking space in a three-point turn and hence enter and exit the site in a forward direction.

5. CONCLUSIONS AND RECOMMENDATIONS

Consideration has been given to the traffic impacts and proposed vehicle and pedestrian traffic arrangements for the proposed residential apartment development.

It is expected that the total number of vehicle trips expected to be generated by the proposed 12 apartment development will be around 60 vehicles/day and around 6 vehicles/hour during peak traffic periods. This level of two-way traffic activity generated by the proposed development will not have a significant impact on the Argyle Street traffic flow.

The sight distances along Argyle Street for vehicles entering and exiting the site will be significantly greater than required by AS 2890.1, in meeting the requirements of Clause E6.7.2.

The sight triangle between motorists exiting the building and pedestrians walking along the Argyle Street footpath from the north will not be sufficient to meet AS 2890.1 requirements. It is therefore recommended that a flashing light be installed on the wall outside the building, near the right side of the door, and a sign be installed at a 1.5m height on the inside columns of the driveway door to warn pedestrians of cars leaving the site.

The proposed 5.5m wide driveway is sufficient to accommodate the two-way traffic volume of up to 6 vehicles/hour.

While the number of parking spaces on the site will be three less than required by the planning scheme, the proposed 24 car parking spaces on the site for residents of the apartments is in accordance with the planning scheme and will be quite sufficient to meet the resident parking demand. In addition, there is available on-street parking along Argyle Street with reasonable walking distance to meet parking needs of visitors to the apartments

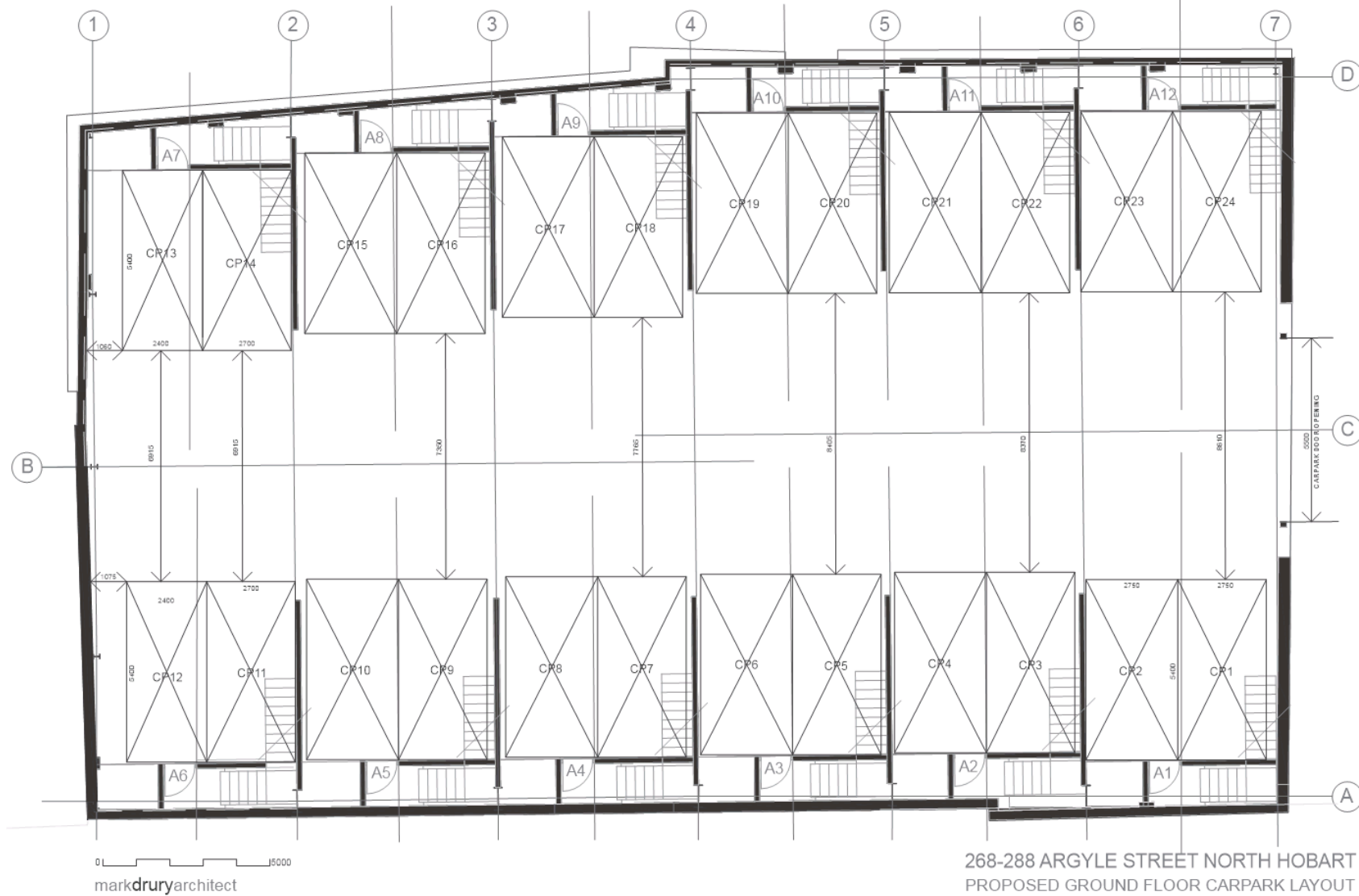
All parking space and parking aisle dimensions and clearances will meet the requirements of AS 2890.1 with adequate provision for vehicles to enter and exit the site in a forward direction.

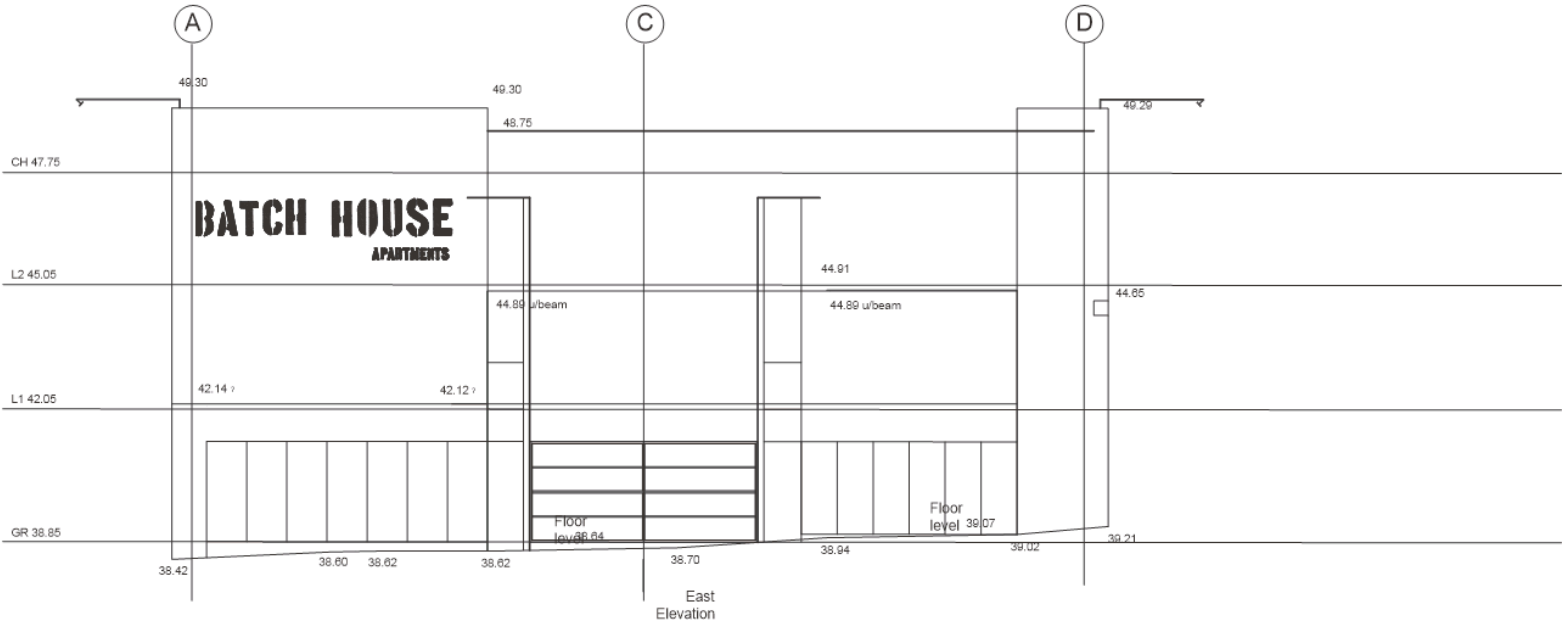
Therefore, the proposed development is supported on traffic grounds.



Milan Prodanovic

19 June 2017





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C.L. ANDREWS & ASSOC.
LAND & ENGINEERING SURVEYORS
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PROPOSED EAST ELEVATION
286-288 ARGYLE STREET HOBART
FOR MARK DRURY

PAGE 2 OF 4

DA16

From: Gina Goodman
To: [Emma Riley](#)
Subject: TasNetworks' advice - 286-288 Argyle Street, North Hobart - Proposed Section 43A Application
Date: Monday, June 5, 2017 10:01:11 AM
Attachments: [image002.png](#)
[image004.png](#)
[image005.png](#)
[CCI16052017_4.pdf.pdf](#)
[Batch House.pdf.pdf](#)
[CCI16052017_3.pdf.pdf](#)

Hi Emma,

Thank you for your early referral regarding this proposal.

Our technical experts have reviewed the proposal. Based on the attached preliminary plans, I can advise the following:

- Two 110kV underground electricity transmission cable from Creek Rd to North Hobart substation run along Argyle Street. One is likely located directly adjacent to the building with the other across the road.
- A number of underground 11kV electricity distribution cables also run along Argyle Street, directly adjacent to this development.
- Overhead an underground low voltage distribution lines also run along Argyle Street near this location.

In order to protect these assets, ensure the safety of the community in the area and those working on the site, it is essential that Dial Before You Dig enquiries are made prior to any ground disturbing activities at this location. It is the developer's responsibility to undertake this enquiry, locate any assets and ensure any instructions provided are adhered to.

Provided the above advice is followed and assuming no other activities will occur that impact electricity assets, TasNetworks has no objection to the proposal proceeding.

Please ensure this advice is provided to Council and the Tasmanian Planning Commission and forms part of the application information as this represents the parameters of TasNetworks consideration of the proposal.

Thanks again for your early engagement. It is much appreciated.

Kind Regards

Gina Goodman



Gina Goodman

Land Use Planner

Strategic Asset Management

Monday, Tuesday & Wednesday

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From: Emma Riley [mailto:emma@erassociates.com.au]
Sent: Tuesday, 23 May 2017 2:51 PM
To: Gina Goodman
Subject: 286-288 Argyle Street, North Hobart - Proposed Section 43A Application

Afternoon Gina,

We are in the early stages of preparing a Section 43A application for 286-288 Argyle Street, North Hobart.

The site is partially within the Electricity Transmission Infrastructure Protection overlay due to the underground cables in Argyle Street. It includes both the ETI and IPA.

The proposal is to rezone the site to Inner Residential and redevelop the site for 16 residential apartments.

The site is currently within the Light Industrial Zone under the Hobart Interim Planning Scheme 2013.

The proposed use and development will be fitted within the external structure of the existing building on the site (in other words there is no demolition proposed) with only minor modifications to the façade and more substantial modifications to the roof and internal layout. I have attached a copy of the current concept plans.

As the development application component will be required to be assessed under P1 of Clause E8.7.1 we are seeking your input at this stage of the process to ensure that there are no significant issues in progressing the application.

It would therefore be appreciated if you could provide advice as to whether there are any particular requirements of Tas Networks in relation to this site and the proposed Section 43A application.

Please do not hesitate to contact me if you have any queries.

Regards

Emma Riley
Director & Principal Planner



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ENVIRONMENTAL SITE ASSESSMENT
286-288 ARGYLE STREET, NORTH HOBART
JULY 2017



EXECUTIVE SUMMARY

This report presents the findings of an Environmental Site Assessment (ESA) undertaken by Geo-Environmental Solutions Pty. Ltd. (GES) located at 286-288 Argyle Street, Hobart - hereby referred to as 'The Site'. GES was commissioned by Mark Drury Architects to conduct the site assessment. The requirement for an environmental site assessment has been triggered by the interim planning scheme (IPS) contaminated site overlay. The aim of the investigation was to:

- Determine the suitability of the site for the intended use;
- Review any historical contaminated site assessment reports or documents which may indicate previous land use which may have had involved contaminating activities
- Assess the following at the site:
 - Chemicals of Potential Concern (COPC's);
 - Areas of Environmental Concern (AEC); and
 - Human and Environmental health risk.
- Conduct an invasive investigation in areas where site development is proposed;
- Determine the potential for offsite impact from site contamination, and implications for offsite ecosystem and human health receptors;
- Assess any environmental site assessment data gaps;
- Provide recommendations on what measures may need to be put in place to address any potential data gaps and to further assess contamination remediation and/or management (if required).

From the soil assessment, it is concluded that:

- Given that Health Investigation Levels (HIL's) are not exceeded in any of the soil samples, there is a low risk to all present and potential future onsite inhabitants;
- ESL's are exceeded in one sample collected from the site. The environmental risk is low given the limited opportunity for off site impact.

In summary the following conclusions can be made:

- A risk to potential receptors has not been identified during and after development.
- All samples collected at the site are below threshold concentrations for assessing risk to human health;
- No particular health and safety issues are identified which may originate from onsite contamination;
- Other than advice provided within the recommendations section of this report, there are no specific remediation and protection measures required to be implemented before excavation commences;
- Soils sampled on the site during the investigation are classified as clean fill for disposal, however as a precaution it is recommended any excavated soil on site is stockpiled and inspected prior to disposal to confirm it is level 1 - clean fill;
- As a result of proposed site excavation, there is a very low human health risk to future users of the site; and
- GES advise that during site excavation works for site redevelopment, there is a low risk that site contamination will present an environmental risk.

Table of Contents

EXECUTIVE SUMMARY	I
ABREVIATIONS	VI
1 INTRODUCTION	1
1.1 GENERAL	1
1.2 SITE DETAILS	2
1.3 INVESTIGATION OBJECTIVES	3
1.4 SCOPE OF WORKS	3
2 PLANNING	4
2.1 EXISTING SITE LAYOUT	4
2.2 ZONING	4
2.3 PROPOSED SITE DEVELOPMENT WORKS	5
2.4 ASSESSMENT TRIGGER	8
2.5 PERFORMANCE CRITERIA	8
3 DESKTOP STUDY	9
3.1 SITE WALKOVER	9
3.1.1 SURFACE COVERINGS	13
3.1.2 SIGNS OF CONTAMINATION	13
3.2 MRT GEOLOGY MAPPING	13
3.3 SITE TOPOGRAPHY, DRAINAGE & HYDROGEOLOGY	13
3.4 HISTORICAL TITLE SEARCH	14
3.5 HISTORICAL AERIAL PHOTOGRAPHY INTERPRETATION	14
3.6 PREVIOUS SITE INVESTIGATIONS	24
3.7 DANGEROUS GOODS RECORDS (WORKPLACE STANDARDS)	24
3.8 COUNCIL ENVIRONMENTAL RECORDS	24
3.9 EPA INFORMATION REQUEST	24
3.10 GROUNDWATER	25
3.10.1 POTENTIAL UP-GRADIENT CONTAMINATION SOURCES	25
3.10.2 DOWNGRADIENT ECOSYSTEM RECEPTORS	25
3.10.3 WATER BORE USERS	25
3.11 POTENTIAL CONTAMINATION ISSUES	25
3.11.1 AREAS OF POTENTIAL CONCERN	25
3.11.2 CONTAMINANTS OF POTENTIAL CONCERN	25
4 FIELD INVESTIGATION PROCEDURES	26
4.1 WORKS SUMMARY	26
4.2 SOIL INVESTIGATION	26
4.2.1 BOREHOLE DRILLING	26
4.2.2 SOIL SAMPLING	27
4.2.3 SOIL ANALYSIS	27
5 QUALITY CONTROL	28

5.1	FIELD	28
5.2	LABORATORY	28
6	<u>FIELD INVESTIGATION FINDINGS</u>	<u>30</u>
6.1	SOIL BORES	30
6.1.1	GEOLOGICAL INTERPRETATION	30
6.1.2	GRAIN CLASS INTERPRETATION	30
7	<u>SOIL ECOLOGICAL IMPACT ASSESSMENT</u>	<u>31</u>
7.1	PROTECTED ENVIRONMENTAL VALUES	31
7.2	NEPM (2013) GUIDELINES	31
7.3	GUIDELINES	32
7.3.1	ECOLOGICAL SCREENING LEVELS	32
7.3.2	ECOLOGICAL INVESTIGATION LEVELS	32
7.4	FINDINGS	32
7.4.1	ECOLOGICAL SCREENING LEVELS	32
7.4.2	ECOLOGICAL INVESTIGATION LEVELS	35
8	<u>SOIL HUMAN HEALTH DIRECT CONTACT ASSESSMENT</u>	<u>36</u>
8.1	GUIDELINES	36
8.1.1	LAND USE CLASSIFICATION	36
8.1.2	ADOPTED LAND USE CLASSIFICATION	36
8.1.3	HEALTH INVESTIGATION & SCREENING LEVELS	37
8.2	FINDINGS	37
8.2.1	DERMAL CONTACT - PETROLEUM HYDROCARBONS	37
8.2.2	DUST INHALATION & SOIL INGESTION	38
9	<u>INDOOR INHABITANT PVI ASSESSMENT – HSL’S</u>	<u>40</u>
9.1	LAND USE CLASS	40
9.2	SELECTED MEDIA FOR ASSESSING PVI RISK	41
9.3	SOIL	41
9.3.1	GUIDELINES	41
9.3.2	FINDINGS	41
10	<u>TRENCH WORKER PVI ASSESSMENT – HSL’S</u>	<u>43</u>
10.1	CLASSIFICATION	43
10.2	FINDINGS	43
10.2.1	SOIL	43
11	<u>SOIL DISPOSAL ASSESSMENT</u>	<u>44</u>
11.1.1	GUIDELINES	44
11.1.2	FINDINGS	44
12	<u>CONCEPTUAL SITE MODEL</u>	<u>46</u>
12.1	POTENTIAL & IDENTIFIED SOURCES OF CONTAMINATION	46

12.1.1	POTENTIAL SOURCES	46
12.1.2	IDENTIFIED SOURCES	46
13	CONCLUSIONS	47
13.1	DESKTOP ASSESSMENT	47
13.2	ADOPTED LAND USE SETTINGS	47
13.3	INVASIVE SOIL ASSESSMENT	47
13.4	PROPOSED DEVELOPMENT WORKS	48
14	RECOMMENDATIONS	48
15	REFERENCES	49
16	LIMITATIONS STATEMENT	51
	APPENDIX 1 GES STAFF	52
	APPENDIX 2 DANGEROUS GOODS RECORDS	53
	APPENDIX 3 COUNCIL EMAIL CORRESPONDENCE	57
	APPENDIX 4 ENVIRONMENTAL PROTECTION AUTHORITY RECORDS	58
	APPENDIX 5 REGISTERED WATER BORE DATABASE	60
	APPENDIX 6 LABORATORY CHAIN OF CUSTODY (COC)	63
	APPENDIX 7 QUALITY CONTROL DOCUMENTATION	64
	APPENDIX 8 SOIL BORE LOGS	83
	APPENDIX 9 SOIL ANALYTICAL RESULTS - CERTIFICATE OF ANALYSIS	86

Plates

PLATE 1	INSIDE THE WAREHOUSE AT THE SITE, VIEW TOWARDS THE NORTHERN BOUNDARY	9
PLATE 2	INSIDE THE WAREHOUSE AT THE SITE, VIEW TOWARDS ARGYLE STREET	10
PLATE 3	VIEW TO THE NORTHWEST UP ARGYLE STREET, GOOGLE EARTH IMAGE	10
PLATE 4	VIEW TO THE SOUTHEAST DOWN ARGYLE STREET, GOOGLE EARTH IMAGE	11
PLATE 5	HISTORICAL AERIAL PHOTOGRAPH – THE SITE 1957	16
PLATE 6	HISTORICAL AERIAL PHOTOGRAPH – AREA SURROUNDING THE SITE IN 1957	17
PLATE 7	HISTORICAL AERIAL PHOTOGRAPH – THE SITE 1965	18
PLATE 8	HISTORICAL AERIAL PHOTOGRAPH – AREA SURROUNDING THE SITE 1965	19
PLATE 9	HISTORICAL AERIAL PHOTOGRAPH – THE SITE 1984	20
PLATE 10	HISTORICAL AERIAL PHOTOGRAPH – AREA SURROUNDING THE SITE 1984	21
PLATE 11	HISTORICAL AERIAL PHOTOGRAPH – THE SITE 1992	22
PLATE 12	HISTORICAL AERIAL PHOTOGRAPH – AREA SURROUNDING THE SITE 1992	23

Figures

FIGURE 1	SITE LOCATION, SITE OUTLINED IN RED, IMAGE SOURCED FROM THE LIST	1
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FIGURE 2 VIEW OF THE SITE, OUTLINED IN RED, GOOGLE EARTH IMAGE	2
FIGURE 3 COUNCIL PLANNING ZONES (2015), SITE OUTLINED IN RED	4
FIGURE 4 EXISTING SITE LAYOUT.....	6
FIGURE 5 PROPOSED GROUND FLOOR SITE LAYOUT.....	7
FIGURE 6 SITE CONTEXT PLAN.....	12
FIGURE 7 MINERAL RESOURCES TASMANIA 1:25000 SCALE MAPPING (THE LIST).	13
FIGURE 8 INFERRED GROUNDWATER FLOW.....	14
FIGURE 9 BOREHOLE (BH1 TO BH3) INVESTIGATION AREAS	26
FIGURE 10 – LOCATION OF GROUNDWATER BORE RECORD # 41515 2.6KM.....	60

Tables

TABLE 1 SITE DETAILS	2
TABLE 2 SURROUNDING LAND USE.....	4
TABLE 3 HISTORICAL AERIAL PHOTOGRAPH REVIEW	14
TABLE 4 WORKPLACE STANDARDS TASMANIA DOCUMENTATION, 290-296 ARGYLE STREET	24
TABLE 5 SUMMARY OF SOIL SAMPLING METHODS	27
TABLE 6 OVERVIEW OF SOIL ANALYSIS AND QUALITY CONTROL.....	27
TABLE 7 FIELD QA/QC PROCEDURES.....	28
TABLE 8 LABORATORY QA/QC PROCEDURES.....	29
TABLE 9 SUMMARY OF GRAIN CLASS BASED ON USCS CLASSIFICATION.....	30
TABLE 10 SUMMARY OF SOIL INVESTIGATION LIMITS CONSIDERED AT THE SITE BASED IN NEPM (2013) ASC	31
TABLE 11 ADOPTED LAND USE SCENARIO FOR THE VARIOUS SOIL BORES	32
TABLE 12 SUMMARY OF SOIL ANALYTICAL RESULTS COMPARED WITH ESL'S	34
TABLE 13 SOIL ANALYTICAL RESULTS COMPARED AGAINST ECOLOGICAL INVESTIGATION LEVELS	35
TABLE 14 SUMMARY OF LAND USE SETTING AND DENSITY FOR DETERMINING EXPOSURE RISK	36
TABLE 15 SUMMARY OF LAND USE CLASS ADOPTED FOR DEFINING SOIL ANALYSIS THRESHOLD LIMITS	36
TABLE 16 SUMMARY OF EXPOSURE PATHWAYS AND PRELIMINARY (TIER 1) METHODS FOR ASSESSING HUMAN EXPOSURE RISK.....	37
TABLE 17 SOIL ANALYTICAL RESULTS COMPARED AGAINST CRC CARE) GUIDELINES FOR DERMAL CONTACT.....	37
TABLE 18 SOIL ANALYTICAL RESULTS COMPARED AGAINST NEPM (2013) HEALTH INVESTIGATION LIMIT GUIDELINES.....	39
TABLE 19 SUMMARY OF LAND USE SETTING AND DENSITY FOR DETERMINING EXPOSURE RISK	40
TABLE 20 PREFERRED METHODS FOR DETERMINING SITE PVI RISK	41
TABLE 21 CLASSIFICATION USED TO ASSESS PETROLEUM VAPOUR INTRUSION RISK TO LOCAL RECEPTORS FROM SOIL.....	41
TABLE 22 SOIL ANALYTICAL RESULTS COMPARED AGAINST HSL A	42
TABLE 23 SUMMARY OF SOIL ANALYTICAL RESULTS COMPARED AGAINST HSL'S FOR ASSESSING PVI RISK TO TRENCH WORKERS.....	43
TABLE 24 SUMMARY OF IB105 CLASSIFICATION GUIDELINES	44
TABLE 25 SOIL ANALYTICAL RESULTS COMPARED AGAINST IB105 INVESTIGATION LIMITS FOR SOIL DISPOSAL	45

ABBREVIATIONS

AEC	Areas of Environmental Concern
AHD	Australian Height Datum
ALS	Analytical Laboratory Services
ANZECC	Australia and New Zealand Environment and Conservation Council
AWQG	Australian Water Quality Guidelines
BGS	Below Ground Surface
BH	Borehole
BTEX	Benzene Toluene Ethylbenzene Xylene
COA	Certificate of Analysis
COC	Chain of Custody
COPC	Chemical of Potential Concern
CRC CARE	Corporative Research Centre for Contamination Assessment and Remediation of the Environment
CSM	Conceptual Site Model
DQO	Data Quality Objectives
EC	Electrical Conductivity
EPA	Environmental Protection Authority
EPN	Environmental Protection Notice
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
IN	Investigation Notice
LOR	Limits of Reporting
MCRWBA	Minimum Construction Requirements for Water Bores in Australia
MDL	Mean Detection Limit
NATA	National Association of Testing Authorities
NEPM	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
NRMMC	Natural Resource Management Ministerial Council
NL	Non Limiting
NRMMC	Natural Resource Management Ministerial Council
PAH	Poly-Aromatic Hydrocarbons
PCP	Physico-Chemical Parameters
PEV	Protected Environmental Values
PHC	Petroleum Hydrocarbons
PID	Photo-Ionisation Detector
PPA	Preferential (PVI) Pathways Assessment

PSH	Phase Separated Hydrocarbons
Redox	Reduction / Oxidation Potential
RN	Remediation Notice
SCA	Site Contamination Assessment
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
USCS	Unified Soil Classification System
WRG	Water Resource Group

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

1 INTRODUCTION

1.1 General

This report presents the findings of an Environmental Site Assessment (ESA) undertaken by Geo-Environmental Solutions Pty. Ltd. (GES) at 286-288 Argyle Street, North Hobart - hereby referred to as 'The Site'. The site location is presented in Figure 1.

GES was commissioned by Mark Drury Architects to conduct the site assessment.

This ESA has been prepared by a suitably qualified and experience practitioner in accordance with procedures and practices detailed in NEMP (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.

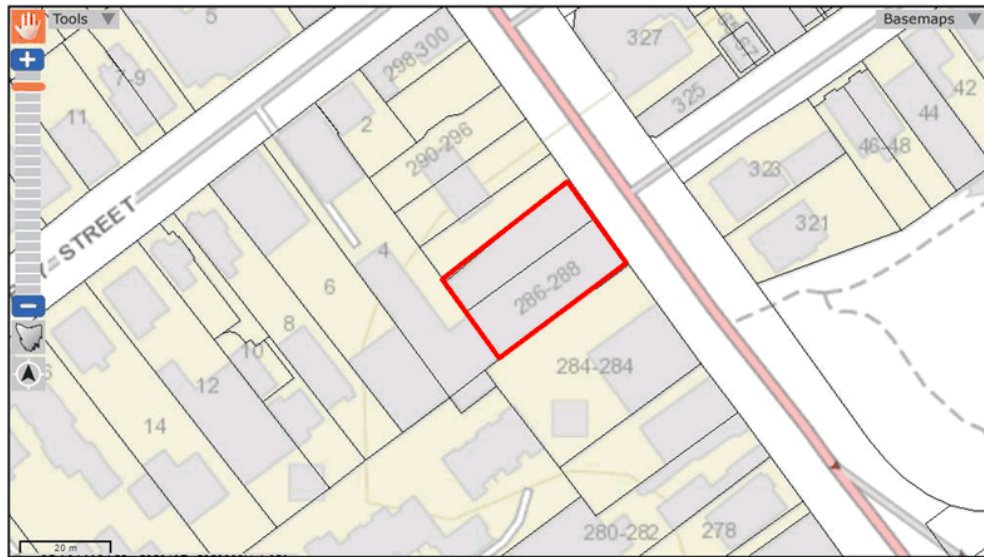


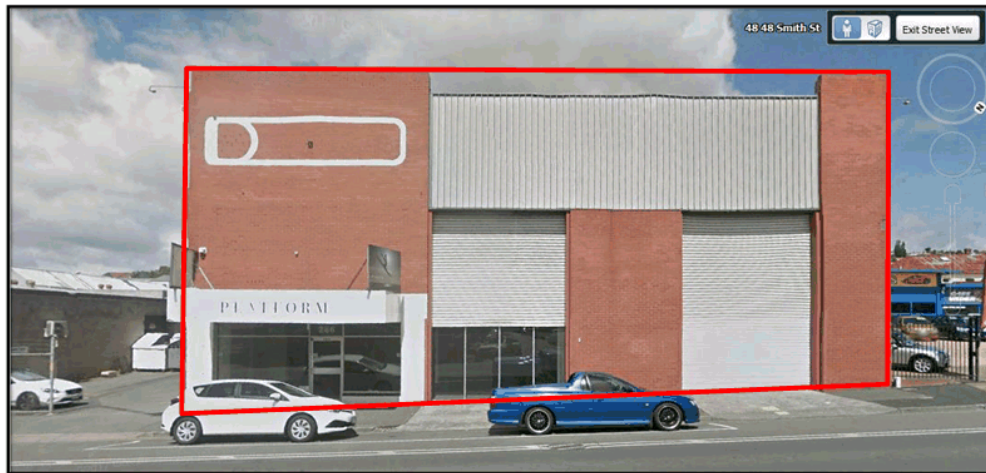
Figure 1 Site Location, site outlined in red, image sourced from the LIST

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***1.2 Site Details**

Site details are presented in Table 1.

Table 1 Site Details

Site Address
286-288 Argyle Street, North Hobart
Current Title identification details
PID 5655233 CT 9228/1 and 65899/2
Current land use
Warehouse
Site total area
Approximately 789 m ²
Current Ownership (as per current certificates of title)
TTA Property Pty Ltd
Zoning
Light Industrial – Hobart Interim Planning Scheme 2015
Local Council
Hobart City Council
Proposed Site Use
Redevelop the site into Apartment building

**Figure 2 View of the site, outlined in red, Google Earth image**

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

1.3 Investigation Objectives

The objective of this ESA was to:

- Determine the suitability of the site for the intended use;
- Review any historical contaminated site assessment reports or documents which may indicate previous land use which may have had involved contaminating activities
- Assess the following at the site:
 - Chemicals of Potential Concern (COPC's);
 - Areas of Environmental Concern (AEC); and
 - Human and Environmental health risk.
- Conduct an invasive investigation in areas where site development is proposed;
- Determine the potential for offsite impact from site contamination, and implications for offsite ecosystem and human health receptors;
- Assess any environmental site assessment data gaps;
- Provide recommendations on what measures may need to be put in place to address any potential data gaps and to further assess contamination remediation and/or management (if required).

1.4 Scope of Works

The scope of works of this ESA was to:

- Conduct a desktop assessment;
- Identify areas of concern and contaminants of concern;
- Drill three soil bores at the site to identify potential human health risk to onsite receptors from potential contamination impacted soil;
- Detail specific onsite human health risk and environmental impacts which may source from any contaminated groundwater;
- Assess all risks with respect to proposed future land use which is to redevelopment the warehouse into an apartment building. Soil disturbance will be limited to drilling holes for building footings.
- Develop a conceptual site model (CSM) for the site and offsite if applicable to assess specific potential ecosystem and human health receptors.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

2 PLANNING

2.1 Existing Site Layout

The site faces Argyle Street and is opposite the Smith Street intersection. A single warehouse building with concrete floors covers the entire site. The site is approximately 21m wide x 36m long.

The land use immediately surrounding the site includes a used car yard 'Mr. Cars' on Argyle Street to the north; a cafe 'The Smiths Street' Store, residential properties and Soundy Park to the east, a carpark and an Appliance Repair shop to the south and office building of 4 Lefroy street to the west.

The surrounding land use within 200m radius of the site is approximately 60% Inner Residential, 26% Light Industrial, 15% Open Space, 7% Utilities (along Argyle Street) and 2% urban mixed use.

A summary of the surrounding land use is presented in Table 2.

Table 2 Surrounding Land Use

North	<ul style="list-style-type: none"> Mr Cars used car yard – next door Argyle Street runs in a NW-SE direction adjacent to the site. Offices
East	<ul style="list-style-type: none"> Smith Street is opposite the site Smiths Street Store (Cafe) is opposite the site Residential properties Soundy Park is approximately 40m to the east
South	<ul style="list-style-type: none"> Carpark adjacent to the warehouse Next door is the Appliance Repairs shop, More broadly the area is Light Industrial and Inner Residential
West	<ul style="list-style-type: none"> Residential properties

2.2 Zoning

The site is zoned Light Industrial under the Hobart Interim Planning Scheme of 2015 (Figure 3). The land use surrounding the site is consistent with the zoning, there is a strip along Argyle Street which is light industrial, surrounded by Inner Residential and Soundy Park on the corner of Argyle and Burnett Street is zoned as Open Space. The property adjacent to the rear was recently rezoned inner residential.

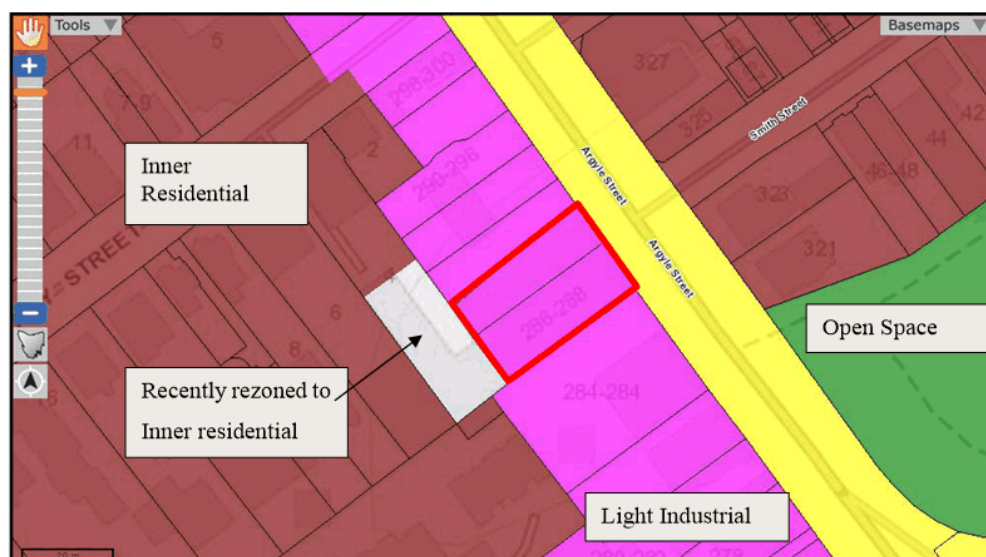


Figure 3 Council planning zones (2015), site outlined in red

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

2.3 Proposed Site Development Works

A schematic of the existing site layout ground floor level is presented in Figure 4. A warehouse covers the entire site and the floor is a concrete slab.

The following is proposed at the site:

- The zoning of the site will change from Light Industrial use to Inner Residential, as the site will change from vacant warehouse to a residential premise;
- The warehouse external walls and the existing concrete slab floor will remain and additional fill and concrete will be added to level the site. A small number of pad footings will then be excavated to support the new internal structure of the new building.
- The new building will have a ground floor for carparking and storage, the first floor will be the first floor of 12 apartments including kitchens and living spaces and a second floor will have the bedrooms and bathrooms for the 12 apartments.

The proposed layout for the ground floor is presented in Figure 5.

The risk assessment herein depends on likely soil and/ or vapour exposure pathways based on:

- Present site conditions;
- Proposed development site layout and building construction; and
- Site earthworks.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

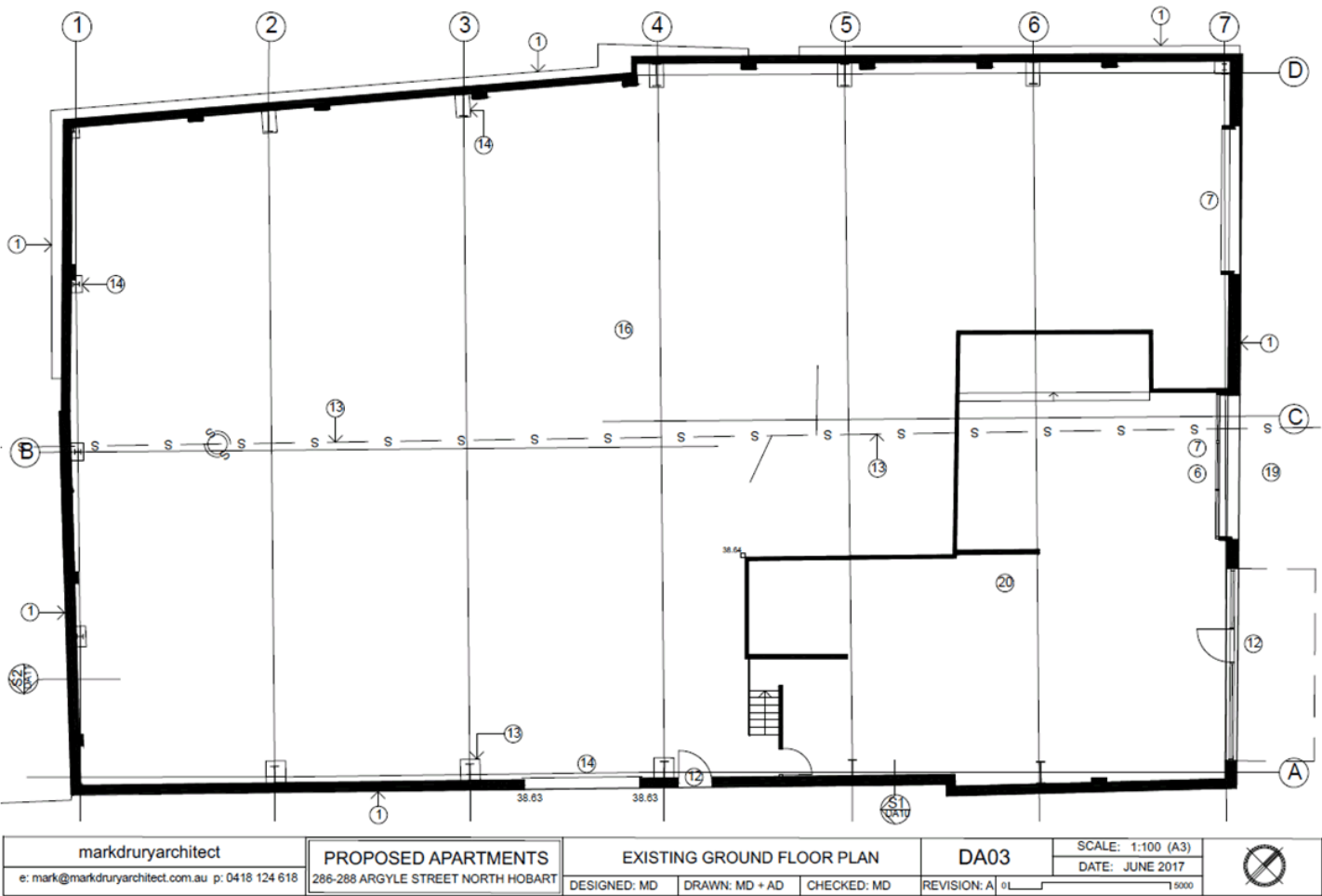


Figure 4 Existing Site Layout

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

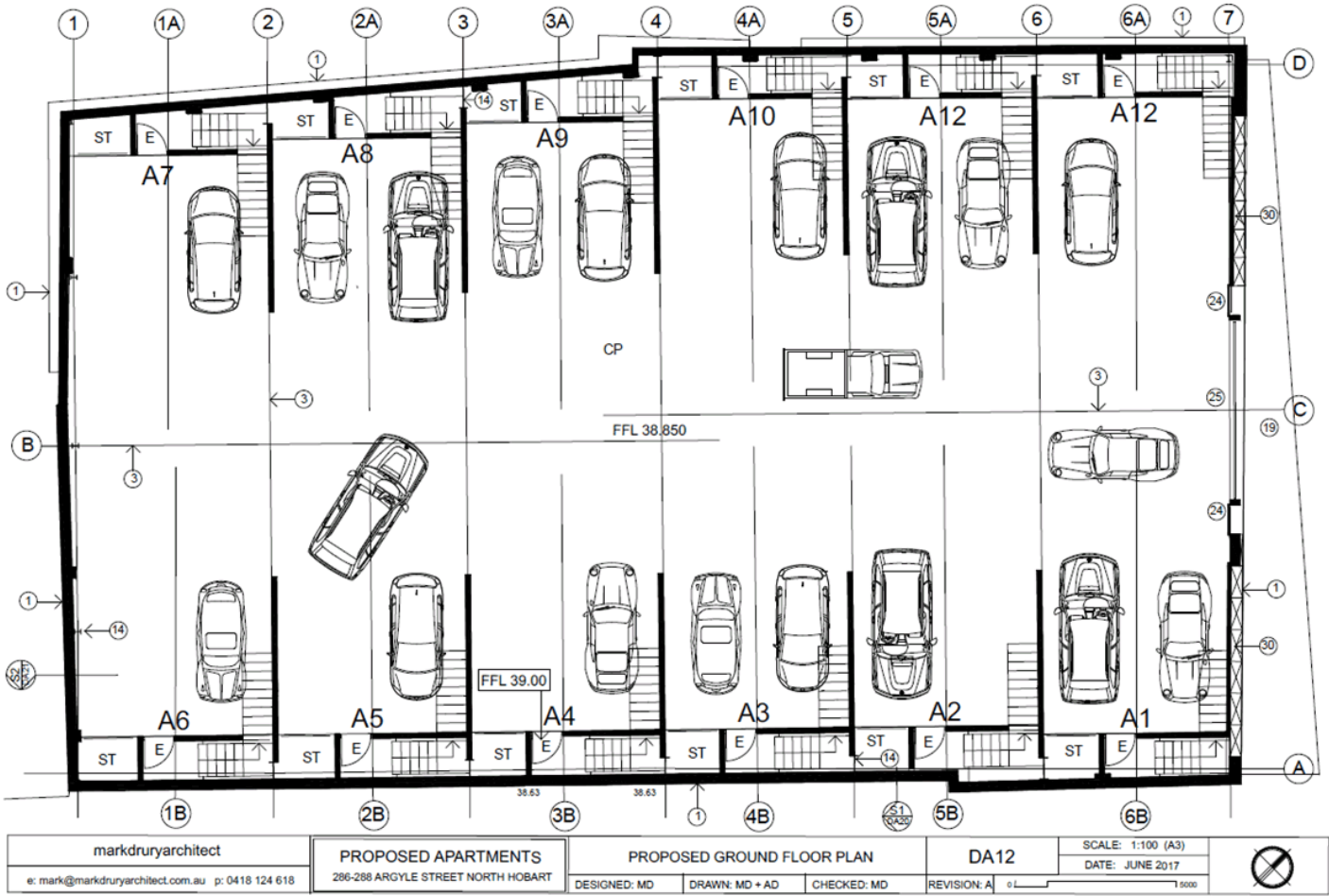


Figure 5 Proposed Ground Floor Site Layout
Geo Environmental Solutions – GES

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

2.4 Assessment Trigger

The need for this assessment has been triggered by the following:

- The site falls within the Hobart City Council contaminated site overlay and need to be assessed in accordance with the following interim planning scheme code:
 - *E2.5 Use Standards*
 - *E2.6.2 Excavation*.
- Given that there is proposed **excavation works** at the site, there are no acceptable solutions to proposed works, and therefore E2.6.2 P1 performance criteria are to be addressed
- Given that there is a proposed **change of use** at the site *The Director, or a person approved by the Director for the purpose of this Code*:
 - a) certifies that the land is suitable for the intended use; or
 - b) approves a plan to manage contamination and associated risk to human health or the environment that will ensure the land is suitable for the intended use.

2.5 Performance Criteria

Excavation does not adversely impact on health and the environment, having regard to:

- (a) an ESA 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 ESA;
 - 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.

Land is suitable for the intended use, having regard to:

- (a) an ESA that demonstrates there is no evidence the land is contaminated; or
- (b) an ESA that demonstrates that the level of contamination does not present a risk to human health or the environment; or
- (c) a plan to manage contamination and associated risk to human health or the environment that includes:
 - i. an environmental site assessment;
 - ii. (any specific remediation and protection measures required to be implemented before any use commences; and
 - iii. a statement that the land is suitable for the intended use.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

3 DESKTOP STUDY

3.1 Site Walkover

A site walkover was completed by GES staff. Attention focused on the following:

- Identify current site uses
- Identification of Potentially Contaminating Activities (PCA) at or surrounding the site.

There is one warehouse building that covers the entire site. The site next door, 290-296 Argyle Street, located upslope is a decommissioned service station and currently operating as a second-hand car yard. The site next door, 284A-284D Argyle Street, down slope of the site has car park adjacent to the Site and there are two other buildings. The front building is an appliance repair shop.

Images of the Site and surrounding properties are illustrated in plates 1-4.



Plate 1 Inside the warehouse at the site, view towards the northern boundary

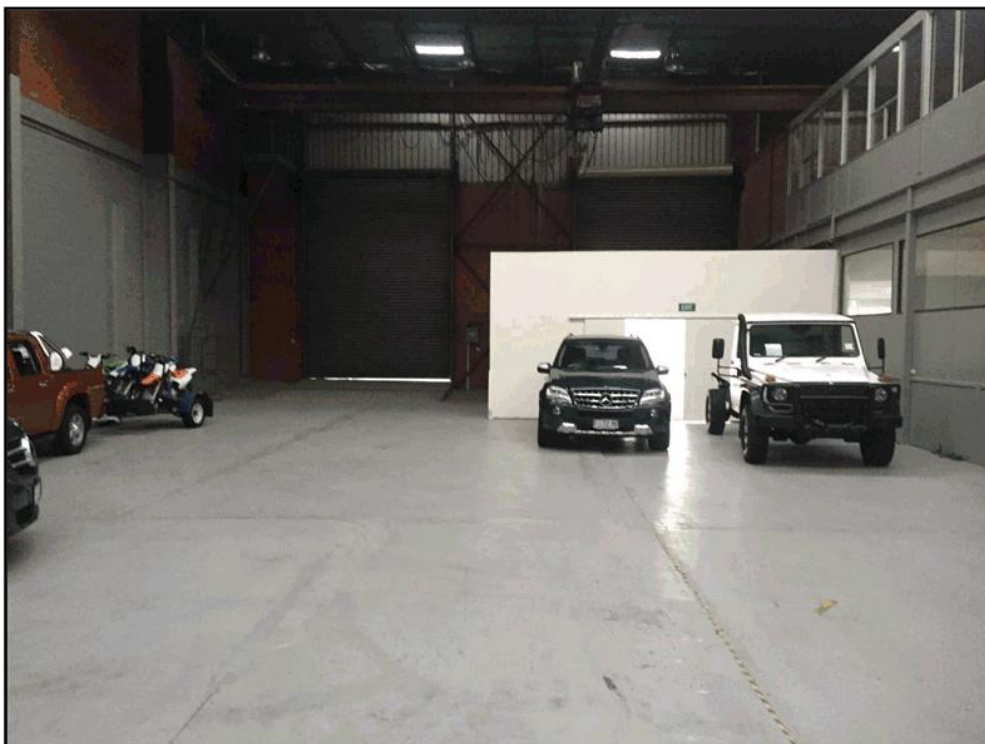
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Plate 2 Inside the warehouse at the site, view towards Argyle Street

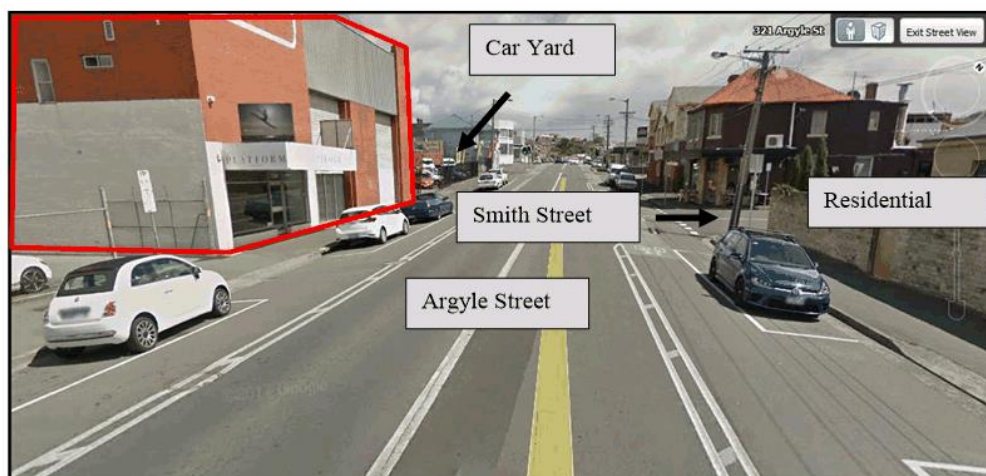


Plate 3 View to the Northwest up Argyle Street, Google Earth image

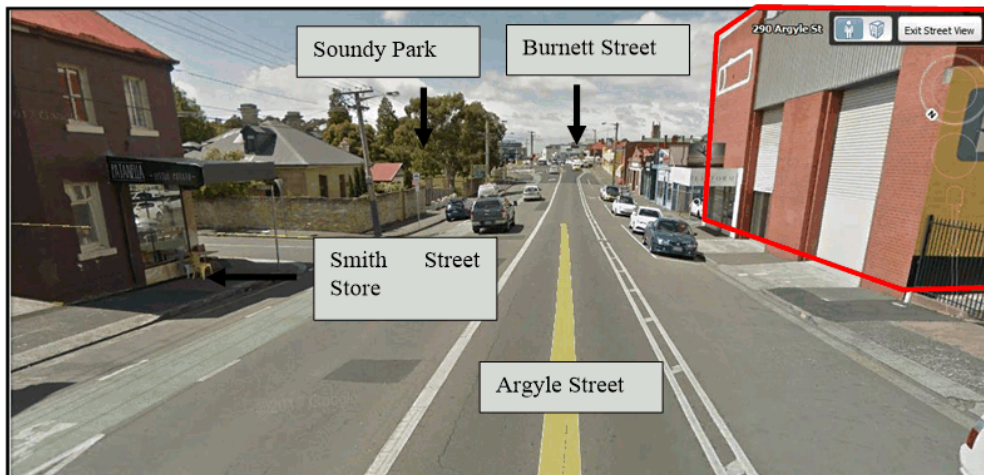
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Plate 4 View to the Southeast down Argyle Street, Google Earth image

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Figure 6 Site Context Plan

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

3.1.1 Surface Coverings

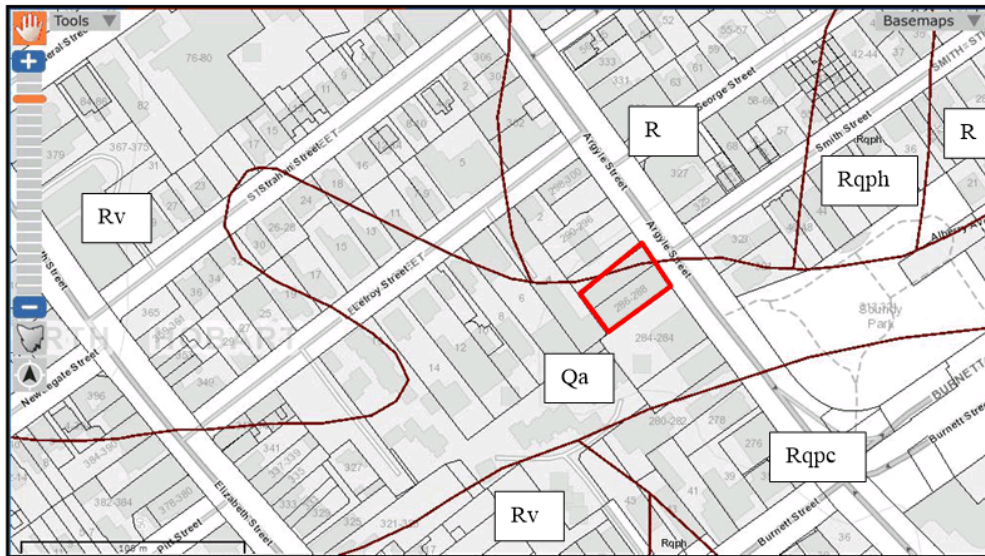
The entire site has a sealed concrete surface under the warehouse.

3.1.2 Signs of Contamination

There was no evidence of surface spills or leaks at the time of the site inspection.

3.2 MRT Geology Mapping

The geology of the site is mapped as mostly Quaternary Sediments (Qa) of alluvial gravel, sand and clay. The northern corner of the site is mapped as undifferentiated Upper Parmeener Supergroup rocks (Figure 7).



RV – Triassic Undifferentiated volcaniclastic, quartz-rich lithic and quartzose sandstone, siltstone, mudstone, carbonaceous beds and coal seams.

R – Undifferentiated Upper Parmeener Supergroup rocks.

Qa – Quaternary Alluvial gravel, sand and clay.

Rqph – Freshwater predominantly cross-bedded quartzose to feldspathic sandstone commonly with overturned cross-bedding, subordinate siltstone with sparse plant and vertebrate fossils (Knocklofty Formation).

Rqpc – Triassic Predominantly interbedded siltstone shale and mudstone and planar-bedded, ripple cross-laminated or cross-bedded sandstone, red-purple, green or carbonaceous siltstone at places (part of Knocklofty Formation where in Hobart area).

Figure 7 Mineral Resources Tasmania 1:25000 Scale Mapping (The LIST).

3.3 Site Topography, Drainage & Hydrogeology

The site is completely covered by a warehouse and rainfall flow is directed from the roof via gutters and downpipes into stormwater mains. Surrounding the site surface runoff from paved areas generally moves down gradient to the east.

The hydrogeology of the area is likely to consist of groundwater moving parallel with slope to the east along the top of sandstone basement or along clay horizons.

If the localised topographic relief is indicative of groundwater gradients, groundwater is also expected to flow within a similar flow path which will be directed along more permeable horizons such as the interface immediately above sandstone outcrop or within fractures inside the sandstone.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

Groundwater recharge from the site may occur through the seepage of surface water into gardens and other unpaved areas upslope.

Groundwater discharge is expected to occur where permeable zones are intersected by building excavations or further downslope where fracture-bound groundwater may discharge.

The inferred groundwater flow is illustrated in Figure 8.

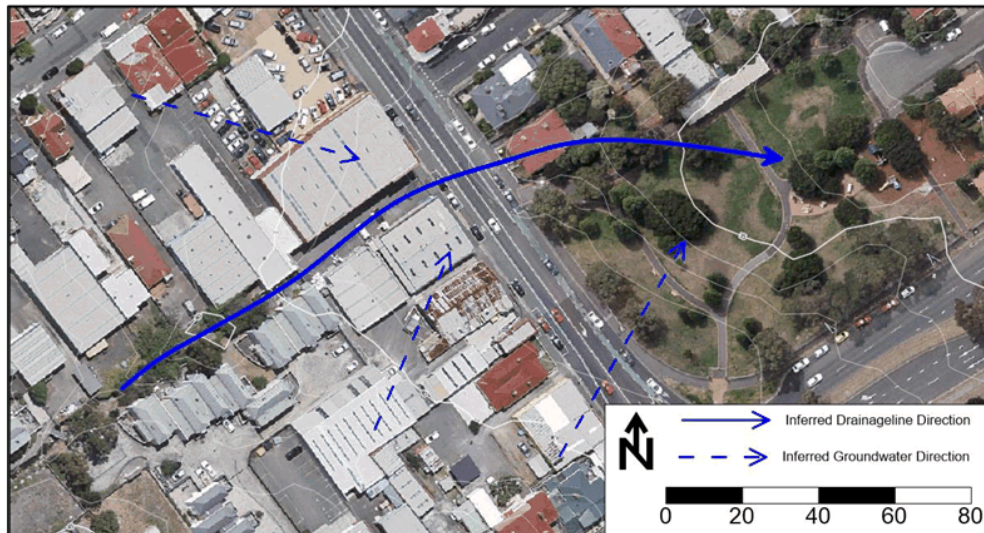


Figure 8 Inferred Groundwater Flow

3.4 Historical Title Search

Due to time constraints and the availability of high resolution historical aerial photographs, a historical title search was not conducted.

3.5 Historical Aerial Photography Interpretation

Historical aerial photographs of the site were collated from the Department of Primary Industries, Parks, Water and Environment (DPIPWE).

Table 3 presents a summary of alterations to the site between photographic events and the individual aerial photographs are presented in Plate 5 to Plate 12.

Table 3 Historical Aerial Photograph Review

Photo	Observations
1957	<ul style="list-style-type: none"> Two house present at site (probably two titles at the time). Appear to be residential properties. No buildings at the rear either property. Surrounding land use either residential or light industrial. Historical Aerial Photo 1 and 2
1965	<ul style="list-style-type: none"> The two houses are gone. Large shed on the southern half of the site. Smaller shed on the northern half of the site, probably a garage, half of that area is a driveway and the remaining area is scattered with building materials. Residential properties to the northwest of the site. Vacant land to the south.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

	<ul style="list-style-type: none"> • Historical Aerial Photo 3 and 4
1984	<ul style="list-style-type: none"> • New warehouse structure over the entire site. • Residential properties to the northwest are gone and petrol station now exists. Evidence of surface drainage and water pooling in the southern corner of the service station site, which backs onto The Site. Flow maybe derived from runoff from the roof of the service station or it could be from a workshop. • Vacant land to the south being used as wrecked car storage. Down slope of the site and not likely to impact it. • Historical Aerial Photo 5 and 6
1992	<ul style="list-style-type: none"> • Warehouse structure on site and the service station next door remain unchanged. • Drainage from service station is very clear in this image. • Historical Aerial Photo 7 and 8
2017 - Current	<ul style="list-style-type: none"> • Warehouse the same. • Service station has been decommissioned and is being occupied by a second hand car yard. Area where drainage has been identified appears to has been sealed with concrete and asphalt. • Vacant land to the south have high density housing • See Figure 6

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Plate 5 Historical Aerial Photograph – the Site 1957

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Plate 6 Historical Aerial Photograph – Area surrounding the site in 1957

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Plate 7 Historical Aerial Photograph – The site 1965

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Plate 8 Historical Aerial Photograph – Area surrounding the site 1965

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Plate 9 Historical Aerial Photograph– The site 1984

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Plate 10 Historical Aerial Photograph –Area surrounding the site 1984

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Plate 11 Historical Aerial Photograph – The site 1992

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Plate 12 Historical Aerial Photograph –Area surrounding the site 1992.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

3.6 Previous Site Investigations

GES is not aware of any previous site investigations for the site. The neighboring site, 290 Argyle Street was a former BP Service Station the following report exists.

- IT Environmental, 2000 *'Site Validation Report Former BP Argyle Street Service Station 290 Argyle Street, North Hobart, Tasmania'*.

Due to time constraints, this report has not been reviewed. However the report is available on file at council and EPA and no records or any investigation/remediation notices as results of the report could be found which suggests the findings of the report were satisfactory.

3.7 Dangerous Goods Records (Workplace Standards)

A search of Workplace Standards files returned no results relating to the site. No information was found detailing the storage or use of any dangerous goods on site

Workplace Standard Tasmania provided information on the upslope property to the site at 290-296 Argyle Street. The details are summarised in Table 4. (Appendix 2).

Table 4 Workplace Standards Tasmania documentation, 290-296 Argyle Street

Date	Details
25 January 2002	File note conversation with Mr Hawkins and WST: <ul style="list-style-type: none"> • Tanks have been removed. • Concerned about overflow water from the site • Council looking into overflow issue. • WST compliant.
2 February 2000	Email Correspondence between Simon Marshall of Boral and Daryl Gillie of Workplace Standards Tasmania regarding the BP Service Station – 290 Argyle Street, Hobart: <ul style="list-style-type: none"> • <i>'Yes, the installation was been decommissioned quite some time ago, and the vessel, pump and associated valves removed. The LPG dispenser on the forecourt has been removed, and the pipework connecting the dispenser to the pump was made "gas free".'</i>
8 February 2000	Declaration letter from BP Australian Limited (Guy Kent) to Workplace Standards Authority. Detailing the following: <ul style="list-style-type: none"> • <i>'Underground Fuel Storage Tank Facilities and associated pipe work and pumps at BP Argyle Street Service Station have been removed'</i>

3.8 Council Environmental Records

Hobart City Council was contacted for records relating to the site. No files exist for the site but an IT Environmental Report is on file for 290 Argyle street. See Appendix 3 for email correspondence. At this stage it has been deemed unnecessary to acquire a copy of this report as there are no notices associated with it.

3.9 EPA Information Request

Due to time constraints, a request for a Property Information Request was not lodged, there is currently a six week wait. Verbal correspondence confirmed that there are no records relating to contamination or potentially contaminating activities on the subject property.

GES previously acquired EPA files from the neighboring site at 290-296 Argyle Street, North Hobart. The Property Information Request documentation is included in Appendix 4. Information included in EPA PIR

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

is consistent also with the information from the council search showing evidence of UST removal and decommissioning

3.10 Groundwater

Groundwater is beyond the scope of the current ESA and will not be discussed beyond this section in detail.

3.10.1 Potential Up-Gradient Contamination Sources

Groundwater is likely to drain towards the site from 290 Argyle street, from a northwesterly direction. The site is located downgradient from the historical services station site which is known to have held UST's, removed in 1999.

3.10.2 Downgradient Ecosystem Receptors

Groundwater is likely to drain in a south easterly direction towards Soundy Park which is the closest ecological receptor from the site. Soundy Park is approximately 40 m from the site. Given the site is covered by a warehouse and all rain water is captured and diverted into storm water drains, it is unlikely that any potential impact from the site will impact downgradient ecosystem receptors.

3.10.3 Water Bore Users

Mineral Resources Tasmania Registered water bores are presented in Appendix 5. The nearest registered groundwater bore to the site (bore ID 41515) is located approximately 2.6km to the west of site in Triassic sandstone to maximum depth of 48. The bore yielded only 1L/s with a total dissolved solids (TDS) of 1700. The bore has been capped.

3.11 Potential Contamination Issues

3.11.1 Areas of Potential Concern

No areas of potential concern have been identified on the site. However, the following areas of potential concern have been identified on the neighboring site, 290 Argyle Street a former BP Service Station that may impact the site:

- Former UST at the adjacent site;
- Historical bowsters and associated fuel lines at the adjacent site; and
- General run off from the adjacent site

3.11.2 Contaminants of Potential Concern

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

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

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

4 FIELD INVESTIGATION PROCEDURES

4.1 Works Summary

Site investigation work was conducted on the 22 June 2017 and involved the drilling of three soil bores (BH1 – BH3). Locations are presented in Figure 9.

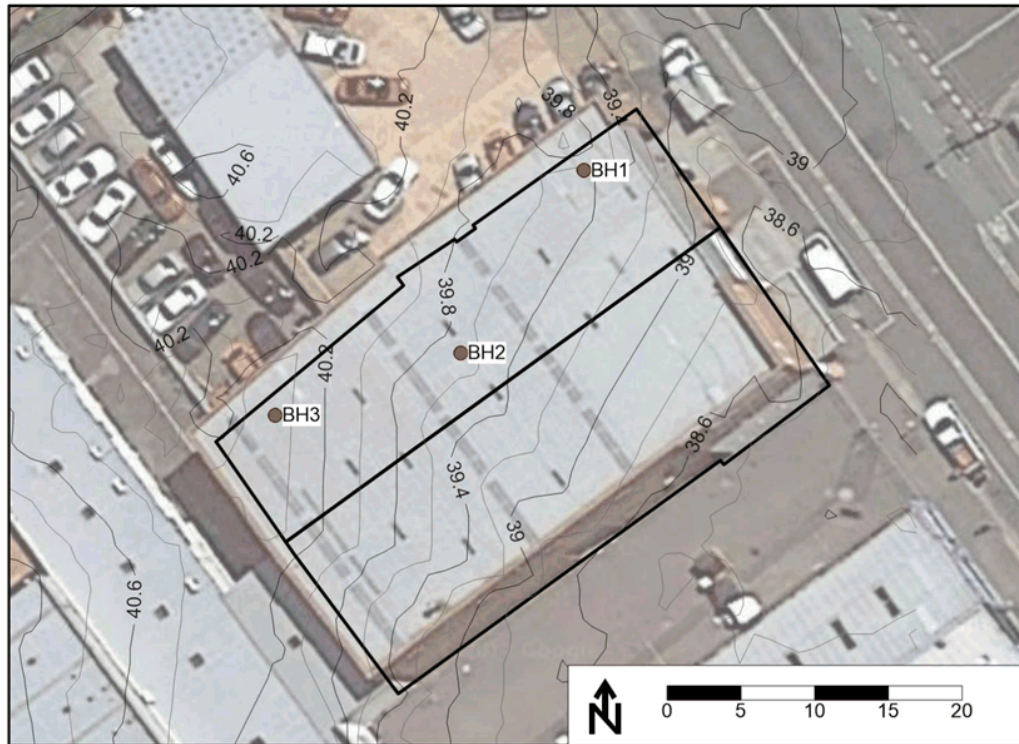


Figure 9 Borehole (BH1 to BH3) Investigation Areas

4.2 Soil Investigation

4.2.1 Borehole Drilling

At each of the bore locations, the following precautions were put in place to avoid disrupting underground service assets:

- Dial Before You Dig plans were obtained;
- Archers Underground Service were engaged; and
- Where practical, the first meter of the bore was cleared with a hand auger.

Concrete coring was undertaken concrete at each drilling location as required.

A total of three 65 mm diameter soil bores were drilled for assessing site geology and sampling for contamination impact. The bores were drilled by GES using a hand auger and or 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.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

4.2.2 Soil Sampling

Soil bore soil sampling was conducted per the National Environmental Protection Measure (NEPM 2013) and AS4482 sampling guidelines. Table 5 presents a summary of the soil assessment methodology adopted at the site.

Table 5 Summary of Soil Sampling Methods

Activity	Details / Comments
Drilling Method	Soil bores were drilled: <ul style="list-style-type: none"> • Hand auger over the first meter to clear for services, and grab sampling; • Hollow stem auger until refusal depth and split spoon sampling; • Percussion drilling in rock and grab samples were collected from air blasted cuttings
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.
Soil Screening	The Photoionisation Detector (PID) that is usually used to screen soil was unavailable and therefore not utilised for this sampling event.
Laboratory Soil Sample Collection	In accordance with AS4482.2. All samples were collected using disposable nitrile gloves. Samples were selected for laboratory analysis : <ul style="list-style-type: none"> • where PID values exceeded a nominal value • at least every metre • in the case where hydrocarbons were not detected in individual bores using the PID, select samples were collected from representative horizons and submitted for analysis. A minimum number of samples were carefully selected which would provide sufficient information to delineate hydrocarbon contamination in soils.
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 B3-2013) from collection to extraction.

4.2.3 Soil Analysis

Primary and QC samples (excluding triplicates) were submitted to Analytical Laboratory Services (ALS) for analysis. Of the eight primary samples collected, eight were selected for analysis. Chain of Custody (COC) documentation was completed and is provided in Appendix 6. Table 6 presents a summary of the laboratory analyses undertaken.

Table 6 Overview of Soil Analysis and Quality Control

Analytes	Primary Soil Samples	Duplicates ^a	Rinse Blank ^b	Trip Blank ^c
TPH/TRH	8	1	1	-
BTEX	8	1	1	-
PAH*	8	1	1	-
15 Metals	8	1	-	-

Sampling Quality Control Standards (AS4482):

a - One (1) in twenty (20) intra laboratory split (duplicate) samples

b - Single rinse sample per piece of equipment per day

c - Single trip blank per esky

Given that a full 15 metal suite was analysed, there was 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; and
- Soil pH

The soil physical properties were assessed through site assessment and chemical properties were based on knowledge of similar soil types encountered around Hobart.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***5 QUALITY CONTROL**

Field and laboratory quality control results are presented in Appendix 7.

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 findings are summarized in Table 7.

Table 7 Field QA/QC procedures

QA/QC Requirement	Completed	Comments
Appropriate sampling strategy used and representative samples collected	Yes	Sampling program was undertaken in accordance with AS4482.1-2005
Field instruments calibrated	Yes	Certificates Provided
Appropriate and well documented sample collection, handling, logging, transportation and decontamination procedures.	Yes	None
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 samples collected (1:20)	Soil – Yes	A single duplicate from 8 primary samples
QA/QC samples reported method detection limits within indicated guidelines.	No	Noncompliance for Be, Cu, Pb, Mn, Zn Hg
Required numbers of field and rinse blank samples collected	No	
Acceptable field and rinse blank samples collected	No	
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

Laboratory findings are summarized in Table 8.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***Table 8 Laboratory QA/QC procedures**

QA/QC Requirement	Compliance	Comments
All analyses NATA accredited	Yes	
Appropriate analytical methods used, in accordance with Schedule B(3) of the NEPM	Yes	
Acceptable laboratory limits of reporting (LORs) adopted.	Yes	
Method Blanks: zero to <Practical Quantitation Limit (PQL)	Yes	
Duplicate Samples: <30% to 50% RPD.	Yes	
Control Samples: 70% to 130% recovery for soil; or 80% to 120% recovery for waters;	Yes	
Matrix spikes: 70% to 130% recovery for organics or 80%-120% recovery for inorganics	No	Single outlier for Manganese
Surrogates: 70% to 130% recovery	Yes	
Analysis holding time outliers	Yes	
Quality Control Sample Frequency Outliers	Yes	

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

6 FIELD INVESTIGATION FINDINGS**6.1 Soil Bores****6.1.1 Geological Interpretation**

The soil bore logs are presented in Appendix 8. The site is paved with approximately 100 mm of concrete. Below the concrete is a silty clay that is grey-brown, brown to black in colour; it is firm to stiff and generally had high plasticity.

Bedrock was encountered at 2.9 m below ground surface in BH2.

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).

When assessing petroleum vapour intrusion screening levels, where soil is proposed to be excavated from the site, the excavated material is excluded from the grain class averaging. The corresponding depth class from which the sample is collected is also shallowed based on the renewed basement depth.

Table 9 provides a summary of the grain class averages for material overlying the sample (excluding the excavated materials). Where the fields are left blank, a class is not assigned given the sample was collected from within the proposed excavation.

Table 9 Summary of Grain Class Based on USCS Classification

Sample	Excavation (m)	USCS Class														Rock (R)	Pavement (P)	Petroleum Vapour Intrusion HSL Grain Class	SAMPLE USCS
		GW	GP	GM	GC	SW	SP	SM	SC	ML	CL	OL	MH	CH	OH				
BH1 0.1-0.2	0																0.1	CLAY	GC
BH1 1.0-1.1	0													0.9			0.1	CLAY	GC
BH1 1.5-1.6	0													1.4			0.1	CLAY	GC
BH2 0.1-0.2	0																0.1	CLAY	GC
BH2 1.0-1.1	0													0.9			0.1	CLAY	GC
BH2 2.5-2.6	0													2.4			0.1	CLAY	GC
BH3 0.1-0.2	0																0.1	CLAY	CH
BH3 1.0-1.1	0													0.9			0.1	CLAY	CH

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

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 (2013) Guidelines

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

- NEMP (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 2013);
- NEMP (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 2013).

Soil analytical results are compared against Ecological Screening Levels (ESL's) and Ecological Investigation Levels (EIL's) limits presented in Table 10.

Table 10 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	Analysed	Analysed	Not Analysed

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***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 11.

Table 11 Adopted Land Use Scenario For the Various Soil Bores

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

7.4 Findings**7.4.1 Ecological Screening Levels**

Laboratory analytical results are presented in Appendix 9.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

Table 12 compares soil analytical results for residual samples (non-excavated soil which is to remain at the site) against relevant NEPM ESL's. Concentrations which exceeded laboratory levels of reporting (LOR) are highlighted in bold, and ESL exceedances are highlighted with a colored cell.

Three samples were above the laboratory LOR and one sample BH10.1-0.2 exceeded the ESL guideline for Benzo(a)pyrene (B(a)p).

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Table 12 Summary of Soil Analytical Results Compared with ESL's

NEPM Ecological Screening Levels for Soil				EP080: BTEXN					EP080/071: TRH			
Bold - Indicates LOR Exceedances				Benzene	Toluene	Ethylbenzene	Xylenes	Benzo(a)pyrene	F1 (C6 - C10)	F2 (>C10 - C16)	F3 (>C16 - C34)	F4 (>C34 - C40)
Colour Shading - Indicates ESL Exceedances: >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	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
BH1 0.1-0.2	22/6/17	COARSE	URBAN	<0.2	<0.5	<0.5	<0.5	0.7	<10	<50	<100	<100
BH1 1.0-1.1	22/6/17	COARSE	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH1 1.5-1.6	22/6/17	COARSE	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH2 0.1-0.2	22/6/17	COARSE	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	14	50	<100	<100
BH2 1.0-1.1	22/6/17	COARSE	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	60	<100	<100
BH2 2.5-2.6	22/6/17	COARSE	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH3 0.1-0.2	22/6/17	FINE	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100
BH3 1.0-1.1	22/6/17	FINE	URBAN	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<100	<100

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

7.4.2 Ecological Investigation Levels

Table 13 compares soil analytical results for residual samples (non-excavated soil which is to remain at the site) against relevant ecological investigation limits (EIL's). Concentrations which exceeded laboratory LOR are highlighted indicated in bold, and EIL exceedances are highlighted with a colored cell.

There were no exceedances of the laboratory LOR or EILs for metals.

Table 13 Soil Analytical Results Compared Against Ecological Investigation Levels

NEPM Ecological Investigation Levels for Soil							Copper (CEC)	Copper (pH)	Nickel	Zinc	Chromium III	Lead	Arsenic	Naphthalene
Bold - Indicates LOR Exceedances														
Colour Shading - Indicates ESL Exceedances: >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 Grain Class	Soil Clay Content (%)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH1 0.1-0.2	22/06/2017	URBAN	20	4.5	C	30	30	30	8	66	6	82	<5	<1
BH1 1.0-1.1	22/06/2017	URBAN	20	4.5	C	30	17	17	11	14	18	10	<5	<1
BH1 1.5-1.6	22/06/2017	URBAN	20	4.5	C	30	13	13	13	11	19	8	<5	<1
BH2 0.1-0.2	22/06/2017	URBAN	20	4.5	C	30	34	34	13	41	18	130	<5	<1
BH2 1.0-1.1	22/06/2017	URBAN	20	4.5	C	30	31	31	23	20	26	12	<5	<1
BH2 2.5-2.6	22/06/2017	URBAN	20	4.5	C	30	20	20	18	28	13	7	<5	<1
BH3 0.1-0.2	22/06/2017	URBAN	45	4.5	F	100	11	11	8	35	8	39	<5	<1
BH3 1.0-1.1	22/06/2017	URBAN	45	4.5	F	100	13	13	11	16	18	14	<5	<1

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***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 car parks; 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 14.

Land use class is based on the opportunity for soil access as per NEPM 2013 guidelines. A land use class A has been applied to all soil samples which is consistent with the surrounding low density setting with opportunity for access to impacted soil.

Table 14 Summary of Land Use Setting and Density for Determining Exposure Risk

Property	Land Use Class	Land Use Density	Paved Area	Sensitive Land Use
All downgradient Properties	A	Low to Medium	Variable	No

Table 15 summarises the areas of the site in which the soil analytical results are expected to be relevant as well as the applicable land use class for defining the threshold limits.

Table 15 Summary of Land Use Class Adopted for Defining Soil Analysis Threshold Limits

Soil Bores	Relevant Properties	Adopted Land Use Class
BH1 to BH3	286-288 Argyle Street	D

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

8.1.3 Health Investigation & Screening Levels

The main exposure pathways and methods for assessing short term health risk from contaminated soils are presented in Table 16. Vapour inhalation risk is addressed in Section 10 of this report.

Table 16 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 (Petroleum Vapour Intrusion – PVI)	Petroleum Hydrocarbons	HSL's (addressed in PVI section)	CRC CARE (Friebel & Nadebaum, 2011)
Dermal Contact		HSL's	
Dust Inhalation	Metals PAH's Organochlorides Phenols Herbicides Other Pesticides	Health Investigation Levels (HIL's)	NEPM (2013)
Soil Ingestion			

8.2 Findings**8.2.1 Dermal Contact - Petroleum Hydrocarbons**

Laboratory analytical results are presented in Appendix 9. Table 17 and Table 18 presents soil hydrocarbon analytical results compared against CRC CARE (Friebel & Nadebaum, 2011) HSL guidelines for assessing dermal contact risk. Concentrations which exceeded laboratory LOR are highlighted in bold, and HIL exceedances are highlighted with a colored cell indicating the highest HIL land use class which is exceeded. Two samples exceeded the laboratory LOR. There were no exceedances of the CRC CARE HSL guidelines for assessing dermal contact risk. The dermal contact risk is acceptable in selected sample locations per guidelines for intrusive maintenance workers and HSL A guidelines for low density residential use.

Table 17 Soil Analytical Results Compared Against CRC CARE) Guidelines for Dermal Contact

CRC CARE Health Screening Level 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 A Low Density Residential		100	14000	4500	12000	1400	4400	3300	4500	6300
HSL B High Density Residential		140	21000	5900	17000	2200	5600	4200	5800	8100
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									
22/06/2017	BH1 0.1-0.2	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
22/06/2017	BH1 1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
22/06/2017	BH1 1.5-1.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
22/06/2017	BH2 0.1-0.2	<0.2	<0.5	<0.5	<0.5	<1	14	50	<100	<100
22/06/2017	BH2 1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	60	<100	<100
22/06/2017	BH2 2.5-2.6	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
22/06/2017	BH3 0.1-0.2	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
22/06/2017	BH3 1.0-1.1	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100
22/06/2017	DUPLICATE	<0.2	<0.5	<0.5	<0.5	<1	<10	<50	<100	<100

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***8.2.2 Dust Inhalation & Soil Ingestion**

Combined dust inhalation and soil ingestion risk is assessed through the application of NEPM (2013) HIL's for exposure to soil contaminants.

Soil analytical results are compared against the HIL's presented in Table 17. Concentrations which exceeded laboratory LOR are highlighted in bold, and HIL exceedances are highlighted with a colored cell indicating the highest HIL land used class which is exceeded.

Two samples exceeded the laboratory LOR. There were no exceedances of the NEPM (2013) HIL's guidelines for dust inhalation and soil ingestion.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Table 18 Soil Analytical Results Compared Against NEPM (2013) Health Investigation Limit Guidelines

Report to US EPA Analytical Results Compared Against NELAP (2015) Health Investigation Limit Guidelines																																			
Bold - Indicates LOR Exceedance in Non Metallic Compounds		EG005T: Total Metals by ICP-AES											EG03 EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																						
NEPM Health Investigation Levels (HIL's)	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium Total	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Mercury	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	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	10	1	50	1	2	2	5	5	5	2	5	5	5	0.1	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	0.5	
HIL A Low Density Residential	100	60	4500	20	100	6000	300	3800	400	200	7400	40																					300	3	
HIL B High Density Residential	500	90	40000	150	600	30000	1200	14000	1200	1400	60000	120																					400	4	
HIL C Recreational	300	90	20000	90	300	17000	600	19000	1200	700	30000	80																					300	3	
HIL D Commercial/Industrial	3000	500	3E+05	900	4000	2E+05	1500	60000	6000	10000	4E+05	730																					4000	40	
Sample date:	Sample ID																																		
22/06/2017	BH1 0.1-0.2	<5	80	<1	<50	<1	6	8	30	82	262	8	<5	28	66	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	0.9	0.6	<0.5	0.9	<0.5	0.7	<0.5	<0.5	<0.5	3.8	0.8	
22/06/2017	BH1 1.0-1.1	<5	90	<1	<50	<1	18	12	17	10	138	11	<5	57	14	<0.1	<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	
22/06/2017	BH1 1.5-1.6	<5	80	<1	<50	<1	19	23	13	8	82	13	<5	59	11	<0.1	<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	
22/06/2017	BH2 0.1-0.2	<5	100	<1	<50	<1	18	12	34	130	596	13	<5	68	41	0.3	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	0.8	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	<0.5
22/06/2017	BH2 1.0-1.1	<5	110	<1	<50	<1	26	25	31	12	700	23	<5	88	20	<0.1	<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	
22/06/2017	BH2 2.5-2.6	<5	50	<1	<50	<1	13	12	20	7	162	18	<5	64	28	<0.1	<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	
22/06/2017	BH3 0.1-0.2	<5	100	<1	<50	<1	8	7	11	39	100	8	<5	24	35	0.3	<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	
22/06/2017	BH3 1.0-1.1	<5	70	<1	<50	<1	18	11	13	14	55	11	<5	53	16	<0.1	<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	

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

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 *CRC CARE Technical Report 23 Appendix L checklist* is presented in Appendix 10. 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 odors;
- Flammable risk in confined spaces; and/or
- Health complaints from occupants.

Based on the preliminary site visit, 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 Land Use Class

For surrounding properties, the potential PVI risk is characterized through application of CRC CARE HSL's for each individual properties based on their existing land use (NEPM 2013; Friebe & 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. Site land use class and land use class of downgradient receptors (where onsite HSL exceedances have been identified) are indicated in Table 19.

Table 19 Summary of Land Use Setting and Density for Determining Exposure Risk

Property	Land Use Class	Land Use Density	Paved Area	Sensitive Land Use
286-288 Argyle Street	D	High	100%	No

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

9.2 Selected Media for Assessing PVI Risk

Table 20 presents a summary of the preferred HSL approach to assessing PVI risk.

Table 20 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	Determining PVI risk based on groundwater is inherently conservative when interpreting vapour risk to account for not readily discernable preferential pathways. Reference may be drawn to alternative assessment approaches: 1) Application of site specific conditions to the CRC CARE model for assessing PVI risk 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 placed on utilizing groundwater analysis over soil.	Tertiary

9.3 Soil

9.3.1 Guidelines

Soil HSL's are specific to each soil sample and involves characterisation based on the following variables:

- Land use class;
- 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 1 m; 1 to 2 m; 2 to 4 m; and greater than 4 m;

Table 21 summarises soil bores and land use classification used to characterise PVI risk for various properties near the site.

Table 21 Classification Used to Assess Petroleum Vapour Intrusion Risk to Local Receptors from Soil

Property	Soil Bores	Land Use Class
BH1 to BH3	286-288 Argyle Street	D

9.3.2 Findings

Residual soil samples (non-excavated soil which is to remain at the site) have been assessed against the elected NEPM (2013) health screening levels (HSL) to determine potential hydrocarbon vapour risk to site users. Laboratory analytical results are presented in Appendix 9.

Specific grain, depth and land use classes are presented in Table 22. Concentrations which exceeded laboratory LOR are highlighted in bold, and HSL exceedances are highlighted with a colored cell.

Two samples exceeded the laboratory LOR. There were no exceedances of the NEPM (2013) HSLs for assessing indoor vapour intrusion.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Table 22 Soil Analytical Results Compared Against HSL A

Soil Hydrocarbon HSL's for Assessing Indoor Vapour Intrusion (NEPM 2013)					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 LOR 0.2	mg/kg LOR 0.5	mg/kg LOR 0.5	mg/kg LOR 0.5	mg/kg LOR 1	mg/kg LOR 10	mg/kg LOR 50
BH1 0.1-0.2	22/06/2017	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH1 1.0-1.1	22/06/2017	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH1 1.5-1.6	22/06/2017	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH2 0.1-0.2	22/06/2017	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	14	50
BH2 1.0-1.1	22/06/2017	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	60
BH2 2.5-2.6	22/06/2017	2 - 4	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH3 0.1-0.2	22/06/2017	0 - 1	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH3 1.0-1.1	22/06/2017	1 - 2	CLAY	D	<0.2	<0.5	<0.5	<0.5	<1	<10	<50

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

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**10.2.1 Soil**

Laboratory analytical results are presented in Appendix 9. Table 23 Summary of Soil Analytical Results Compared against HSL's for Assessing PVI Risk to Trench Workers. Concentrations which exceeded laboratory LOR are highlighted in bold, and HSL exceedances are highlighted with a colored cell indicating the highest HSL land used class which is exceeded.

Two samples exceeded the laboratory LOR. There were no exceedances of the CRC CARE HSL guidelines for Assessing PVI Risk to Trench Workers.

Table 23 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				EP080: BTEXN					EP080/071: TRH	
Bold - Indicates LOR Exceedances				Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	C6 - C10 Fraction	>C10 - C16 Fraction
Dark Grey 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	mg/kg LOR 0.2	mg/kg LOR 0.5	mg/kg LOR 0.5	mg/kg LOR 0.5	mg/kg LOR 1	mg/kg LOR 10	mg/kg LOR 50
BH1 0.1-0.2	22/06/2017	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH1 1.0-1.1	22/06/2017	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH1 1.5-1.6	22/06/2017	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH2 0.1-0.2	22/06/2017	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	14	50
BH2 1.0-1.1	22/06/2017	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	60
BH2 2.5-2.6	22/06/2017	2 to 4m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH3 0.1-0.2	22/06/2017	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50
BH3 1.0-1.1	22/06/2017	0 to 2m	CLAY	<0.2	<0.5	<0.5	<0.5	<1	<10	<50

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

11 SOIL DISPOSAL ASSESSMENT

11.1.1 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 24:

- (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.

11.1.2 Findings

The soil samples have been compared against IB105 guidelines for soil disposal. Elevated benzo(a)pyrene concentrations near BH1 are identified as LEVEL 2 contaminated (Table 25). When all soil hydrocarbon concentrations are averaged, the soil is reduced to LEVEL 1 classification.

Table 24 Summary of IB105 Classification Guidelines

	Classification (with reference to Table 2)	Controlled Waste ¹	Comments
Fill Material² (Level 1)	Soil that exhibits levels of contaminants below the limits defined under <i>Fill Material</i> in Table 2.	Unlikely	Soil classified as <i>Fill Material</i> can still be a 'pollutant' under the <i>Environmental Management and Pollution Control Act 1994</i> and needs to be responsibly managed.
Low Level Contaminated Soil (Level 2)	Soil that exhibits levels of contaminants above the limits defined under <i>Fill Material</i> but below the limits defined under <i>Low Level Contaminated Soil</i> 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 <i>Low Level Contaminated Soil</i> but below the limits defined under <i>Contaminated Soil</i> 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 <i>Contaminated Soil</i> 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 <i>Contaminated Soil</i> , are generally classified as <i>Contaminated Soil for Remediation</i> .
¹ Controlled Waste is defined in the <i>Environmental Management and Pollution Control Act 1994</i> .			
² Criteria for <i>Fill Material</i> are the limits set by the Director for the purposes of R.9(2)(a)(ii) in the <i>Regulations</i> .			

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Table 25 Soil Analytical Results Compared Against IB105 Investigation Limits for soil Disposal

Information Bulletin 105 Classification and Management of Contaminated Soil For Disposal	EG005T: Total Metals by ICP-AES											EG035		EG048:		EP066: Polychlorinated Biphenyls			EP075(SIM):A: Phenols			EP080: BTEX					EP080/071: TR	
	Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Cobalt	Copper	Lead	Manganese	Nickel	Zinc	Mercury	Hexavalent Chromium	Total Polychlorinated biphenyls	Aldrin + Dieldrin	DDT + DDD + DDE	Phenol	Benzo(a)pyrene	Sum of polycyclic aromatic hydrocarbons	Benzene	Toluene	Ethylbenzene	Total Xylenes	C6 - C9 Fraction	C10 - C35 Fraction (sum)			
	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		
	LOR	5	10	1	1	2	2	5	5	5	2	5	0.1	0.5	0	0.05	0.05	0	0.5	0.5	0.2	0.5	0.5	0.5	10	50		
	Investigation Level Selected																											
	IB105 Level 1	20	300	2	3	50	100	100	300	500	60	200	1	1	2	2	2	25	0.08	20	1	1	3	14	65	1000		
	IB105 Level 2	200	3000	40	40	500	200	2000	1200	5000	600	14000	30	200	20	20	200	500	2	40	5	100	100	180	650	5000		
	IB105 Level 3	750	30000	400	400	5000	1000	7500	3000	25000	3000	50000	110	2000	50	50	1000	2000	20	200	50	1000	1080	1800	1000	10000		
	IB105 Level 4	>750	>30000	>400	>400	>5000	>1000	>7500	>3000	>25000	>3000	>50000	>110	>2000	>50	>50	>1000	>2000	>20	>200	>50	>1000	>1080	>1800	>1000	>10000		
22/06/2017	BH1 0.1-0.2	<5	80	<1	<1	6	8	30	82	262	8	66	0.5	0	0	0	0	0.7	3.8	<0.2	<0.5	<0.5	<0.5	<10	<50			
22/06/2017	BH1 1.0-1.1	<5	90	<1	<1	18	12	17	10	138	11	14	<0.1	0	0	0	0	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<10	<50			
22/06/2017	BH1 1.5-1.6	<5	80	<1	<1	19	23	13	8	82	13	11	<0.1	0	0	0	0	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<10	<50			
22/06/2017	BH2 0.1-0.2	<5	100	<1	<1	18	12	34	130	596	13	41	0.3	0	0	0	0	<0.5	2.1	<0.2	<0.5	<0.5	<0.5	<10	70			
22/06/2017	BH2 1.0-1.1	<5	110	<1	<1	26	25	31	12	700	23	20	<0.1	0	0	0	0	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<10	70			
22/06/2017	BH2 2.5-2.6	<5	50	<1	<1	13	12	20	7	162	18	28	<0.1	0	0	0	0	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<10	<50			
22/06/2017	BH3 0.1-0.2	<5	100	<1	<1	8	7	11	39	100	8	35	0.3	0	0	0	0	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<10	<50			
22/06/2017	BH3 1.0-1.1	<5	70	<1	<1	18	11	13	14	55	11	16	<0.1	0	0	0	0	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<10	<50			
22/06/2017	DUPLICATE	<5	50	<1	<1	16	15	28	20	129	28	33	<0.1	0	0	0	0	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<10	<50			
Averaging		0	81.111	0	0	15.78	13.89	21.89	35.778	247.11	14.78	29.333	0.12	0	0	0	0	0.08	0.66	0	0	0	0	0	15.56			

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

12 CONCEPTUAL SITE MODEL

A conceptual site model is not required as there are no Tier 1 HIL or HSL exceedances for assessing human health risk and minor ecological exceedances are unlikely to result in environmental harm.

12.1 Potential & Identified Sources of Contamination

12.1.1 Potential Sources

The primary source of potential contamination at the site is the former BP Service Station, 290 Argyle Street. The former Service Station is upslope and historically there were underground storage tanks (UST's). The boundary of the Site has been tested and result show no areas of potential concern.

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

12.1.2 Identified Sources

The soil test results revealed that although there were results above the laboratory LOR there were no exceedances of EIL's, Dermal Contact, HIL's, Trench PVI HSL's or Indoor PVI HSL's. Once sample: BH10.1-0.2 exceeded the ESL guideline for B(a)p.

The exact source of the impact is not known but it is likely that B(a)p was derived historical

- heating oil such as kerosene or coal when the site was residential or contamination derived offsite from the former service station.
- Fill which may contain charcoal

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

13 CONCLUSIONS

13.1 Desktop Assessment

From the desktop assessment, it is concluded that:

- Based on a review of the dangerous goods records, the historical aerial photographs and correspondence with the EPA and the HCC; it has been ruled out that there were contaminating activities on the site. This is supported by the fact that there were no dangerous goods records for either title, 286 or 288 Argyle Street.
- Areas of potential concern include:
 - Adjacent site, the former BP Service Station which is up gradient
- Identified contaminants of potential concern include:
 - TPH, BTEX, PAH compounds & heavy metals

13.2 Adopted Land Use Settings

The following investigation limits were adopted for the site:

- Ecosystem – residential use;
- Future land users access to soil – limited soil access in commercial space (all paved) therefore:
 - HIL D for soil ingestion and inhalation and
 - HSL D for dermal contact;
- Future land users vapour inhalation risk – HSL D for commercial workers
- Site development works:
 - HSL D for vapour intrusion risk based on commercial land use;
 - Standard guidelines for assessing dermal contact risk; and
 - HIL D for assessing dust inhalation and soil ingestion risk
- Contamination exposure to trench workers:
 - HSL D for vapour intrusion risk based on commercial land use;
 - Standard guidelines for assessing dermal contact risk; and
 - HIL D for assessing dust inhalation and soil ingestion risk

13.3 Invasive Soil Assessment

From the soil assessment, it is concluded that:

- Given that Health Investigation Levels (HIL's) are not exceeded in any of the soil samples, there is a low risk to all present and potential future onsite inhabitants;
- ESL's are exceeded in one sample collected from the site. The environmental risk is low given the limited opportunity for off site impact.

The risk of exposure to contaminants of concern to future site users is very limited for the following reasons:

- There were no HSL or HIL exceedences for COPCs at the site.
- There is limited exposure pathways for the following reasons
 - The site is currently sealed with a concrete slab approximately 100mm thick;
 - The ground floor will have fill and an additional concrete slab added to level the site;
 - The proposed use of the ground floor is for a car park
- The greatest contamination risk is from the upslope site, 290 Argyle Street, the former BP Service Station. Samples from boreholes close to the boundary with 290 Argyle Street have been tested to the depth if underlying sandstone and no contamination of concern has been identified.
- No groundwater was encountered in any of the boreholes drilled into residual sandstone under the site

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

13.4 Proposed Development Works

In summary the following conclusions can be made:

- A risk to potential receptors has not been identified during and after development.
- All samples collected at the site are below threshold concentrations for assessing risk to human health;
- No particular health and safety issues are identified which may originate from onsite contamination activities;
- Other than advice provided within the recommendations section of this report, there are no specific remediation and protection measures required to be implemented before excavation commences;
- As a result of proposed site excavation, there is a very low human health risk to future users of the site; and
- GES advise that during site excavation works for site redevelopment, there is a low risk that site contamination will present an environmental risk.

14 RECOMMENDATIONS

There is no bulk excavation planned as part of the development works, with only isolated pad footings required for the new structure. Although it is highly unlikely that excavated soil will exceed LEVEL 1, GES recommends that all soil excavated at the site is stockpiled and tested to confirm this Level 1 category.

Yours faithfully,



Sarah Joyce BSc (Hons)
Environmental Geologist

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***15 REFERENCES**

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- Geo – Environmental Solutions GES*

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

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*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***16 LIMITATIONS STATEMENT**

This monitoring Report has been prepared in accordance with the scope of services between Geo-Environmental Solutions Pty. Ltd. (GES) and Mark Drury Architects ('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.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***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
- 12 years' experience in environmental contamination assessment and site remediation.

Ms Sarah Joyce BSc (Hons)

- Senior Environmental Scientist
- Honours in Geography and Environmental Science at the University of Tasmania in 2003;
- Undergraduate Degree Double Major in Geology and Geography & Environmental Science
- 15 years professional work experience and six years contaminated site assessment

Mr Kris Taylor Bsc (Hons)

- Senior Environmental & Engineering Geologist
- Honours in Environmental Geology at the University of Tasmania in 1998
- 15 years' experience in environmental contamination assessments and hydrogeology (including honours in mine site tailing pollution assessment)

Mr Aaron Plummer (Cert. IV)

- Soil Technician
- 3 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater.

Mr Grant McDonald (Adv. cert. hort.)

- Soil Technician
- 6 years' experience in hydrocarbon and heavy metal contamination sampling of soils and groundwater.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***Appendix 2 Dangerous Goods Records****JP Cumming**

From: Case, Lorraine (DoJ) <Lorraine.Case@justice.tas.gov.au>
Sent: Tuesday, 13 June 2017 3:58 PM
To: JP Cumming; Mark Drury
Subject: RE: 286 - 288 ARGYLE ST. NORTH HOBART - POTENTIAL CONTAMINATED LAND CODE

Hi John Paul

We don't appear to have a dangerous goods site file for this property, the closest is one for 290 Argyle – former BP....any value in this?

I've also checked the EPA's register and there is nothing.

Lorraine Case
Administrative Officer
Right to Information & Privacy Unit
Department of Justice

Ph (03) 6166 4680 Fax (03) 6173 0206
PO Box 56 Rosny Park TAS 7018
Lorraine.Case@justice.tas.gov.au

From: JP Cumming [mailto:jcumming@geosolutions.net.au]
Sent: Tuesday, 13 June 2017 3:43 PM
To: Mark Drury
Cc: Case, Lorraine (DoJ)
Subject: RE: 286 - 288 ARGYLE ST. NORTH HOBART - POTENTIAL CONTAMINATED LAND CODE

Hey Mark form attached. I have also cc'd Lorraine at WST, if you can fill out and sign and then email back to both us the search can get underway.

Thanks

JP

From: Mark Drury [mailto:mark@markdruryarchitect.com.au]
Sent: Tuesday, 13 June 2017 9:45 AM
To: JP Cumming <jcumming@geosolutions.net.au>
Subject: 286 - 288 ARGYLE ST. NORTH HOBART - POTENTIAL CONTAMINATED LAND CODE

Hi JP

Further to our discussions this morning please find attached the following information which i trust will assist you in the preparation of your Site Contamination Assessment.

1. Detailed Site Survey
2. Detailed interior Survey

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



BP OIL

WORKSAFE TASMANIA
Released under active disclosureBP Australia Limited
A.C.N. 004 085 616
Selfs Point Road New Town 7008
Postal Address:
G.P.O. Box 689G Hobart 7001Switchboard: (03) 6278 1310
Central Fax: (03) 6278 2205

Direct Line: 0418 399 136

Reference:

8 February, 2000

Chief Inspector of Explosives
Workplace Standards Authority
PO Box 56
ROSNY PARK
Tasmania 7018re; BP ARGYLE SERVICE STATION
290 - 296 Argyle Street North Hobart
your site ref; 0362

Dear Sir/ Madam

I wish to inform you that all Underground Fuel Storage Tank Facilities and associated pipe work and pumps at the BP Argyle Street Service Station have been removed. BP Australia propose to eventually sell the site for non petroleum use.

To the best of my knowledge the above mentioned works were carried out in accordance with our interpretation of both AS1940 and ADG Codes.

Should you require further information please contact the undersigned by telephone on 6278 1310.

Yours faithfully
Guy KentProject Engineer
BP Australia Limitedcounter signed
Stephen LoosmoreTasmanian Terminals and Engineering Manager
BP Australia Limited

WGA	
FILE REF	0362
DOC REF	01137/00
18 FEB 2000	
APPROVED	RECEIVED
RMN	hwa

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Daryl Gillie

From: Daryl Gillie
Sent: Wednesday, 2 February 2000 14:29
To: 'Simon.Marshall@boralenergy.com.au'
Subject: RE: BP Service Station - 290 Argyle Street, Hobart

Hello Simon. Thank you for your advice.

Regards

Daryl Gillie

-----Original Message-----

From: Simon.Marshall@boralenergy.com.au
[SMTP:Simon.Marshall@boralenergy.com.au]
Sent: Wednesday, 2 February 2000 12:44
To: Daryl.Gillie@dier.tas.gov.au
Subject: RE: BP Service Station - 290 Argyle Street, Hobart

Hello Daryl.

Sorry for the delay in replying.

Yes, the installation was been decommissioned quite some time ago, and the vessel, pump and associated valves removed.

The LPG dispenser on the forecourt has been removed, and the pipework connecting the dispenser to the pump was made "gas free".

We believe that a "declaration" was made, and are searching our records for a copy.

Regards.

Simon Marshall

Tel: (03) 6228 6256
Fax: (03) 6228 5356
Mobile: 0419 887 114

-----Original Message-----

From: Daryl Gillie [mailto:Daryl.Gillie@dier.tas.gov.au]
Sent: Monday, 31 January 2000 11:48
To: Marshall, Simon
Subject: BP Service Station - 290 Argyle Street, Hobart

Hello Simon

Could you please provide a statement concerning the decommissioning/removal of the LP Gas storage facility from the old BP Service Station site - 290 Argyle Street, North Hobart. Or if removal has not been done the timing when this work will be completed by.

Thank you.

Regards

Daryl Gillie
Sector Leader - Standards
Workplace Standards Tasmania

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

To:	FILE	File Number:	0362.
From:	LRS.	Date:	25/01/00
Subject:	BP Argyle Tanks Removal.		

Contacted. Mr Hawkins 0418 120 820
as a result of helpline query.

Tanks have been removed from the ground.
Site is enclosed - no safety hazard.
His concern is over the water
from site.

Council are looking into problem
already.

No further action on part
of WST in relation to complaint.

Letter Stat Dec required stating
site has been decommissioned
correctly.

File to go to standards for
action.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017***Appendix 3 Council Email Correspondence****From:** Chamberlain, Sally [mailto:chamberlains@hobartcity.com.au]**Sent:** Friday, 30 June 2017 4:43 PM**To:** JP Cumming <jcumming@geosolutions.net.au>**Subject:** 286-288 Argyle Street

Good afternoon John,

Apologies for the delay getting back to you. We have been really thin on the ground this week.

I looked up the site you enquired about and the surrounding properties.

286-288 is not on our contaminated sites register and a look through its history doesn't suggest anything of concern.

Next door, though, at 290 Argyle Street was a petrol station. There is a document you may find useful called 'Site Validation report Former BP Argyle Street Service Station 290 Argyle Street, North Hobart, Tasmania. By IT Environmental in April 2000. (Put on our system TRIM 12/3/2015). If you would like this please request a copy of it through our right to information process.

The other adjoining properties are also not on our register.

Please bear in mind this search is not completely exhaustive.

I hope that helps, please let me know if you have any further questions.

Kind regards

Sally Chamberlain

Environmental Health Officer | Environmental Health

16 Elizabeth Street, Hobart, Tasmania, Australia, 7000 | hobartcity.com.au

Telephone (03) 6238 2115

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Please consider the environment - Do you really need to print this email?

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Appendix 4 Environmental Protection Authority Records

Level 7, 134 Macquarie Street, Hobart TAS
GPO Box 1550, Hobart, TAS 7001 Australia

Enquiries: Contaminated Sites Unit
Ph: (03) 6165 4594 Fax: (03) 6233 3800
Email: contaminatedsites@environment.tas.gov.au
Web: www.epa.tas.gov.au
Our Ref: (EN-EM-AV-100709_36: H510474ars)



2 March 2016

Dr John Paul Cumming
GeoEnvironmental Solutions
86 Queens Street
SANDY BAY TAS 7005

Dear Dr Cumming

**Property Information Request
4 Lefroy St, North Hobart
Certificate of Title: 106904/1**

On 16 February 2016, 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.

No records relating to contamination or potentially contaminating activities on the Site were found during the search.

In relation to adjacent sites, EPA Division holds several volumes of documents regarding the remediation works and redevelopment of the sites 16 to 18 Lefroy Street and 45A Burnett Street for Housing Department accommodation during 1992-1994. This work included the removal of an Underground Storage Tank from 16 Lefroy Street [referred to in Workplace Standards Tasmania File A241] and heavy metal and hydrocarbon contaminated soil from the former Modern Auto wreckers property. The last two reports on file are:

- *Works Tasmania July 1993 Remediation and Validation of 16-18 Lefroy Street North Hobart prepared by Sinclair Knight and Partners P/L; and*
- *Validation of Clean up of Contaminated site Lefroy street North Hobart prepared by Aquahealth University of Tasmania June 1994*

A record indicates that in September 1999 an underground petroleum storage system was decommissioned at the former BP service station at 290 Argyle Street, adjacent to the site on the eastern boundary. However, the EPA does not hold any reports detailing the decommissioning.

No other records relating to contamination or potentially contaminating activities at adjacent properties were found.

The search of records is restricted to those held by the EPA Division and includes records relating to: the *Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2010*; Industrial Sites (which are or have been regulated by the EPA Division); historic landfills; and contamination issues reported to the Division. In addition, the Incidents and Complaints database and records relating to the historical storage of dangerous goods (as detailed below) are searched.

If dangerous goods have or may have been stored on the Site or an adjacent property, Workplace Standards Tasmania (1300 366 322) may have issued dangerous goods licences and/or may hold records of requested licences for the Site. As the storage of dangerous goods/fuels is regarded as an environmentally relevant activity, you may wish to contact them for further information.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

The dangerous goods licensing records held by the EPA Division are only for sites which ceased holding a Dangerous Goods Licence prior to 1993. After this date Workplace Standards Tasmania holds the records for the Licenses.

The EPA Division does not hold records on all sites that are, or may be, contaminated. It is recommended that the history of the Sites and adjacent properties be investigated in order to determine the likelihood of contamination. If contamination is considered likely on the Sites or an adjacent property then further site assessment by a competent environmental assessment practitioner is recommended. Site assessment should be performed in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999*, National Environment Protection Council or as varied. Additionally, you should note the Director's requirements, from 1 July 2015, regarding the mandatory use of certified practitioners for the preparation of site reports that will be assessed by the EPA. Further details, including an Information Sheet, are available at:

<http://epa.tas.gov.au/regulation/engaging-a-contaminated-land-consultant>

As local councils are able to issue Environment Protection Notices, Environmental Infringement Notices and record complaints, you may wish to contact them for additional information that may be relevant to the site. Further, if the Site has historically been subject to a permit under the *Land Use Planning and Approvals Act 1993*, the Council would have issued the permit.

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.

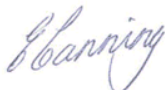
If you are purchasing a property, you should consider Part 5A of the *Environmental Management and Pollution Control Act 1994* (EMPCA) which defines and specifies requirements for managing contaminated sites. If there is reason to believe the site is, or is likely to be, contaminated there are certain 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 which may arise from reliance upon this letter, and any person relying on the letter does so at their own risk absolutely.

As you are aware, property searches incur a charge of \$226.50. An invoice is enclosed.

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 and Assessment' to locate information on Underground Fuel Tanks and Contaminated Sites.

Yours sincerely



Liz Canning
TEAM LEADER – CONTAMINATED SITES

Email: lcumming@geosolutions.net.au

Attachment: Invoice

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Appendix 5 Registered Water Bore Database

Bore location is record 41515, 2.6km West of the Site.

Figure 10 – Location of groundwater bore Record # 41515 2.6km

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

**Groundwater Feature
Detailed Report**

Identification	Feature id:	41515	Feature type:	Bore
Location	Locality:	Lenah Valley		
	Easting:	523252	Datum:	GDA94
	Northing:	5253248	Accuracy:	2
	Ground level (m ASL):			
Construction	Date drilled:	05/03/2015		
	Drilling company:	KMR Drilling Pty Ltd		
	Depth (metres):	48.00		
	Initial yield (L/sec):	1.00		
	Initial EC (µS/cm):			

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	0.5	225.00	Downhole Hammer (Rotary Hammer)
0.5	48.0	171.00	Downhole Hammer (Rotary Hammer)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
0.0	0.5	185.00	200.00	"unplasticised polyvinylchloride uPVC, Class 9"
0.0	36.0	132.00	140.00	unplasticised polyvinylchloride uPVC
46.0	48.0	132.00	140.00	unplasticised polyvinylchloride uPVC

Screens

From (m)	To (m)	Inlet type
36.0	46.0	slotted casing

Seals

From (m)	To (m)	Material type
0.0	0.6	cement

**Geological /
Hydrogeological
Information****Lithological Log**

From (m)	To (m)	Lithological description
0.0	0.5	Soil Clay
0.5	48.0	Triassic

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

**Groundwater Feature
Detailed Report****Depth to water struck**

Date	From (m)	To (m)	Cumulative yield
05/03/2015	39.0	39.0	0.30
05/03/2015	45.0	45.0	0.75
05/03/2015	48.0	48.0	1.00

Main aquifer geology: Triassic

Final TDS (mg/L): 1700

**Standing Water
Levels****Standing water levels**

Date	SWL (metres)
05/03/2015	8.00

Current status**Last recorded statuses**


Type	Value	Date recorded
function	capped	05/03/2015
purpose	domestic garden	05/03/2015

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Appendix 6 Laboratory Chain of Custody (COC)

CHAIN OF CUSTODY  ALS Laboratory: please tick →

CLIENT: Geoenvironmental Solutions
OFFICE: 86 Quers St, Sandy Bay
PROJECT: 286-288 Argyle
ORDER NUMBER:
PROJECT MANAGER: J.P. Warming
SAMPLER: A.P. Warming
COC emailed to ALS? (YES / NO)
Email Reports to: (will default to PM if no other addresses are listed)
Email Invoice to: j.warming@geosolutions.net.au

TURNAROUND REQUIREMENTS:
 (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)
ALS QUOTE NO.: N/A

Standard TAT (List due date): 3 DAYS
Non Standard or urgent TAT (List due date):

RECEIVED BY: M. Warming
DATE/TIME: 27/6 9.15

RELINQUISHED BY: A.P. Warming
DATE/TIME: 26-6-17 5:00pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (Nil. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottles required) or Dissolved (filtered bottles required).		Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES			
1	BH1 0.1-0.2m	22-6-17	S	JAR	1	✓		
2	BH1 1.0-1.1		S		1	✓		
3	BH1 1.5-1.6				1	✓		
4	BH2 0.1-0.2				1	✓		
5	BH2 1.0-1.1				1	✓		
6	BH2 2.5-2.6				1	✓		
7	BH3 0.1-0.2				1	✓		
8	BH3 1.0-1.1m				1	✓		
9	DUPLICATE				1	✓		
10	Rinsate			1 AG, 2 VS	3	✓		
TOTAL					12			

**Environmental Division
Melbourne
Work Order Reference
EM1708311**

Telephone : + 61-3-4549 9600

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved; AG = Amber Glass Unpreserved; AP = Antifreeze Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Antifreeze Unpreserved Vial SO₂; Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Specification bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; AGS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Appendix 7 Quality Control Documentation

Duplicate Comparison		EA002 :	EA055:	ED040N	EG005T												EG035T
		pH Value	Moisture Content (dried @ 103°C)	Sulfate as SO ₄ 2-	Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Cobalt	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Mercury
22/06/2017	BH2 2.5-2.6		13.4		<5	50	<1	<1	13	12	20	7	162	18	64	28	<0.1
22/06/2017	DUPLICATE		12.3		<5	50	<1	<1	16	15	28	20	129	28	186	33	<0.1
Relative Percentage Difference (RPD) %			8.6		NA	0.0	NA	NA	20.7	22.2	33.3	96.3	22.7	43.5	97.6	16.4	NA
Method Detection Limit (MDL)			20		NA	200	NA	NA	40	40	100	100	500	40	500	100	NA
MDL Class			LOW		NONE	LOW	NONE	NONE	LOW	LOW	LOW	LOW	MED	LOW	MED	LOW	NONE
RPD Compliance With MDL?			YES		YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	YES
Deviation from MDL (%)			41		NONE	50	NONE	NONE	29	28	17	-46	7	7	-68	34	NONE

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



Environmental

QUALITY CONTROL REPORT

Work Order	: EM1708311	Page	: 1 of 10
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 86 QUEEN STREET SANDY BAY TASMANIA, AUSTRALIA 7005	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: 286-288 Argyle	Date Samples Received	: 27-Jun-2017
Order number	: ----	Date Analysis Commenced	: 27-Jun-2017
C-O-C number	: ----	Issue Date	: 30-Jun-2017
Sampler	: AP		
Site	: ----		
Quote number	: Blanket quote 2017		
No. of samples received	: 10		
No. of samples analysed	: 10		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. 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
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	Senior Semivolatile Instrument Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 2 of 10
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**General Comments**

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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 QW1-EN/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 Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method; Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 966845)									
EM1708301-015	Anonymous	EA055: Moisture Content	----	1	%	18.0	16.6	7.94	0% - 50%
EM1708311-002	BH1 1.0-1.1	EA055: Moisture Content	----	1	%	23.3	22.6	3.04	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 966666)									
EM1708311-003	BH1 1.5-1.6	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	80	80	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	19	20	5.47	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	23	24	0.00	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	13	13	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	13	13	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	8	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	82	75	9.03	0% - 50%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	59	62	4.72	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	11	11	0.00	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EM1708301-042	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	1	1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	180	180	0.00	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	62	64	3.03	0% - 20%
		EG005T: Cobalt	7440-48-4	2	mg/kg	14	15	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	34	34	0.00	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	6	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	12	11	9.72	No Limit

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 3 of 10
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 966666) - continued									
EM1708301-042	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	13	14	8.48	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	245	268	8.87	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	105	108	2.37	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	22	21	0.00	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 966665)									
EM1708311-003	BH1 1.5-1.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EM1708301-042	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 968605)									
EM1708249-001	Anonymous	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	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		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): Dibenzo(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
EM1708311-005	BH2 1.0-1.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	0.6	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	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 4 of 10
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 968605) - continued									
EM1708311-005	BH2 1.0-1.1	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): Dibenzo(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: 966673)									
EM1708301-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1708311-003	BH1 1.5-1.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 968606)									
EM1708249-001	Anonymous	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
EM1708311-005	BH2 1.0-1.1	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	70	<50	33.5	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	70	<50	33.3	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 966673)									
EM1708301-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1708311-003	BH1 1.5-1.6	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: 968606)									
EM1708249-001	Anonymous	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
EM1708311-005	BH2 1.0-1.1	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	60	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	60	<50	18.2	No Limit
EP080: BTEXN (QC Lot: 966673)									
EM1708301-001	Anonymous	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	108-38-3 106-42-3	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
EM1708311-003	BH1 1.5-1.6	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

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 5 of 10
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 966673) - continued									
EM1708311-003	BH1 1.5-1.6	EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		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 Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 967001)									
EM1708311-010	Rinsate	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1708326-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 967001)									
EM1708311-010	Rinsate	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1708326-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 967001)									
EM1708311-010	Rinsate	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		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
EM1708326-005	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		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

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 6 of 10
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Method Blank (MB) and Laboratory Control Spike (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 Spike (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: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method/Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EG005T: Total Metals by ICP-AES (QCLot: 966666)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	94.1	79	113
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	89.0	87	114
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	104	77	125
EG005T: Boron	7440-42-8	50	mg/kg	<50	33.2 mg/kg	101	84	124
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	92.1	85	109
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	91.6	89	113
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	97.2	81	117
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	92.5	84	116
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	91.4	85	107
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	95.8	87	113
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	94.4	89	111
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	100	93	109
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	99.4	81	117
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	97.3	89	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 966665)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	89.4	85	103
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 968605)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	106	80	121
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	86.8	70	130
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	110	80	120
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	107	70	124
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	108	80	122
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	91.4	80	126
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	114	70	128
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	117	80	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	106	70	130
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	103	80	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	3 mg/kg	99.3	70	124
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	108	75	125
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	93.6	65	125
EP075(SIM): Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	105	65	128
EP075(SIM): Dibenzo(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	109	65	126
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	104	65	127

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 7 of 10
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 966673)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	88.9	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 968606)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	837 mg/kg	101	65	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3061 mg/kg	97.1	70	126
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1592 mg/kg	99.5	70	122
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 966673)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	86.0	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 968606)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1222 mg/kg	99.1	68	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3919 mg/kg	99.6	72	116
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	316 mg/kg	99.5	38	132
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 966673)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	95.4	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	88.6	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	91.3	73	125
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	4 mg/kg	92.7	77	128
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	96.7	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	110	66	130
Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 966766)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	72.8	39	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	70.7	40	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	77.0	47	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	77.0	51	118
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	79.9	53	119
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	54.4	51	113
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	72.4	59	123
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	70.9	58	123
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	57.7	52	126
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	62.5	55	123
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	5 µg/L	73.5	52	131
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	76.4	57	126

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 8 of 10
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Sub-Matrix: WATER					Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EP075(SIM): Polynuclear Aromatic Hydrocarbons (QCLot: 966766) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	72.3	56	126
EP075(SIM): Indeno(1,2,3-cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	75.3	53	123
EP075(SIM): Dibenzo(a,h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	75.0	53	125
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	77.0	53	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 966767)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	76.5	53	123
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	76.0	57	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	73.0	55	141
EP080/071: Total Petroleum Hydrocarbons (QCLot: 967001)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	97.6	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 966767)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	74.4	54	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	73.3	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	78.2	51	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 967001)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	95.8	65	125
EP080: BTEXN (QCLot: 967001)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	86.6	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	95.4	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	93.8	72	124
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	40 µg/L	104	72	130
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	104	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	90.3	71	129

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: SOIL

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 966666)							
EM1708301-043	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	94.0	78	124
		EG005T: Barium	7440-39-3	50 mg/kg	# Not Determined	71	135
		EG005T: Beryllium	7440-41-7	50 mg/kg	105	85	125
		EG005T: Cadmium	7440-43-9	50 mg/kg	100	84	116

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 9 of 10
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 966666) - continued							
EM1708301-043	Anonymous	EG005T: Chromium	7440-47-3	50 mg/kg	114	79	121
		EG005T: Copper	7440-50-8	50 mg/kg	97.2	82	124
		EG005T: Lead	7439-92-1	50 mg/kg	99.8	76	124
		EG005T: Manganese	7439-96-5	50 mg/kg	# Not Determined	68	136
		EG005T: Nickel	7440-02-0	50 mg/kg	99.9	78	120
		EG005T: Selenium	7782-49-2	50 mg/kg	73.8	71	125
		EG005T: Vanadium	7440-62-2	50 mg/kg	92.6	76	124
		EG005T: Zinc	7440-66-6	50 mg/kg	92.4	74	128
EG035T: Total Recoverable Mercury by FIMS (QCLot: 966665)							
EM1708301-043	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	91.6	76	116
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 968605)							
EM1708249-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	103	67	117
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	120	52	148
EP080/071: Total Petroleum Hydrocarbons (QCLot: 966673)							
EM1708301-006	Anonymous	EP080: C6 - C9 Fraction	----	28 mg/kg	77.8	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 968606)							
EM1708251-001	Anonymous	EP071: C10 - C14 Fraction	----	837 mg/kg	95.8	53	123
		EP071: C15 - C28 Fraction	----	3061 mg/kg	91.2	70	124
		EP071: C29 - C36 Fraction	----	1592 mg/kg	90.0	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 966673)							
EM1708301-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	74.7	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 968606)							
EM1708251-001	Anonymous	EP071: >C10 - C16 Fraction	----	1222 mg/kg	93.8	65	123
		EP071: >C16 - C34 Fraction	----	3919 mg/kg	92.7	67	121
		EP071: >C34 - C40 Fraction	----	316 mg/kg	71.3	44	126
EP080: BTEXN (QCLot: 966673)							
EM1708301-006	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	99.2	50	136
		EP080: Toluene	108-88-3	2 mg/kg	101	56	139
Sub-Matrix: WATER				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 967001)							
EM1708318-003	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	114	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 967001)							
EM1708318-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	115	44	122

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

Page : 10 of 10
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Sub-Matrix: WATER				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike/Recovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP080: BTEXN (QCLot: 967001)							
EM1708318-003	Anonymous	EP080: Benzene	71-43-2	20 µg/L	118	68	130
		EP080: Toluene	108-88-3	20 µg/L	121	72	132

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM1708311	Page	: 1 of 8
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Telephone	: +61-3-8549 9630
Project	: 286-288 Argyle	Date Samples Received	: 27-Jun-2017
Site	: ----	Issue Date	: 30-Jun-2017
Sampler	: AP	No. of samples received	: 10
Order number	: ----	No. of samples analysed	: 10

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.
- Matrix Spike outliers exist - please see following pages for full details.
- 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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Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 2 of 8
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Outliers : Quality Control Samples**

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG005T: Total Metals by ICP-AES	EM1708301-043	Anonymous	Barium	7440-39-3	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG005T: Total Metals by ICP-AES	EM1708301-043	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Frequency of Quality Control SamplesMatrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	3	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 summarizes 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 date with the shortest analyte holding time for the equivalent 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 or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH1 0.1-0.2,	BH1 1.0-1.1,	22-Jun-2017	----	----	----	27-Jun-2017	06-Jul-2017	✓
BH1 1.5-1.6,	BH2 0.1-0.2,							
BH2 1.0-1.1,	BH2 2.5-2.6,							
BH3 0.1-0.2,	BH3 1.0-1.1,							
DUPLICATE								

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 3 of 8
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Matrix: SOIL		Evaluation: * = Holding time breach ; ✓ = Within holding time						
Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH1 0.1-0.2, BH1 1.5-1.6, BH2 1.0-1.1, BH3 0.1-0.2, DUPLICATE	BH1 1.0-1.1, BH2 0.1-0.2, BH2 2.5-2.6, BH3 1.0-1.1,	22-Jun-2017	28-Jun-2017	19-Dec-2017	✓	29-Jun-2017	19-Dec-2017	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH1 0.1-0.2, BH1 1.5-1.6, BH2 1.0-1.1, BH3 0.1-0.2, DUPLICATE	BH1 1.0-1.1, BH2 0.1-0.2, BH2 2.5-2.6, BH3 1.0-1.1,	22-Jun-2017	28-Jun-2017	20-Jul-2017	✓	29-Jun-2017	20-Jul-2017	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH1 0.1-0.2, BH1 1.5-1.6, BH2 1.0-1.1, BH3 0.1-0.2, DUPLICATE	BH1 1.0-1.1, BH2 0.1-0.2, BH2 2.5-2.6, BH3 1.0-1.1,	22-Jun-2017	28-Jun-2017	06-Jul-2017	✓	28-Jun-2017	07-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
BH1 0.1-0.2, BH1 1.5-1.6, BH2 1.0-1.1, BH3 0.1-0.2, DUPLICATE	BH1 1.0-1.1, BH2 0.1-0.2, BH2 2.5-2.6, BH3 1.0-1.1,	22-Jun-2017	27-Jun-2017	06-Jul-2017	✓	28-Jun-2017	06-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071)								
BH1 0.1-0.2, BH1 1.5-1.6, BH2 1.0-1.1, BH3 0.1-0.2, DUPLICATE	BH1 1.0-1.1, BH2 0.1-0.2, BH2 2.5-2.6, BH3 1.0-1.1,	22-Jun-2017	28-Jun-2017	06-Jul-2017	✓	28-Jun-2017	07-Aug-2017	✓

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 4 of 8
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Matrix: SOIL		Evaluation: * = Holding time breach ; ✓ = Within holding time						
Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080) BH1 0.1-0.2, BH1 1.5-1.6, BH2 1.0-1.1, BH3 0.1-0.2, DUPLICATE	BH1 1.0-1.1, BH2 0.1-0.2, BH2 2.5-2.6, BH3 1.0-1.1,	22-Jun-2017	27-Jun-2017	06-Jul-2017	✓	28-Jun-2017	06-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071) BH1 0.1-0.2, BH1 1.5-1.6, BH2 1.0-1.1, BH3 0.1-0.2, DUPLICATE	BH1 1.0-1.1, BH2 0.1-0.2, BH2 2.5-2.6, BH3 1.0-1.1,	22-Jun-2017	28-Jun-2017	06-Jul-2017	✓	28-Jun-2017	07-Aug-2017	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) BH1 0.1-0.2, BH1 1.5-1.6, BH2 1.0-1.1, BH3 0.1-0.2, DUPLICATE	BH1 1.0-1.1, BH2 0.1-0.2, BH2 2.5-2.6, BH3 1.0-1.1,	22-Jun-2017	27-Jun-2017	06-Jul-2017	✓	28-Jun-2017	06-Jul-2017	✓
Matrix: WATER								
Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) Rinsate		22-Jun-2017	27-Jun-2017	29-Jun-2017	✓	28-Jun-2017	06-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) Rinsate		22-Jun-2017	27-Jun-2017	29-Jun-2017	✓	28-Jun-2017	06-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate		22-Jun-2017	27-Jun-2017	06-Jul-2017	✓	27-Jun-2017	06-Jul-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071) Rinsate		22-Jun-2017	27-Jun-2017	29-Jun-2017	✓	28-Jun-2017	06-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate		22-Jun-2017	27-Jun-2017	06-Jul-2017	✓	27-Jun-2017	06-Jul-2017	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) Rinsate		22-Jun-2017	27-Jun-2017	06-Jul-2017	✓	27-Jun-2017	06-Jul-2017	✓

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 5 of 8
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(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	Method	Count		Rate (%)		Evaluation	Quality Control Specification
Analytical Methods		QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	5.88	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	Method	Count		Rate (%)		Evaluation	Quality Control Specification
Analytical Methods		QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	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)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 6 of 8
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Matrix: WATER		Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.					
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	OC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	3	33.33	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)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	1	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	3	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

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 7 of 8
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized 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
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 (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
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 (2013) Schedule B(3).
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. 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 (2013) Schedule B(3) (Method 502 and 507).
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A 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 (2013) Schedule B(3).
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D 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 (2013) Schedule B(3).
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B 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 (2013) Schedule B(3).
Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	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 (2013) Schedule B(3) (Method 202).
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.

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

Page : 8 of 8
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle




Preparation Methods	Method	Matrix	Method Descriptions
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 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	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) 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 sparging.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Appendix 8 Soil Bore logs

<div></div> <div>GEO-ENVIRONMENTAL SOLUTIONS</div>		PROJECT: 286-288 Argyle Street		Log of BH1																											
		CLIENT: Mark Drury Architects		EASTING: GDA94																											
				NORTHING: GDA94																											
LOCATION: Hobart		DATE: 22/06/2017		ELEVATION: m AHD																											
CONTRACTOR: Geo-Environmental Solutions				TOTAL DEPTH (m): 1.9																											
EQUIPMENT/METHOD: Direct Push Core				SAMPLING: Core				LOGGED BY: A. Plummer																							
DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE	SAMPLES:				Helath Screening Level Exceedances*						MONITORING WELL	ELEVATION (metres)															
					Sample	Grain Class	HSL	Field PID (ppm)	Benzene	Toluene	Ethylbenz.	Xylene	Naphthalene	F1			F2														
0.0	FILL - Concrete	P		FILL																											
0.1	Silty CLAY: brown, moist, firm, high plasticity	CH	M		BH1 0.1-0.2	CLAY	D		<	<	<	<	<	<																	
0.2																															
0.3																															
0.4																															
0.5	Silty CLAY: black, moist, firm, high plasticity	CH	M																												
0.6																															
0.7																															
0.8																															
0.9		CH	M																												
1.0	Silty CLAY: grey-brown, moist, stiff, high plasticity																														
1.1																															
1.2																															
1.3		CH	M																												
1.4																															
1.5																															
1.6																															
1.5	Sandy Clayey GRAVEL: pale grey/yellow, slightly moist, dense. Refusal	GC	SM		BH1 1.5-1.6	CLAY	D		<	<	<	<	<	<																	
1.6																															
1.7																															
1.8																															

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500


Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

<div></div> <div>GEO-ENVIRONMENTAL SOLUTIONS</div>		PROJECT: 286-288 Argyle Street		Log of BH2									
		CLIENT: Mark Drury Architects		EASTING: GDA94									
				NORTHING: GDA94									
LOCATION: Hobart		DATE: 17/05/2017		ELEVATION: m AHD									
CONTRACTOR: Geo-Environmental Solutions				TOTAL DEPTH (m): 2.9									
EQUIPMENT/METHOD: Direct Push Core		SAMPLING: Core		LOGGED BY: A. Plummer									
DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	SAMPLES:				Health Screening Level Exceedances*		MONITORING WELL	ELEVATION (metres)		
				Sample	Grain Class	HSL	Field PID (ppm)	Benzene Toluene Ethylbenz. Xylene Naphthalene F1 F2					
0.0	FILL - Concrete	P		FILL									
0.1	Silty CLAY: black, moist, firm, high plasticity			BH2 0.1-0.2	CLAY	D	<	<	<	<	-		
0.2													
0.3													
0.4		CH	M										
0.5													
0.6													
0.7													
0.8													
0.9													
1.0	Silty CLAY: grey-brown, moist, stiff, high plasticity			BH2 1.0-1.1	CLAY	D	<	<	<	<	-		
1.1													
1.2													
1.3					R								
1.4													
1.5													
1.6													
1.7	Sandy CLAY: grey, moist, stiff, high plasticity												
1.8													
1.9													
2.0													
2.1													
2.2													
2.3													
2.4													
2.5	Sandy Clayey GRAVEL: orange/grey/yellow, slightly moist, dense. Refusal			BH2 2.5-2.6	CLAY	D	<	<	<	<	<		
2.6													
2.7													
2.8				GC	SM								

Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500


Geo-Environmental Solutions

* PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

		PROJECT: 286-288 Argyle Street				Log of BH3												
		CLIENT: Mark Drury Architects				EASTING: GDA94												
						NORTHING: GDA94												
LOCATION: Hobart		DATE: 17/05/2017				ELEVATION: m AHD												
CONTRACTOR: Geo-Environmental Solutions						TOTAL DEPTH (m): 1.2												
EQUIPMENT/METHOD: Direct Push Core		SAMPLING: Core				LOGGED BY: A. Plummer												
DEPTH (metres)	MATERIAL DESCRIPTION	USCS LITHOLOGY	UNIT	MOISTURE	SAMPLES:				Health Screening Level Exceedances*						MONITORING WELL	ELEVATION (metres)		
					Sample	Grain Class	HSL	Field PID (ppm)	Benzene	Toluene	Ethylbenz.	Xylene	Naphthalene	F1			F2	
0.0	FILL - Concrete	P		FILL														
0.1	Silty CLAY: black, moist, firm, high plasticity																	
0.2		CH	M	R	BH3 0.1-0.2	CLAY	D											
0.3																		
0.4																		
0.5																		
0.6																		
0.7																		
0.8																		
0.9																		
1.0	Silty CLAY: grey-brown, moist, stiff, high plasticity				BH3 1.0-1.1	CLAY	D											
1.1																		
1.2																		

Geo-Environmental Solutions * PVI HSL EXCEEDANCE: X: EXCAVATION; < IL; - NL; A: 1-2; B: 2-5; C: 5-20; D: 20-50; E: 50-200; F: 200-500; G: >500

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Appendix 9 Soil Analytical Results - Certificate of Analysis



CERTIFICATE OF ANALYSIS

Work Order	: EM1708311	Page	: 1 of 11
Client	: GEO-ENVIRONMENTAL SOLUTIONS	Laboratory	: Environmental Division Melbourne
Contact	: DR JOHN PAUL CUMMING	Contact	: Shirley LeCornu
Address	: 86 QUEEN STREET SANDY BAY TASMANIA, AUSTRALIA 7005	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 03 6223 1839	Telephone	: +61-3-8549 9630
Project	: 286-288 Argyle	Date Samples Received	: 27-Jun-2017 09:15
Order number	: ----	Date Analysis Commenced	: 27-Jun-2017
C-O-C number	: ----	Issue Date	: 30-Jun-2017 13:06
Sampler	: AP		
Site	: ----		
Quote number	: Blanket quote 2017		
No. of samples received	: 10		
No. of samples analysed	: 10		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. 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
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nancy Wang	Senior Semivolatile Instrument Chemist	Melbourne Organics, Springvale, VIC

RIGHT SOLUTIONS | RIGHT PARTNER

*Environmental Site Assessment**286-288 Argyle Street, Hobart**July 2017*

Page : 2 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**General Comments**

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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 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.

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.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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, 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.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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.

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 3 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID				
Client sampling date / time				BH1 0.1-0.2	BH1 1.0-1.1	BH1 1.5-1.6	BH2 0.1-0.2	BH2 1.0-1.1
Compound				EM1708311-001	EM1708311-002	EM1708311-003	EM1708311-004	EM1708311-005
CAS Number	LOR	Unit		Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	23.3	23.3	17.1	25.0	26.0
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg	80	90	80	100	110
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	6	18	19	18	26
Cobalt	7440-48-4	2	mg/kg	8	12	23	12	25
Copper	7440-50-8	5	mg/kg	30	17	13	34	31
Lead	7439-92-1	5	mg/kg	82	10	8	130	12
Manganese	7439-96-5	5	mg/kg	262	138	82	596	700
Nickel	7440-02-0	2	mg/kg	8	11	13	13	23
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	28	57	59	68	88
Zinc	7440-66-6	5	mg/kg	66	14	11	41	20
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.5	<0.1	<0.1	0.3	<0.1
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	0.7	<0.5	<0.5	0.8	<0.5
Pyrene	129-00-0	0.5	mg/kg	0.9	<0.5	<0.5	0.8	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	0.6	<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)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.9	<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	0.7	<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

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 4 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID				
				BH1 0.1-0.2	BH1 1.0-1.1	BH1 1.5-1.6	BH2 0.1-0.2	BH2 1.0-1.1
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EM1708311-001	EM1708311-002	EM1708311-003	EM1708311-004	EM1708311-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
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	3.8	<0.5	<0.5	2.1	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	0.8	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	1.2	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.5	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	70	70
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	70	70
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	14	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	14	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	50	60
>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	60
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	50	60
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	1330-20-7	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	%	92.8	96.3	96.6	96.7	97.6
2-Chlorophenol-D4	93951-73-6	0.5	%	106	111	109	108	112
2,4,6-Tribromophenol	118-79-6	0.5	%	88.0	93.2	94.9	91.6	93.1

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 5 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH1 0.1-0.2	BH1 1.0-1.1	BH1 1.5-1.6	BH2 0.1-0.2	BH2 1.0-1.1
Client sampling date / time					22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EM1708311-001	EM1708311-002	EM1708311-003	EM1708311-004	EM1708311-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		113	118	118	115	117
Anthracene-d10	1719-06-8	0.5	%		117	120	121	118	121
4-Terphenyl-d14	1718-51-0	0.5	%		123	130	130	127	132
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		75.1	73.0	74.3	78.3	72.4
Toluene-D8	2037-26-5	0.2	%		71.3	65.8	68.2	72.8	70.8
4-Bromofluorobenzene	460-00-4	0.2	%		89.6	91.3	92.3	91.6	86.9

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 6 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH2 2.5-2.6	BH3 0.1-0.2	BH3 1.0-1.1	DUPLICATE	----
Client sampling date / time					22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	----
Compound	CAS Number	LOR	Unit		EM1708311-006	EM1708311-007	EM1708311-008	EM1708311-009	-----
				Result	Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		13.4	24.0	19.5	12.3	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5	----
Barium	7440-39-3	10	mg/kg	50	100	70	50	50	----
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1	----
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg	13	8	18	16	16	----
Cobalt	7440-48-4	2	mg/kg	12	7	11	15	15	----
Copper	7440-50-8	5	mg/kg	20	11	13	28	28	----
Lead	7439-92-1	5	mg/kg	7	39	14	20	20	----
Manganese	7439-96-5	5	mg/kg	162	100	55	129	129	----
Nickel	7440-02-0	2	mg/kg	18	8	11	28	28	----
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5	----
Vanadium	7440-62-2	5	mg/kg	64	24	53	186	186	----
Zinc	7440-66-6	5	mg/kg	28	35	16	33	33	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1	----
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	----
Benzo(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	----

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 7 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH2 2.5-2.6	BH3 0.1-0.2	BH3 1.0-1.1	DUPLICATE	----
Client sampling date / time					22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	----
Compound	CAS Number	LOR	Unit		EM1708311-006	EM1708311-007	EM1708311-008	EM1708311-009	-----
					Result	Result	Result	Result	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
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	----
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	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
^ >C10 - 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	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<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	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		96.9	95.2	97.8	94.5	----
2-Chlorophenol-D4	93951-73-6	0.5	%		112	107	111	106	----
2,4,6-Tribromophenol	118-79-6	0.5	%		91.7	87.0	88.6	89.0	----

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 8 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH2 2.5-2.6	BH3 0.1-0.2	BH3 1.0-1.1	DUPLICATE	----
Client sampling date / time					22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	-----
Compound	CAS Number	LOR	Unit		EM1708311-006	EM1708311-007	EM1708311-008	EM1708311-009	-----
					Result	Result	Result	Result	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		117	114	116	113	----
Anthracene-d10	1719-06-8	0.5	%		123	120	122	121	----
4-Terphenyl-d14	1718-51-0	0.5	%		132	131	131	129	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		78.8	78.0	83.4	79.5	----
Toluene-D8	2037-26-5	0.2	%		78.1	76.3	77.3	78.6	----
4-Bromofluorobenzene	460-00-4	0.2	%		95.0	94.5	96.3	94.1	----

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 9 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Analytical Results**

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate				
Client sampling date / time					22-Jun-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM1708311-010	Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1	µg/L	<1.0	----	----	----	----	----
Acenaphthylene	208-96-8	1	µg/L	<1.0	----	----	----	----	----
Acenaphthene	83-32-9	1	µg/L	<1.0	----	----	----	----	----
Fluorene	86-73-7	1	µg/L	<1.0	----	----	----	----	----
Phenanthrene	85-01-8	1	µg/L	<1.0	----	----	----	----	----
Anthracene	120-12-7	1	µg/L	<1.0	----	----	----	----	----
Fluoranthene	206-44-0	1	µg/L	<1.0	----	----	----	----	----
Pyrene	129-00-0	1	µg/L	<1.0	----	----	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	----	----	----	----	----
Chrysene	218-01-9	1	µg/L	<1.0	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1	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	µg/L	<1.0	----	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	----	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	1	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	----	----	----	----	----
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	----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<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	----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----	----
EP080: BTEXN									

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 10 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**Analytical Results**

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate				
Client sampling date / time					22-Jun-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM1708311-010	-----	-----	-----	-----
				Result	-----	-----	-----	-----	-----
EP080: BTEXN - Continued									
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	1330-20-7	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	%	27.8	----	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%	78.3	----	----	----	----	----
2,4,6-Tribromophenol	118-79-6	1	%	69.6	----	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%	67.8	----	----	----	----	----
Anthracene-d10	1719-06-8	1	%	79.1	----	----	----	----	----
4-Terphenyl-d14	1718-51-0	1	%	71.7	----	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	97.5	----	----	----	----	----
Toluene-D8	2037-26-5	2	%	93.5	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	108	----	----	----	----	----

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017

Page : 11 of 11
 Work Order : EM1708311
 Client : GEO-ENVIRONMENTAL SOLUTIONS
 Project : 286-288 Argyle

**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	65	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	55	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	46
2-Chlorophenol-D4	93951-73-6	23	104
2,4,6-Tribromophenol	118-79-6	28	130
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	36	114
Anthracene-d10	1719-06-8	51	119
4-Terphenyl-d14	1718-51-0	49	127
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

Environmental Site Assessment

286-288 Argyle Street, Hobart

July 2017